

Spring 5-4-2017

Re (Civic) Function The Cultural Value of L' Aquila

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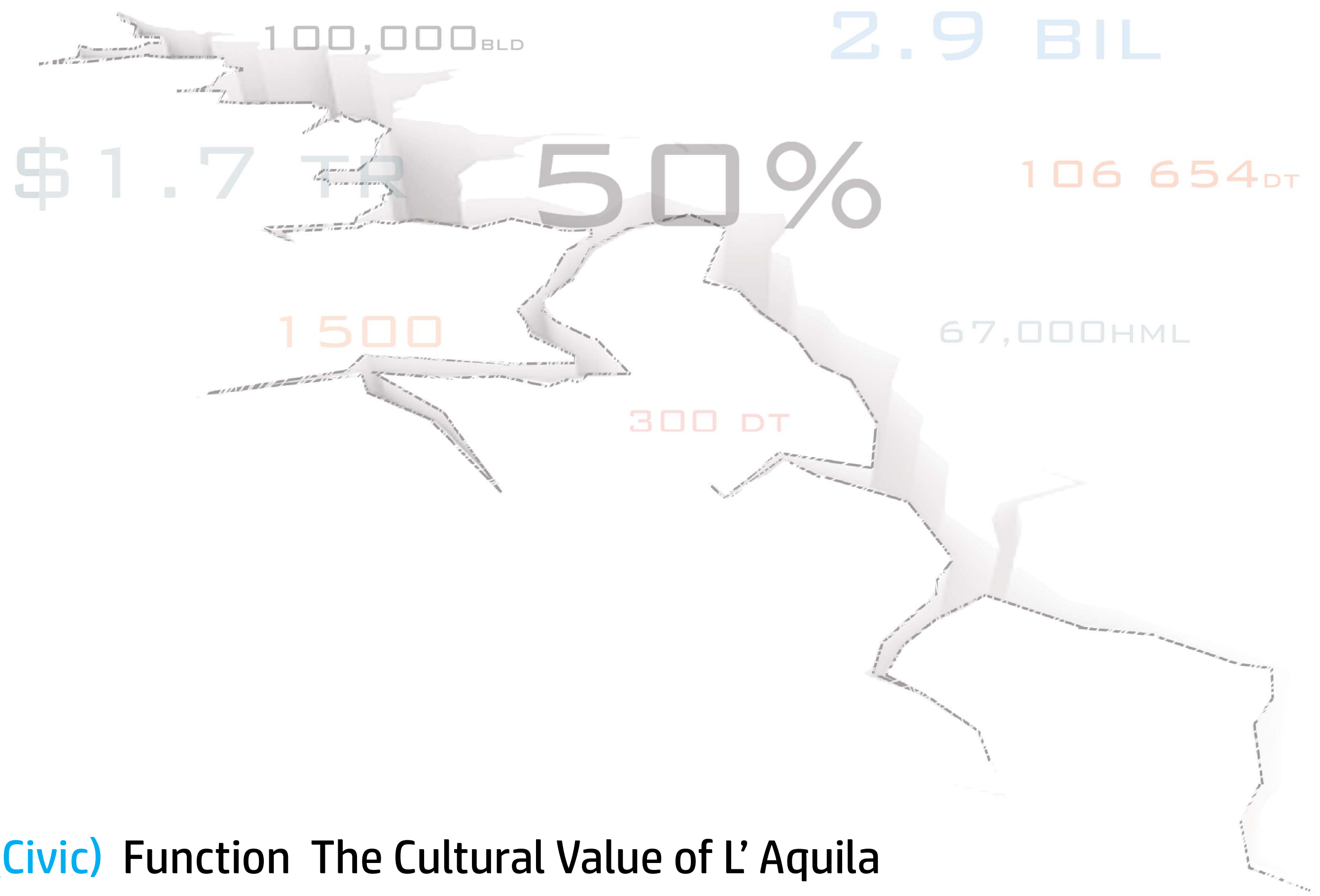


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Re (Civic) Function The Cultural Value of L' Aquila



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2012

100,000

2.9 BIL

106 654

67,000 HML

Re (Civic) Function

The Cultural Value of L' Aquila

Project Location / L'Aquila

Thesis Proposal is Presented to the
Faculty of the Department of Architecture
College of Architecture and Construction Management

Ogechi Silvia Nwoko

In partial fulfillment of the requirements for the Degree

Bachelor of Architecture

Kennesaw State University

Marietta Campus, Georgia

May 6, 2016



Kennesaw State University

Department of Architecture
College of Architecture and Construction Management

Thesis Collaborative 2016 – 2017

Request for Approval of Project Book

Ogechi Silvia Nwoko

Thesis Project Title: Re (Civic) Function-The Cultural Value of L' Aquila

Thesis Summary:

This thesis explores an environmental and responsible method of construction that introduces the use of flexible and modular building in order to faster occupancy and re-construction, especially towards those regions affected by natural calamities. We know that modular buildings are usually design to be portable structure, easy to be installed and for temporary recovery. Also, we need to recognize that the design of notable permanent projects incorporates the use of prefabricated structures, which are modularly customized and tends to satisfy the necessary requirements of the project in less period of time. By designing a modular structure capable of informing, teaching and demonstrating new possibility of life skill survival, this thesis aims to identify new way of constructions using flexible structure that can alleviate the negative circumstances of undergoing through a natural disaster.

Student Signature _____ Date _____

Approved by:

Internal Advisor 1: Bill Carpenter _____ Date _____

Internal Advisor 2: Bronne Dytoc _____ Date _____

Internal Advisor 2: Marietta Monaghan _____ Date _____

Thesis Coordinator: Professor Liz Martin _____ Date _____

Department Chair: Dr. Tony Rizzuto _____ Date _____



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ABSTRACT

I want to start by exploring with you the meaning of you these numbers. From 2000 to 2012 natural disasters have caused 1.7 trillion dollars in damage and affected 2.9 billion people. Nearly 50% of the fatalities caused by natural disasters were due to flooding or earthquakes events.

If we also look at the regions affected, these are usually facing social, cultural and environmental difficulties; therefore, the process of recovery of the communities in most of the time is slowly effective or unsuccessful.

In order to face better future calamities, this research aims to analyze the displacing effect of the community and space functionality, as a solution of regaining and re-linking what has been lost such as gathering spaces, conducting commercial and educational activities, while maintaining the cultural context of the site.

In my thesis, I am looking to a small historical town called l' Aquila, which on 6th April 2009 have been struck by an earthquake and led to 300 death , 1500,000 people injured, about 100,000 buildings were severely damaged and 67,000 people were left homeless by the disaster.

During past natural calamities, the relief timeline starts from emergency shelter move to transitional housing, and finally to permanent housing. My methodology is to propose a new type of resilient civic space and housing which will combine all three stages, based on an earthquake resistant structure in bedded to public spaces, in order to create one useful solution for the location at risk.

In addition, through a literature research and case studies , I am also intending to eliminate the unsustainable conditions and focus on creating a safe and functional space where they will be able to regain the integrity of their community while learning the educational strategies of preservation of material and construction.

The goal of this research is to design alternative ways of constructions that can alleviate the physical and psychological effect of undergoing to a natural disaster.



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Bibliography





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SECTION I:

CH.1-Design Theorem

Thesis Proposal

1.1.Design Hypothesis

It seems that natural disasters have become the norm during yearly seasons, and it appears another nation is victimized by an unstoppable natural force.

In order to face better future calamities, [this thesis aims to analyze the displacement effect of the community and space by focusing in positive design and architectural solutions that can alleviate the physical effect of undergoing to a natural disaster.](#)

As a solution of re-linking what has been lost, this research demonstrates how a combination of recycling local materials and educational strategies can contribute for the community long term changes.



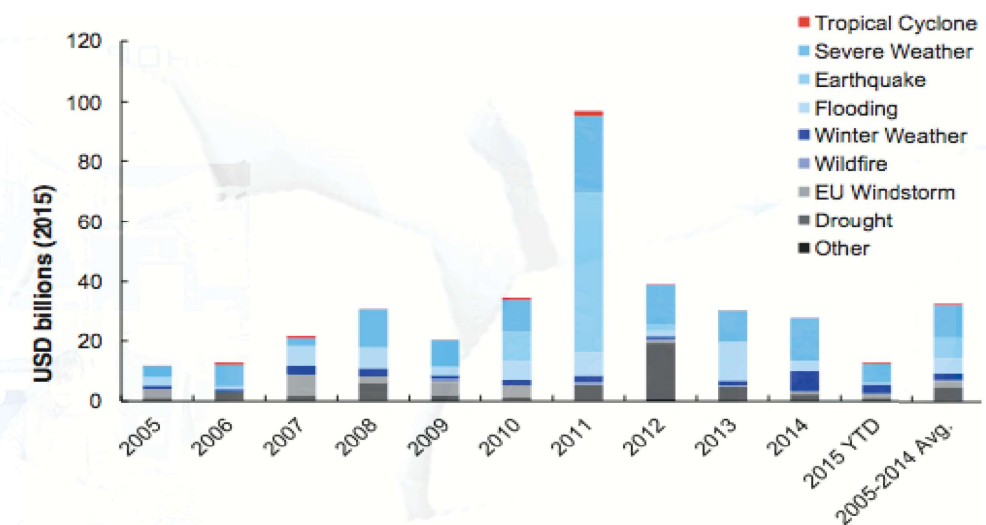
What does resilient shelter involves regarding building? In order to respond to this question, we have to understand that designing an infrastructure with resiliency needs a carefully thinking process which involves typical scenarios of a building including its durability due to normal use, as well as an environmental disaster setting that would challenge the integrity of the building and its occupants or communities.

It's important to understand that the natural environment plays an important role in determining the major factors which make an infrastructure resilient or not, that is why creating a resilient design is based on local environment. In general, each country and city have a specific climate that challenges many buildings and infrastructures through the year.

A resilient building or infrastructure needs to be able to endure any natural event and ordinary usage, in order to last over the time while restoring its minor and normal damages.

Examining and thinking through each potential situation of possible disaster can be overwhelming for an architect, which is why a rational approach can be conducted only by pulling the most likely disaster situation from local knowledge and experience of the place. Moreover, understanding the design principle such as: understanding the regional and ecosystem scale; providing the basic human needs; application of simple, passive and flexible system in order to adapt to changing conditions; enabling the usage of local renewable and reclaimable resource; are considered the primary rational step.

“ HOW TO RE-ACTIVATE THE CIVIC FUNCTION AND THE CULTURAL VALUE OF AN HISTORICAL SITE AFTER A NATURAL CATASTROPHE? ”



In order to understand the activities of an earthquake, we have to understand the physical structure of our planet through the analysis of the plate tectonic. Earthquakes are classified in several types such as terrestrial, oceanic, volcanic, etc; furthermore, they cause disruptions of crustal deformations, slope failures, liquefactions.

Plate tectonics

The understanding of the activity of land masses of the Earth began circa 50 to 60 years ago after examining data obtained by the United States Navy during the Second World War. According to the analysis discovered, each oldest stratum does not match the age of the Earth, some 4.6 billion years. Moreover, the discovery of the movement of the sea floor, of 2 to 3 cm a year, is due to submarine ridge areas, and the sea floor drops down to a trench area. "This theory advocates that the Earth's crust, a thin layer like an eggshell at the ground surface with a thickness of only 2 to 3 km, moves horizontally very slowly driven by the thermal convection of the underlying mantle layer. This theory is known as plate tectonics, and is a research area that advanced rapidly after the war, and reached some degree of comprehension in the 1960s. With this theory, the theory of continental drift put forward by Wegener was established in 1912."

Late Carboniferous About 500 million years ago



Eocene epoch 40~50 million years ago



Early Quaternary period 2 million years ago



1.3. Underlying Principles of the Design Hypothesis to the Proposed Project

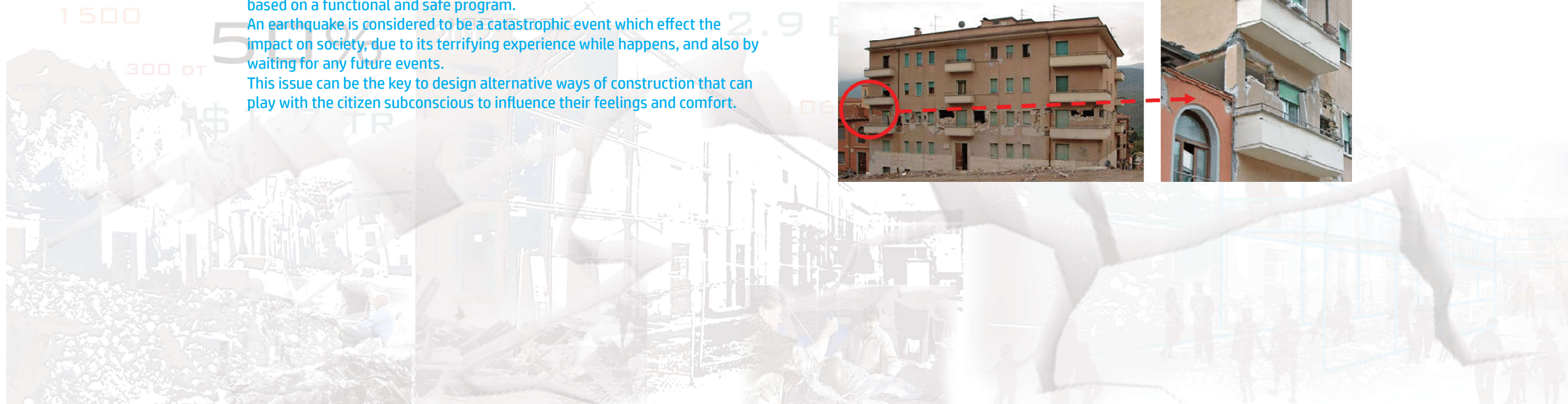
Regarding the event of L'Aquila, the earthquake caused substantial loss of life and damage to man-made structures, minor surface ruptures and several classes of ground deformation and secondary effects. After, three weeks of the disaster a team from the Geological Survey of Israel (GSI) guided by the Italian Geological Survey (ISPRA) have completed an investigation of the damaged area. The report summarizes observations and results of the GSI team, as well as the understanding through the analysis and interpretation of the seismological and geological data of the L'Aquila earthquake. Clearly, seismic shaking, some by surface ruptures and a little by slope failure were the main cause of most of the casualties and damage to dwellings and infrastructures. Even though the damage pattern displayed in this event is normal for the region, the potential risk of the seismic activity, other than the shaking, should not be miscalculated.

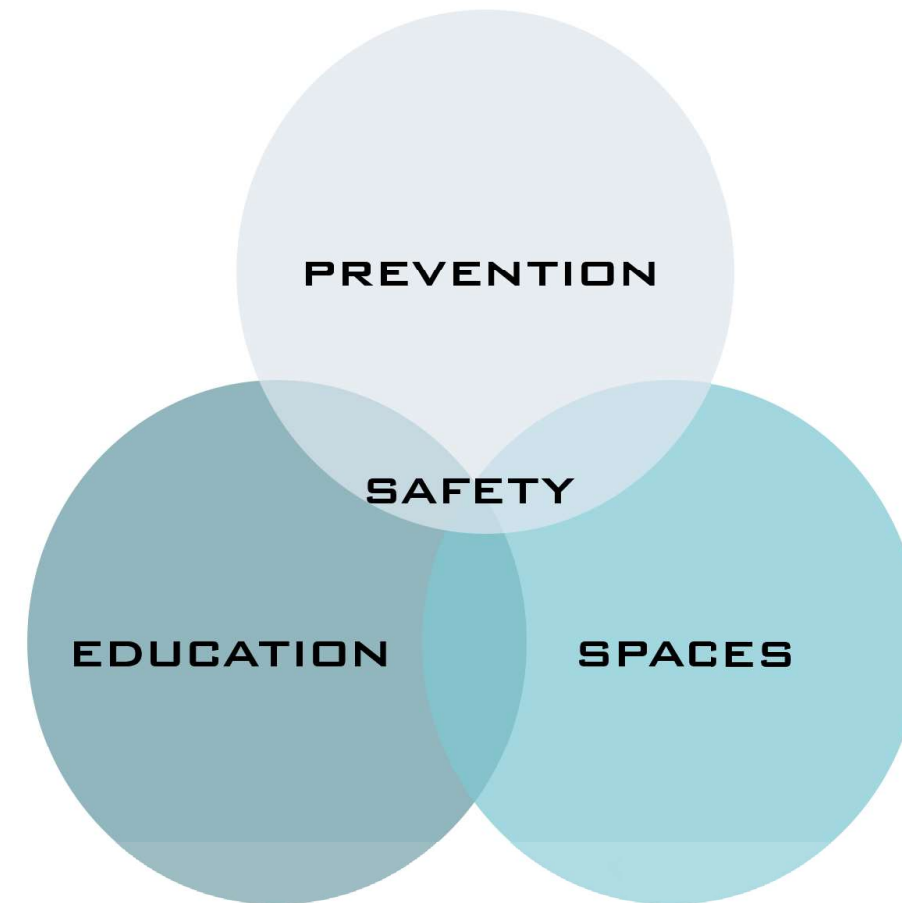
The study aims to analyze existing community practices, in the contribution of reviving communities' integrity. Then based on the analysis and study, new possibilities in future plan of action for building and infrastructure made from the local communities, while evaluating shelter recovery strategies that can resilient for future disasters.

An iconic building can contribute to reform the integrity of a community, based on a functional and safe program.

An earthquake is considered to be a catastrophic event which effect the impact on society, due to its terrifying experience while happens, and also by waiting for any future events.

This issue can be the key to design alternative ways of construction that can play with the citizen subconscious to influence their feelings and comfort.





Responses.

- Camps were set up for homeless people.
- Rescue attempt was well organized between the Army, Fire service and ambulances.
- Cranes and diggers used to remove rubble
- international teams helped with rescue effort.
- Government provided money to pay rent. Mortgages, Gas and electricity bills were suspended.
- PM Silvio Berlusconi promised to build a new town. 4,500 new buildings housing 12,000 people had been built by late 2009.

Management.

Didn't have much effect.

- Despite strict planning regulations, most new building weren't of suitable quality to withstand earthquakes. (San Salvatore hospital, 2000)
- Seismologists in the area, however impossible to predict an earthquake. Local residents blamed scientists for the deaths.

The scope of this thesis is to re-defining the integrity of the community through the notion of modular fragmentation of space capable of re-engaging, informing and demonstrating the civic function lost through a natural calamity.

1.4. History / Literature Relevance

Resilience

In many disciplines the term resilience has been used in many ways, including psychology, natural and human ecology, engineering and geography; nevertheless, there is not an agreed upon definition of resilience. This concept is involved and adaptable to several contexts and disciplines.

Definition	Holling	Timmerman	Wildavsky	Horne and Orr	Miletti	Cardona	UNISDR	Y. Guo
defined resilience as the time required for an ecosystem to return to equilibrium following a perturbation.		the "capacity to adapt to absorb and recover from the occurrence of a hazardous event"	Resilience is the capacity to cope with unanticipated dangers after they have become manifest, learning to bounce back.	Resilience is a fundamental quality of individuals, groups and organizations, and systems as a whole to respond productively to significant change that disrupts the expected pattern of events without engaging in an extended period of regressive behavior.	Local resiliency with regard to disasters means that a locale is able to withstand an extreme natural event without suffering devastating losses, damage, diminished productivity, or quality of life without a large amount of assistance from outside the community.	Resilience is the capacity of the damaged ecosystem or community to absorb negative impacts and recover from these.	The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure.	To promote urban resilience it is necessary to use the resources provided by the government to design urban projects which fulfil the needs of the community
Author	Holling	Timmerman	Wildavsky	Horne and Orr	Miletti	Cardona	UNISDR	Y. Guo
Date	1973	1981	1991	1998	1999	2003	2005	2012

Issue

Disaster resilience is seen as the 'shield', 'shock absorber' or buffer that restrained the outcome to ensure small-scale negative consequences.

- Negative correlation between the number of urban facilities, and dissatisfaction.
- There is no resilience in a city where relocated people are not willing to stay.
- Safeguards against corruption and abuse of the system need to be instituted. Civil protection is in a unique position, in that it must necessarily have recourse to emergency powers, but these need to have proper democratic underpinnings.

Scope

- An exploration of an environmental and responsive method of construction that introduces the use of flexible and modular building in order to faster occupancy and re-construction.
- We know that modular buildings are usually design to be portable structure, easy to be installed and for temporary recovery. Also, we need to recognize that the design of notable permanent projects incorporates the use of prefabricated structures, which are modularly customized and tends to satisfy the necessary requirements of the project in less period of time.
- Designing seismic structure capable of informing, teaching and demonstrating new possibility of life skill survival, that can alleviate the negative circumstances of undergoing through a natural disaster.



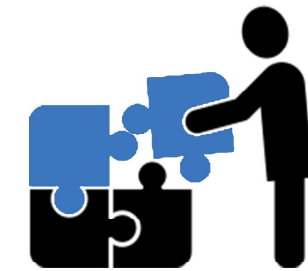
Objectivity

- Encourage community awareness and knowledge through practical construction.
- Create civic space that act as survival spaces and interactive spaces between different discipline that can alleviate the psychological effects.
- Reactivate the integrity of the community by eliminating vulnerable instance and adapt to innovative approach of construction.

Questions

- How to increase the involvement of the collaboration networks existing in the community.
- How to allocate facilities for the needs of the community.
- How to increase spatial and civic resilience in the recovery process in L' Aquila.

Final Outcome



Certainly, the goal of disaster risk management is to guarantee and encourage minimal loss of life and to allow the affected community to go back to 'normal' within the shortest possible time.

In order to re activate the civic function of the site, the future program will be follow by a creation of a public infrastructure capable to be a temporary shelter in a preparation of a catastrophe and then becoming a permanent community center and civic space where students and citizens are able to learn educational and life skills.

Along with providing immediate assistance, they will able to fabricate by using local material and developing positive design and architectural solution that best fit their needs. These skills will contribute to the integrity of the community and their long term changes.





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SECTION I:

CH.2 - Case Study

**Relevance of the Precedent Analysis to the
Proposed Project**

AUDITORIUM Del Parco



WEST ELEVATION



NORTH ELEVATION



Architects: Renzo Piano
 Location: L'Aquila, Italy
 Categories: Musical Auditorium
 Project Year: 2012

The Auditorium in L'Aquila was built as a temporary substitute to replace the Castello Spagnolo concert hall, gravely damaged in the 2009 earthquake.

It was important that it should be sited near the damaged Castello Spagnolo so that people would continue to frequent the area.

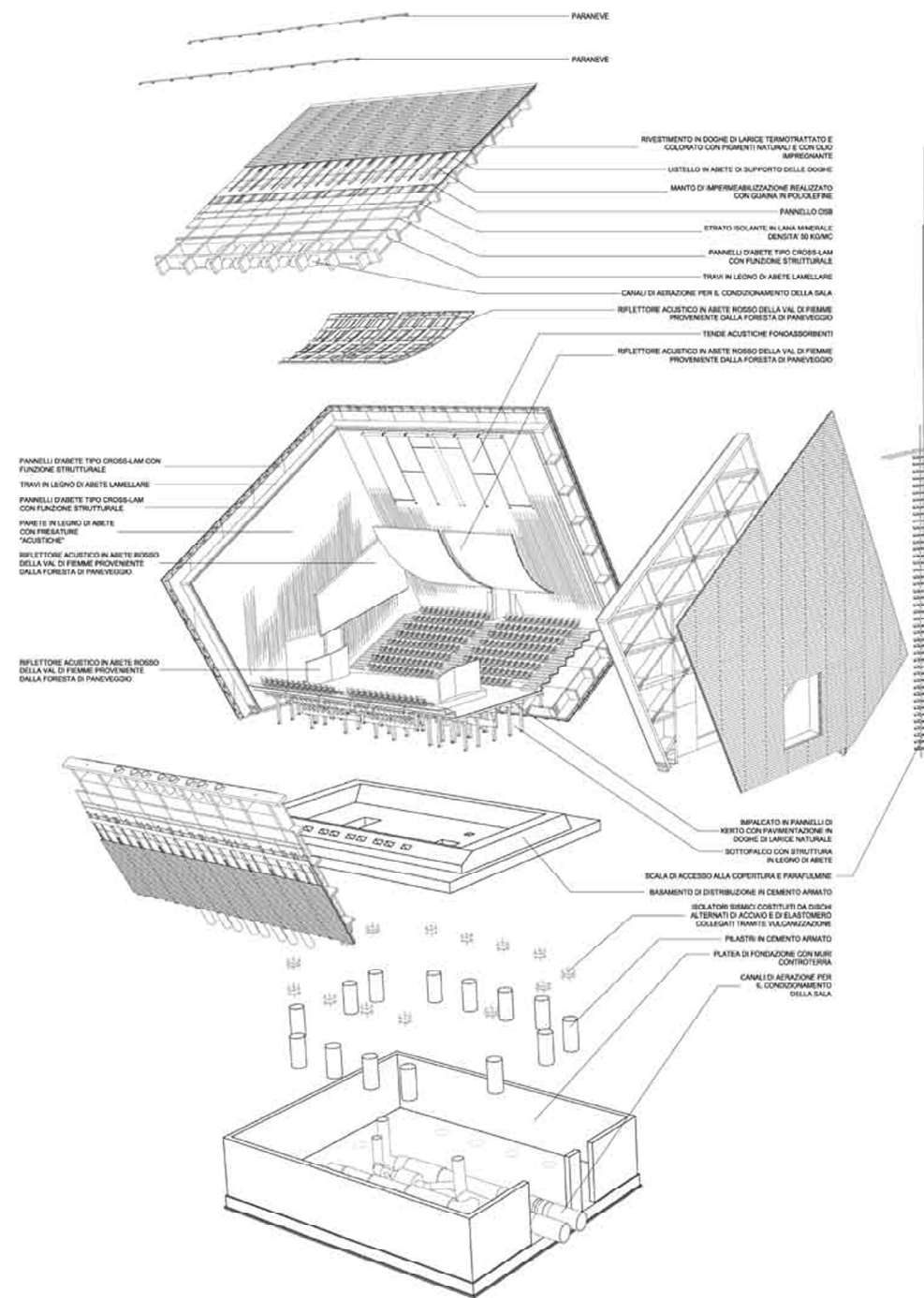
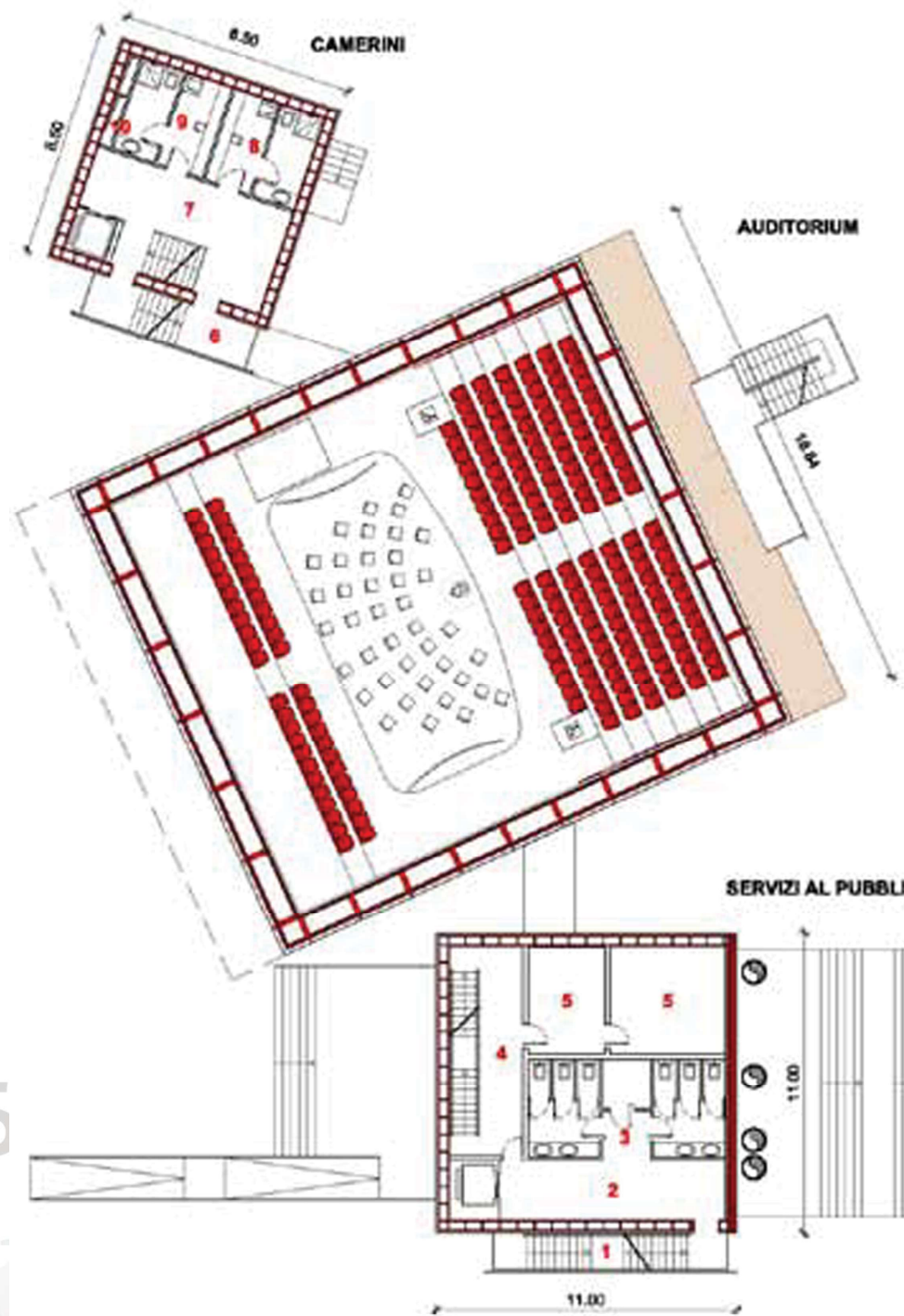
The Auditorium in L'Aquila is an ensemble of three pure volumes – a trio of cubes set at seemingly random angles, a bit like dice thrown on an uneven surface – housing the 238-seat concert hall, the foyer and dressing rooms.

A group of three cubes, it is a simple design that tests the efficiency and expressiveness of spaces that were generated by need and necessity. This situation gave rise to the idea of building a temporary hall in an easily accessible area outside of the city's danger zone.

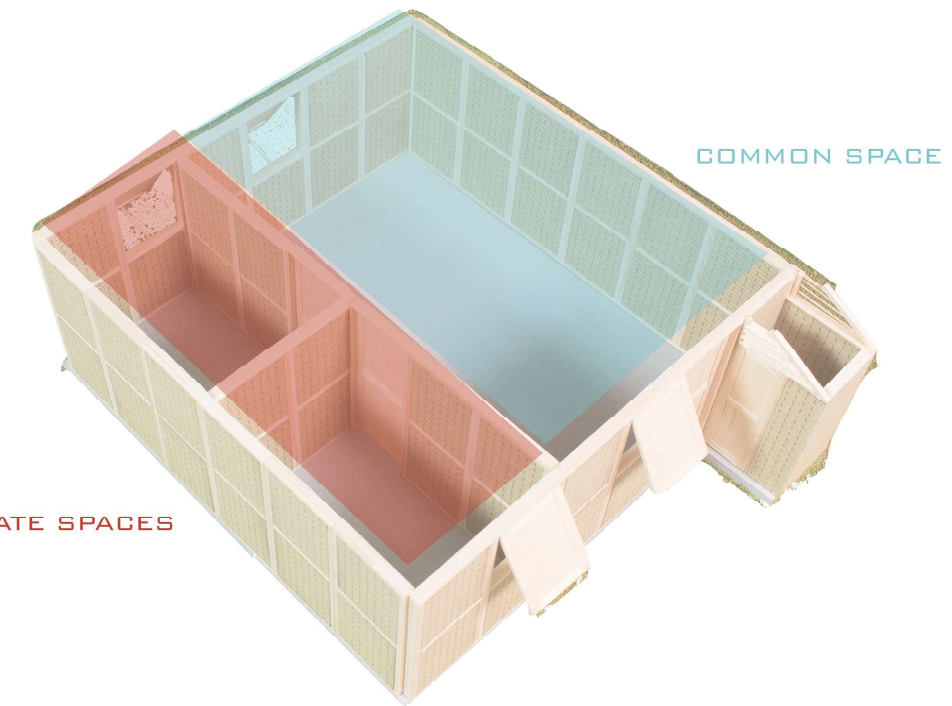
This precedent study is necessary to understand the design principles and relevant program to support the auditorium. The simplicity of its geometry leads to multiple orientation points which addresses the main plaza and the historical castle and park of the region.

This study illustrates how the architect embraces the environment in the design, while combining its functional scope of open air gathering space. This study was relevant to understand supporting program not just as a public space, but also as a safe and practical space for the community.

Renzo piano structure called Auditorium del Parco is the first face of giving back what the community have lost, my part in this thesis is to continue the second face which through the power of education, I am intending to create a space of lecturing and fabricating while enjoying the show case of project made from students and citizens at gallery space.



MODULAR SHELTER for Nepal earthquake victims



PRIVATE SPACES

COMMON SPACE

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Architects: Shigeru Ban designs
 Location: Nepal
 Type Modular/Prefabricated housing
 Categories: Architecture Residential
 Project Year: 2015

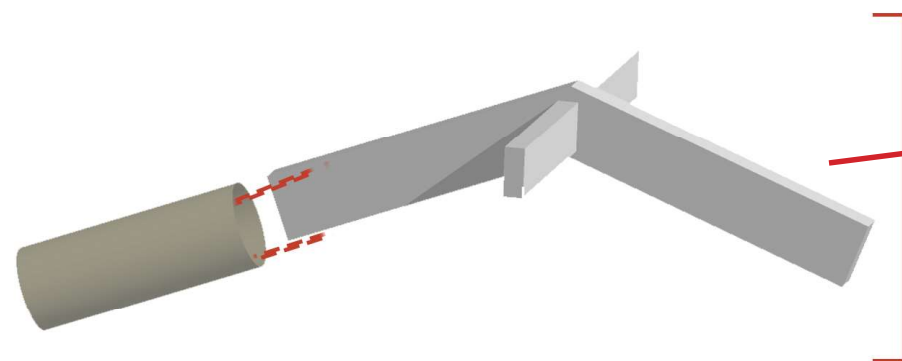
Shigeru Ban has unveiled his designs for modular housing structures to accommodate those made homeless by the two devastating earthquakes that struck Nepal earlier this year.

Ban's design, known as the Nepal Project, aims to provide new houses for some of the hundreds of thousands of people whose homes were destroyed, using rubble sourced from the huge piles of earthquake debris.

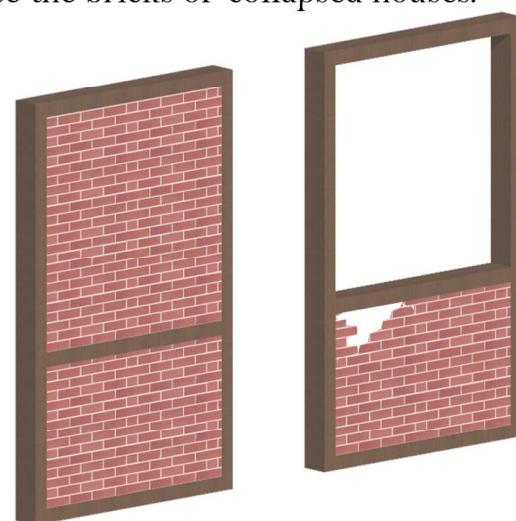
This simple construction method enables anyone to assemble the wooden frames very quickly and if a roof (a truss made of local paper tubes) is secured on top, and the wooden structure covered with a plastic sheet, people can immediately begin to inhabit the shelters. The structural integrity of this temporary house lies primarily in the wooden framing, and although the walls are to be in filled with rubble bricks, the masonry itself functions as a secondary structural system. In the case of a two-story building, one can add a plywood panel inside the wooden frame for structural strength.

Flexibility In Program

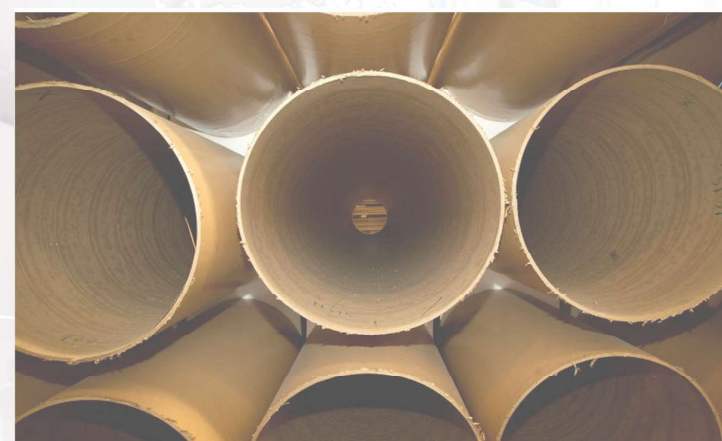
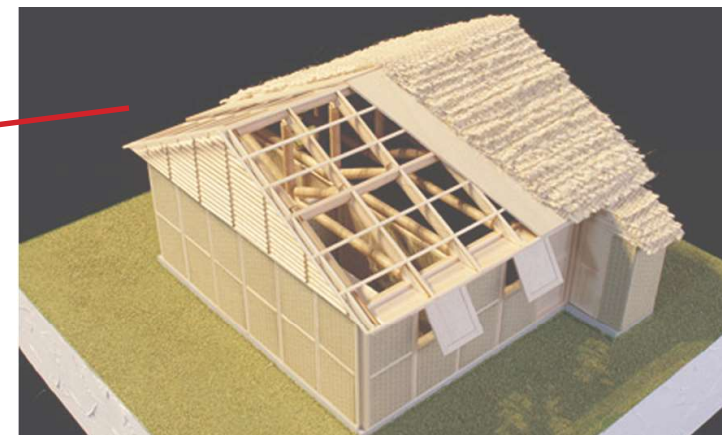
As one unit can be multiplied and arranged for the usage of classroom or shelter etc.



The bricks of the collapsed residential reuse.
 In this project, while the wood frame to the principal structure of the building, we have a mechanism that can be reused with confidence the bricks of collapsed houses.



People can stack the rubble bricks inside the wooden frames and slowly complete the construction themselves.



After the 2010 earthquake in Haiti, he developed paper tube structures using plywood connectors. However, while ready-made paper tubes are cheap and easy to find in any country, plastic and plywood connectors are time consuming to manufacture.

The precedent study is necessary for the investigation of the design responses in sensitive environments (heritage and materiality).

Its ability in filling waste material into a modular housing structure engaged the power of education to empower the community in learning simple assembly technique and being able to customize and enlarge their future conditions.

FOGO Island ARTISTS STUDIOS (The Long Studio)



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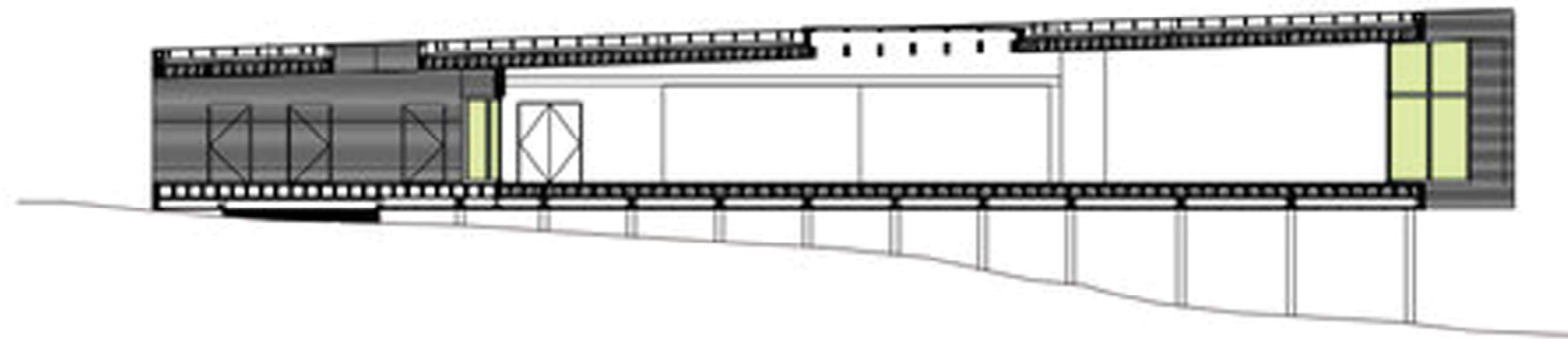
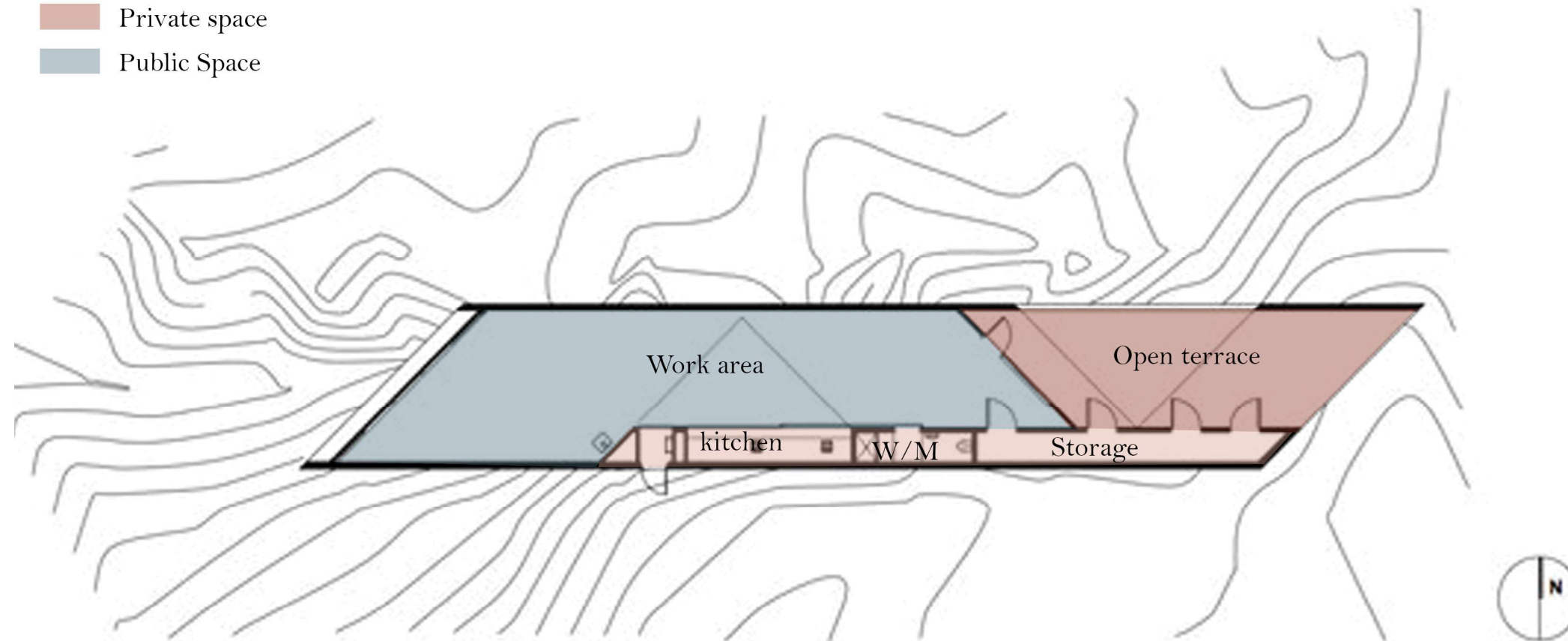
Architects: Saunders Architecture, Todd Saunders
Location: Fogo Island, Newfoundland, Canada
Type Modular/Prefabricated housing
Categories: Architectural studio
Project Year: 2009/2011

The Shorefast Foundation works with the people of Fogo Island to find ways to preserve this special place and this special culture. We have chosen to find new paths by leading with the arts. We want to create structures that respect where we've come from and dignify this landscape that is so fragile yet so fearsome. We want structures that touch our imaginations and help maintain a connection between our past and our future.

The idea behind the forms of the various studios was to create a bold geometric structure to starkly contrast, yet lay silently in the striking natural environment. The main concept behind the layout of the artist studios was to observe the surrounding environment during its transition through the various seasons in which the studios will be in use: spring, summer and fall.

The studios are all oriented towards the sea and elevated above the ground to provide the resident artist with a feeling of being unobstructed and unbound. The materials and construction methods chosen reflect that of the local architecture of Fogo Island. The environment will leave its marks on the studios by weathering the structures over time. All studio are 100% off-the-grid and produce their own power and recycle of of their own waste.

Private space
Public Space



Section & Plan : courtesy of Saunders Architecture

The long linear structure of this artist studio maximizes the amount of open wall and floor space. Large windows at either end and a skylight on the roof of the studio allows the maximum amount of natural light to flood the space. We have made one of the walls 1m deep to house storage, toilets and washbasins, with doors that are flush to the wall, thus avoiding any visual distraction inside the space.

The studios are placed on pillars at the end towards the sea, while the entrance area has a small concrete foundation for anchoring the construction to the landscape.

With this type of construction, the studios can be placed in almost any place on the island.

In addition, this allows for the studios to be per-fabricated in a local workshop during the winter months, and then placed in the landscape in the spring.

The relevance of this precedent is based on the per-fabrication of the module and the function of the space which is capable to involve the scenery of the landscape combination with the human experience of a comfortable space.



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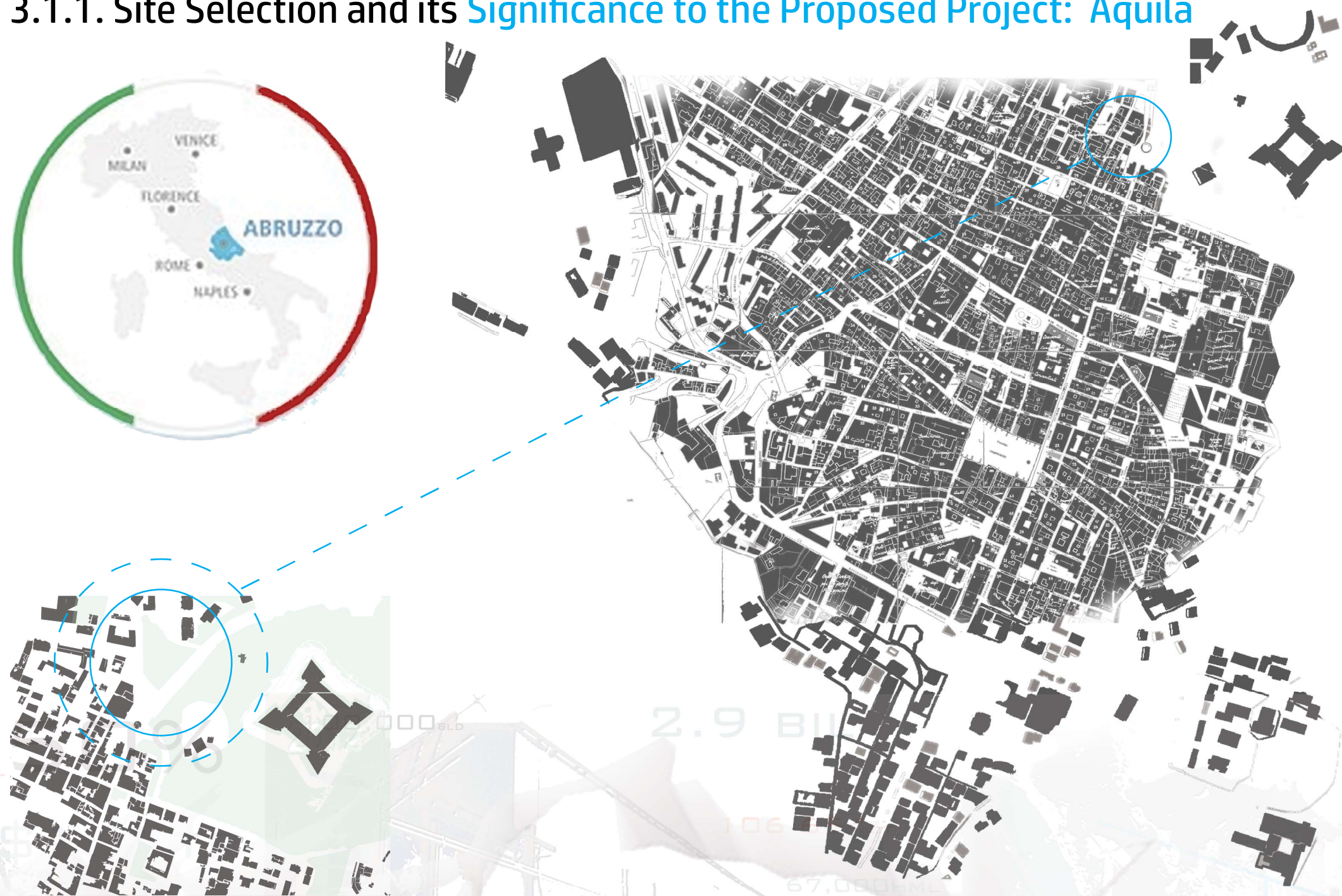


SECTION I:

CH.3 - Design Analysis

Site Context

3.1.1. Site Selection and its Significance to the Proposed Project: Aquila



The site chosen to further study and develop this thesis is located in the central part of Italy called L'Aquila, meaning "The Eagle" is a city and comune in Central Italy, both the capital city of the Abruzzo region and of the Province of L'Aquila. Laid out within medieval walls on a hill in the wide valley of the Aterno river, it is surrounded by the Apennine Mountains, with the Gran Sasso d'Italia to the north-east. L'Aquila sits upon a hillside in the middle of a narrow valley; tall snow-capped mountains of the Gran Sasso massif flank the town. A maze of narrow streets, lined with Baroque and Renaissance buildings and churches, open onto elegant piazzas.

This site was chosen because of the big potential for the area to become a new civic hub for the city, but because of the periodical struggle of the community of going through devastating natural calamities. The site located on the light damaged area can becoming an excellent site to create boundaries of interaction, and push the community to new edges of engagement. The goal will be to generate innovated construction that can inform, teach and interact with the community and then break the psychological and negative circumstances of living in a site of continuous natural catastrophe.

3.1.2. Documentation of Existing Site Conditions



Renzo Piano, Auditorium del Castello
L'Aquila boasts an important music tradition, maintained by numerous institutions involved in promoting and producing classical and symphony music. The April 2009 earthquake compromised all the venues that hosted such music events



Forte Spagnolo
The castle was the main location where music and festival events were hosted.



Chiesa San Bernardino
The earthquake in April 2009 seriously ruined the apse and the campanile.[1] In May 2015, the basilica was reopened to the community.



Consiglio Regionale Abruzzo



Chiesa Cattedrale o Duomo
It was seriously damaged in the earthquake of 2009, and is presently unusable (2015).[2] From August 2013 the functions of the cathedral were temporarily transferred to the Basilica of Santa Maria di Collemaggio, itself also damaged in the earthquake and now closed to worship for rebuilding works.

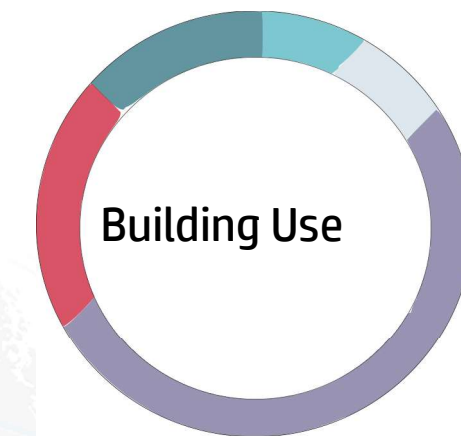
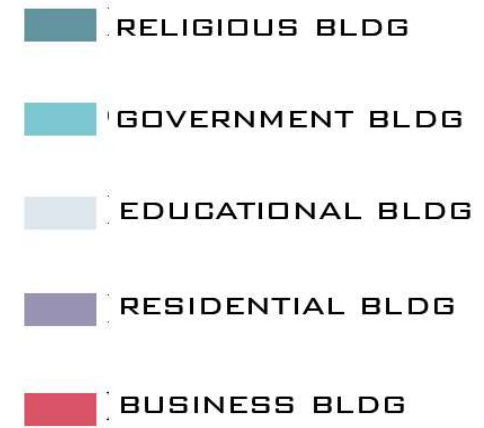
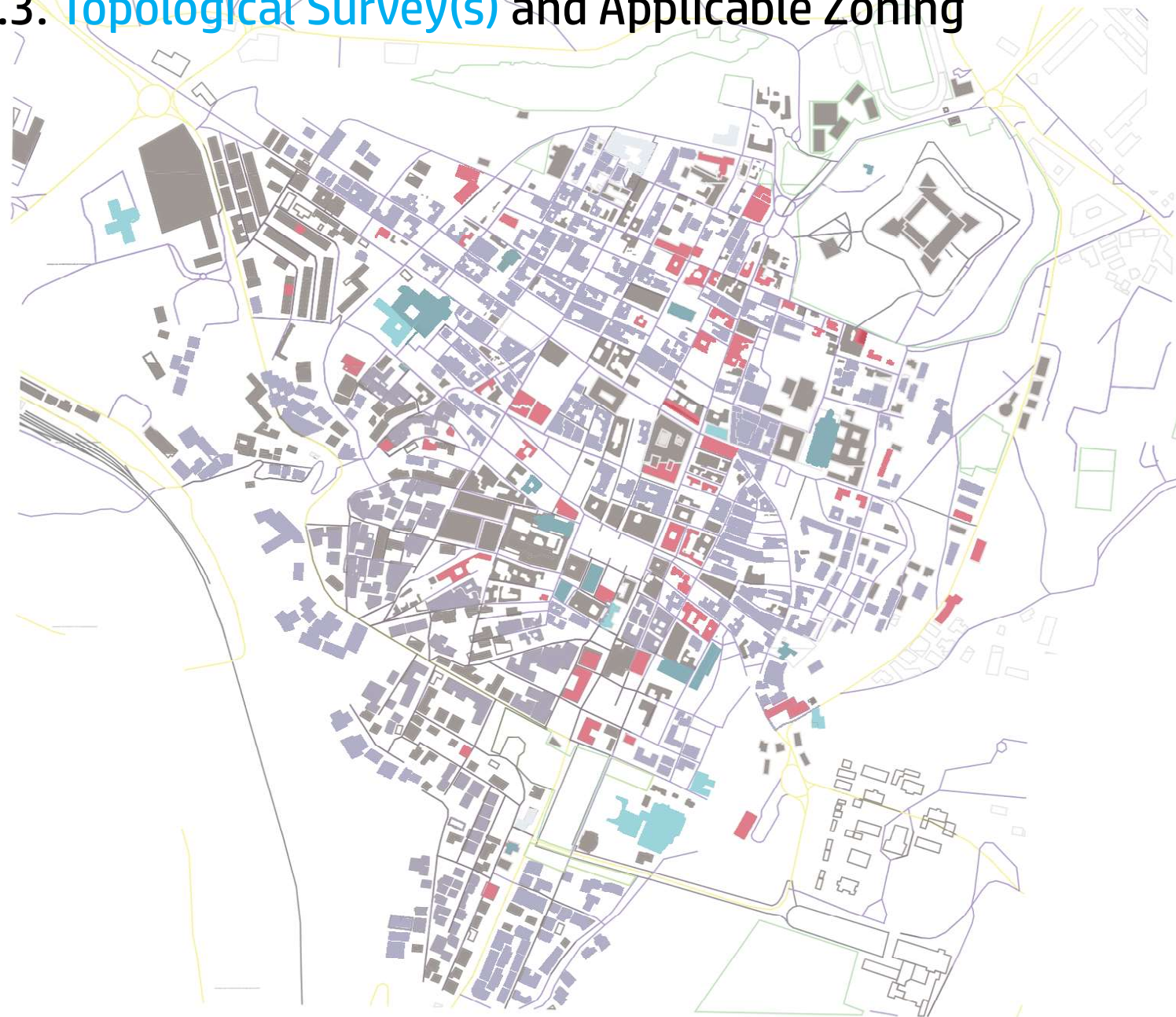


Chiesa di Santa Maria del Suffragio
widespread damage to the entire body of the building is in the equipment structural and decorative, with particular concentration in the reservoir of the apse and the presbytery.



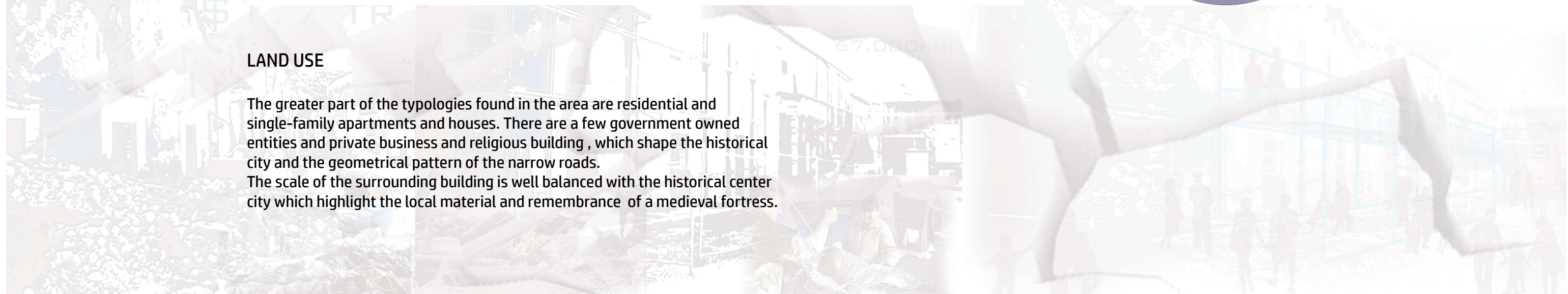
Chiesa San Pietro a Coppito
failure mechanisms of the structure are overturning of the facade exhibiting visible outside the floor, concrete expulsion in the upper part right

3.1.3. Topological Survey(s) and Applicable Zoning



LAND USE

The greater part of the typologies found in the area are residential and single-family apartments and houses. There are a few government owned entities and private business and religious building , which shape the historical city and the geometrical pattern of the narrow roads. The scale of the surrounding building is well balanced with the historical center city which highlight the local material and remembrance of a medieval fortress.

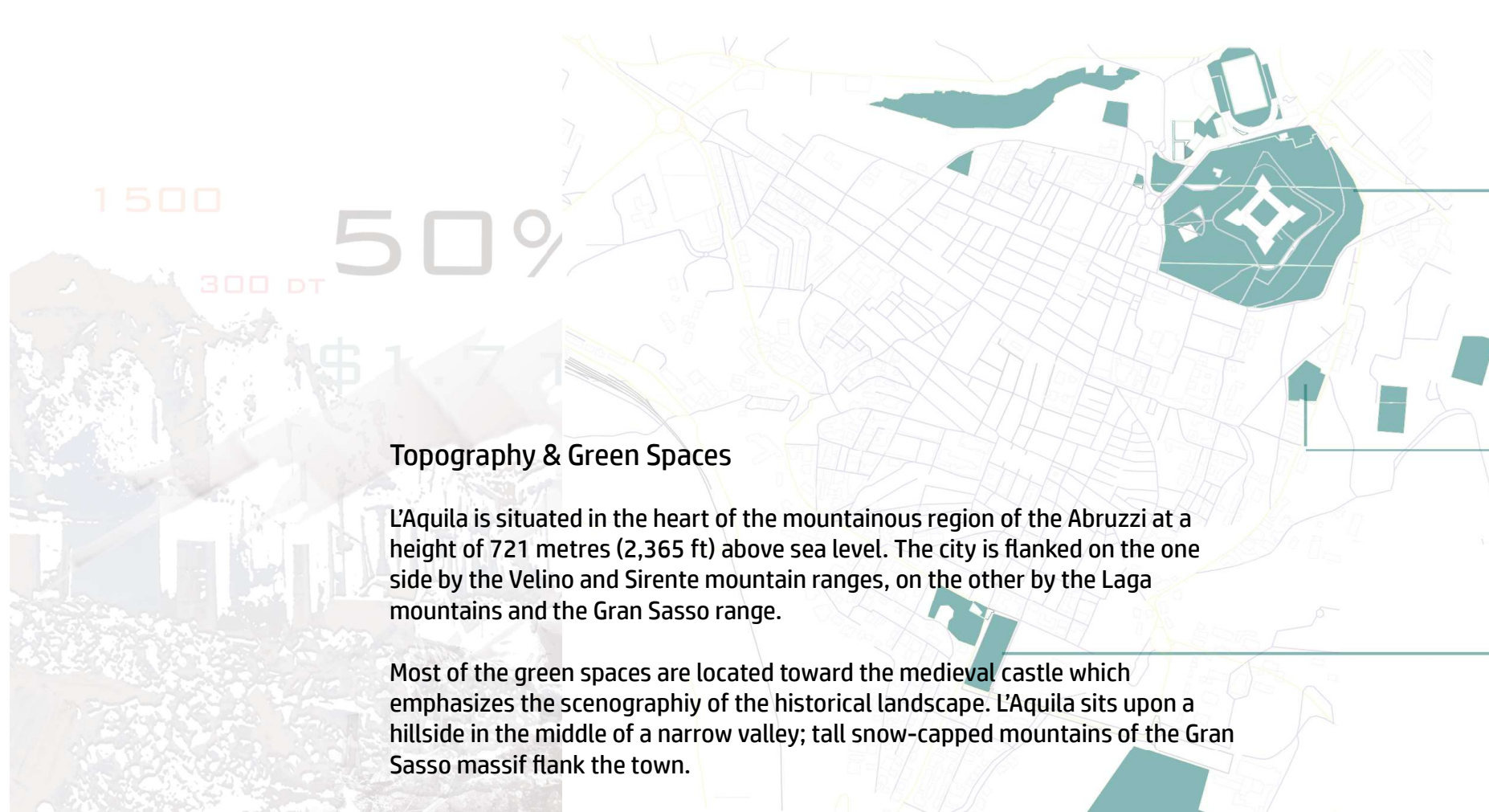
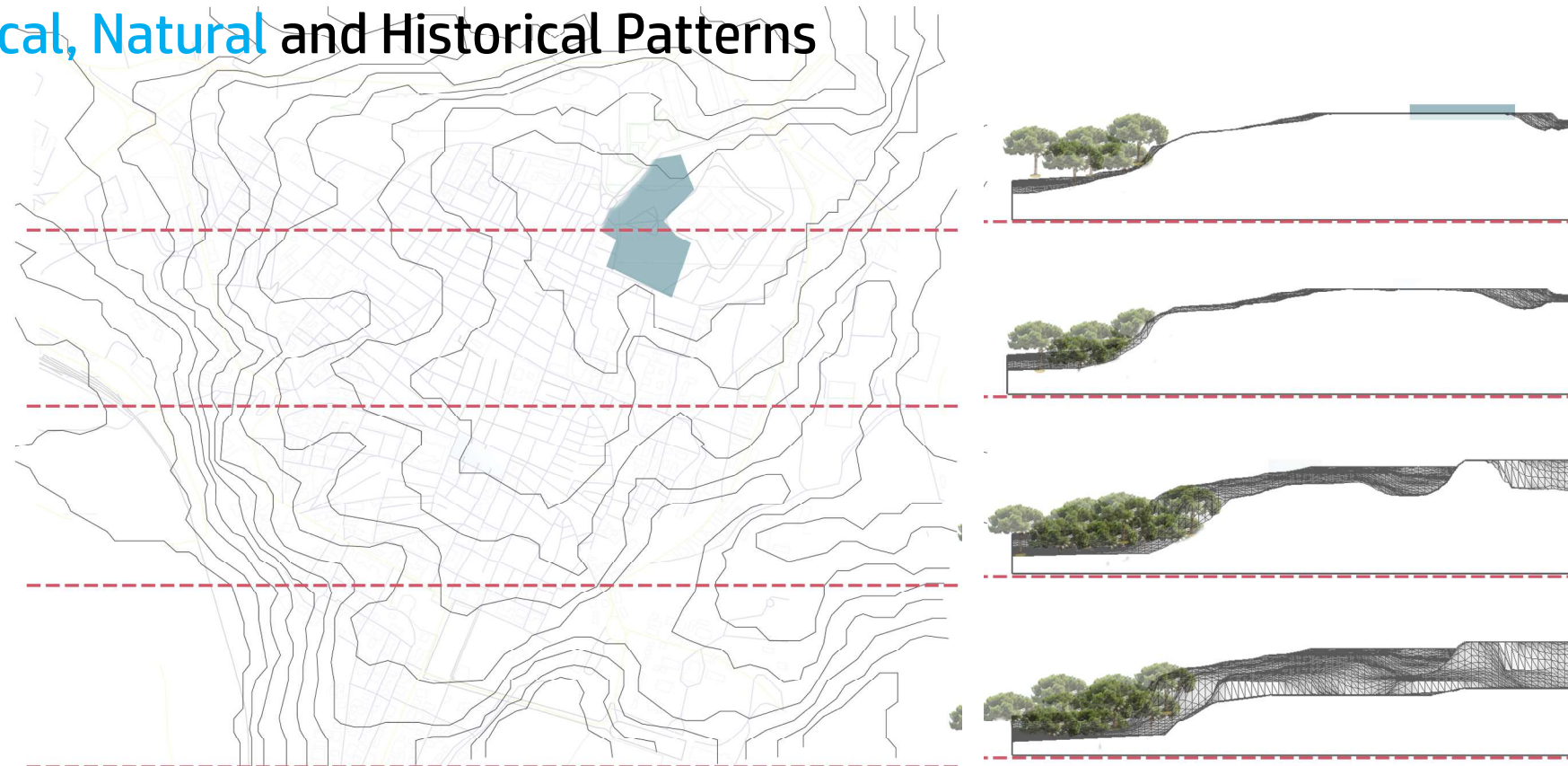


3.1.4. Geographical, Natural and Historical Patterns

L'Aquila is located in the heart of the mountainous region of the Abruzzi at the height of 721 meters (2365 ft) above sea level.

The city is flanked on one side by the Velino and Sirente mountain ranges, on the other by the Lega and the Gran Sasso mountain range.

The north side of the town is surrounded by natural landscape which wraps the medieval Spanish castle.



Topography & Green Spaces

L'Aquila is situated in the heart of the mountainous region of the Abruzzi at a height of 721 metres (2,365 ft) above sea level. The city is flanked on the one side by the Velino and Sirente mountain ranges, on the other by the Lega mountains and the Gran Sasso range.

Most of the green spaces are located toward the medieval castle which emphasizes the scenography of the historical landscape. L'Aquila sits upon a hillside in the middle of a narrow valley; tall snow-capped mountains of the Gran Sasso massif flank the town.



3.1.5. Physical and Socio-spatial Patterns



Plate Margin

- Destructive plate margin.
- Eurasian and African Plates.
- African plate is sub-ducted below the continental Eurasian plate.

Richter Scale

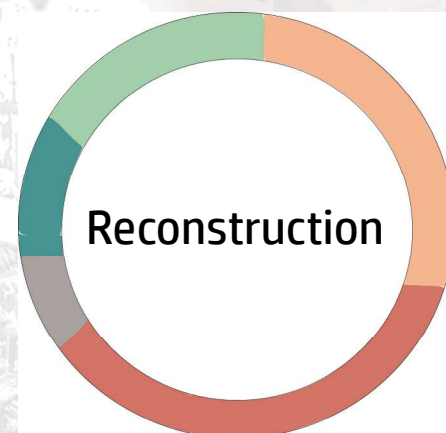
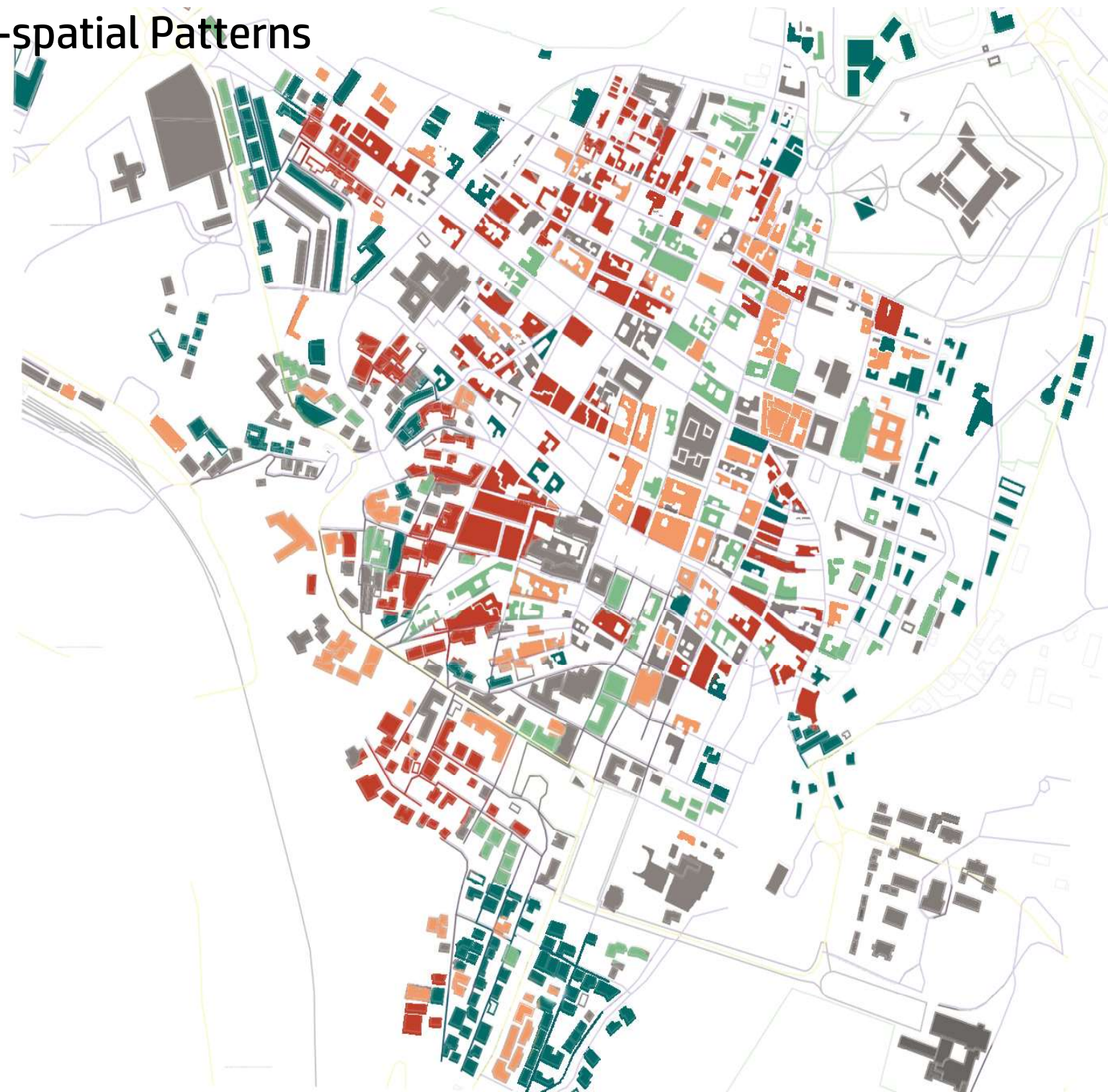
6.3

L'Aquila

- Central Italian city.
- 70,000 population.
- North-south fault line, along the Apennine mountain range.

Depth

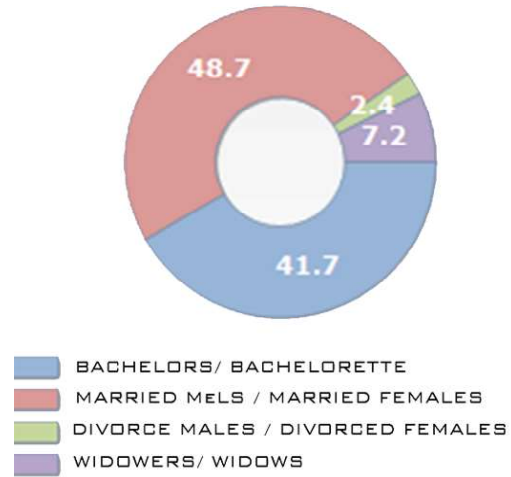
- 5 miles. /8 km
- Shallow focus-(under 70 km)



RECONSTRUCTION MAPPING

Shows the existing and actual condition of the historical city after the devastation. The most devastated area took place toward the south west side of the town where still today are visible remains of the catastrophe, especially towards those religious and older dwelling.

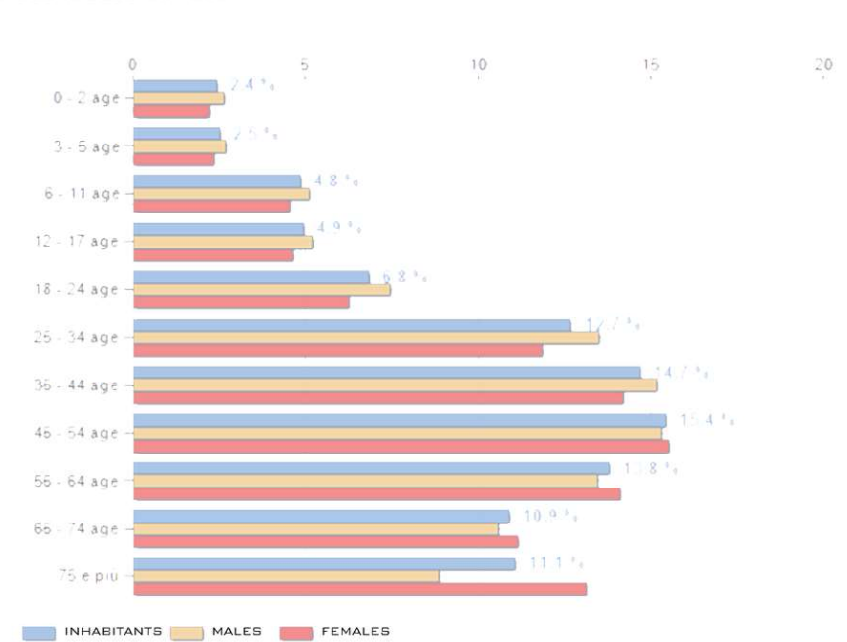
CIVIL STATUS OF 2014



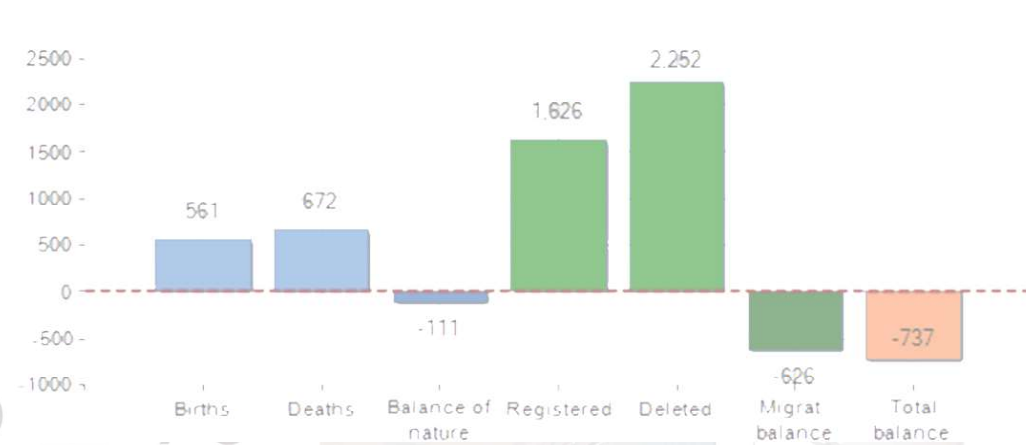
TREND N# FAMILY MEMBERS



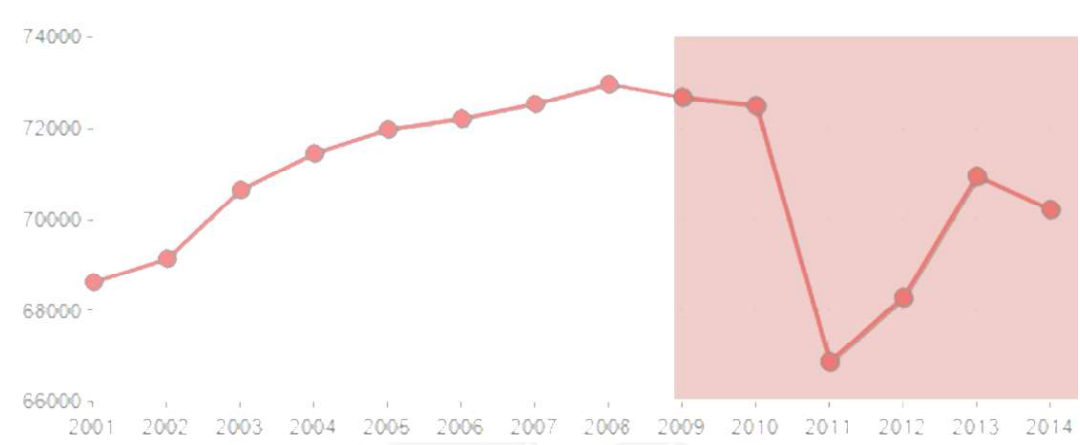
AGE CLASSES OF 2014



DEMOGRAPHIC BALANCE



INHABITANT TREND



Economic Impacts

- cost italy \$15 billion.
- Thousands of buildings destroyed. (including old tourist attraction such as L'aquila cathedral.)
- A bridge in Fossa collapsed.
- Broken Water pipe outside Paganica
- Fires spread in destroyed/ damaged buildings.

Environmental Impacts

- 1000km2 affected by surface ruptures, rockfalls and landslides.
- Wildlife habitats affected, loss of biodiversity in some areas.

Social Impacts

- 300 deaths. (mainly from collapsing buildings)
- 1500 injured.

-70,000 people made homeless.

-after shocks (reaching 5 on RS) hampered rescue efforts and lead to more deaths.

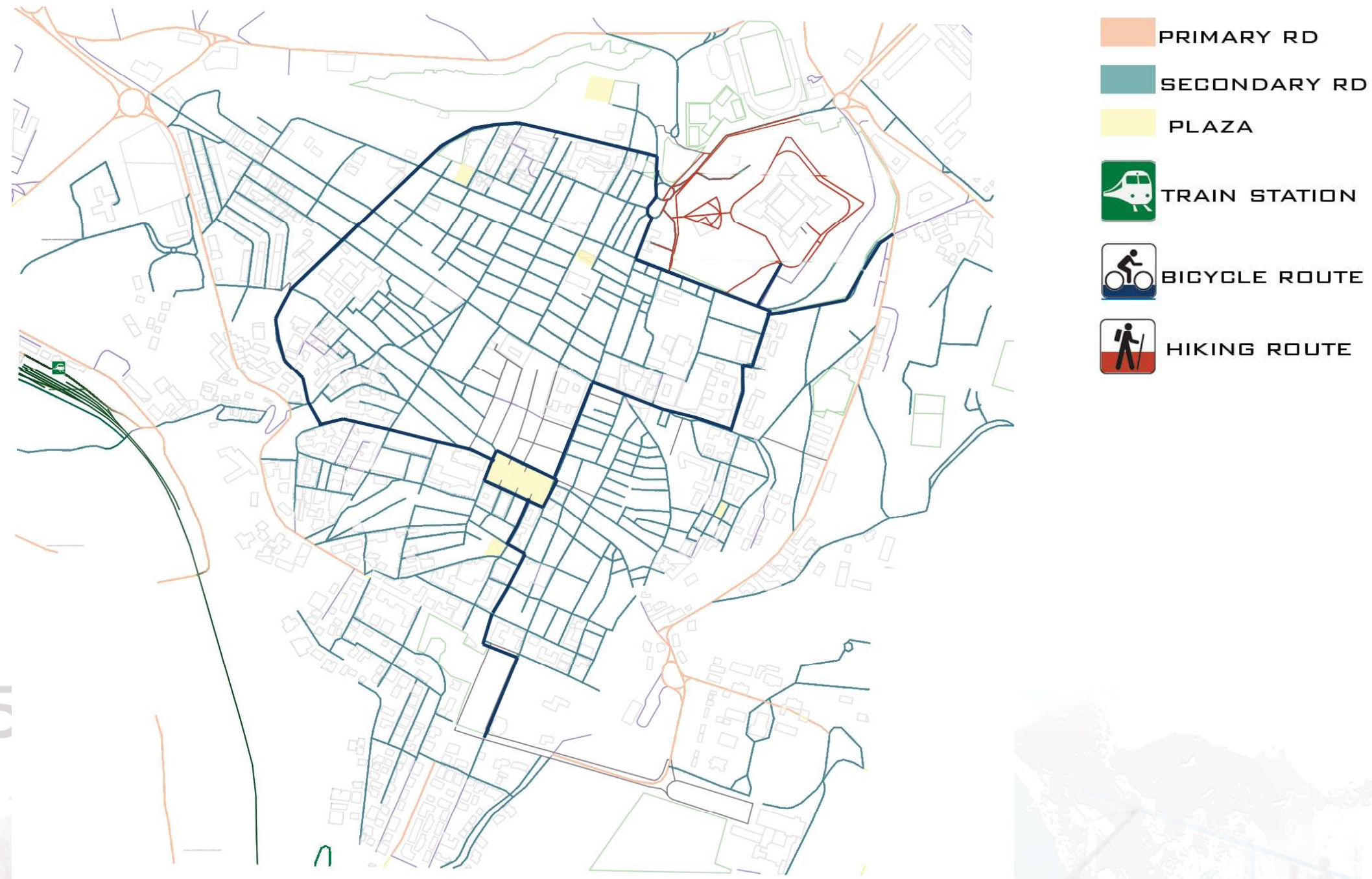
-People had to leave the area (young people for work) to find jobs.

Last known population is ≈ 70 200 (year 2014). This was 0.117% of total Italy population. If population growth rate would be same as in period 2011-2014 (+1.6%/year), L'Aquila population in 2016 would be: 72 495*.

After the natural disaster of 2009 a drop of the population occur due to the natural disaster event which led many citizens to leave the region for safety.

The conclusion of this analysis highlight that demographic trend is populated in majority by elderly families and only after the beginning of 2014 the town have increased in population growth.

3.1.6. Circulation: Pedestrian and Vehicular Patterns/Connections, Transportation Linkages



CONNECTIONS

As shows from the diagram, most of the primary roads are located out site the historical region, while the secondary rd are more likely to be trafficked by pedestrians rather than vehicular, since the region still demonstrates debris of dwelling under construction or restoration. A maze of narrow streets, lined with Baroque and Renaissance buildings and churches, open onto elegant piazzas.

Moreover, the primary road surrounds the entire city, leaving residential and business buildings to be interconnected by internal road. Most of the pedestrian activity takes place in the center of the city because of its historical value and religious meaning. Other extra source of public activity happen toward the north side of the town where the Spanish castle and the auditorium building are embedded in the natural park and landscape scenario of the mountain.

3.1.7. Site Potentials and Constraints to the Proposed Project



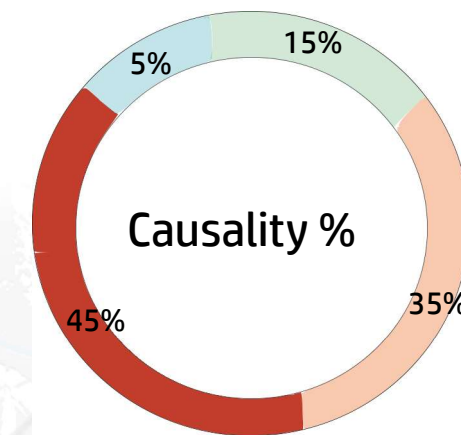
1500

limited casualties

light damage and no casualties

sporadic damage and few casualties

topographic amplification with major damage and casualties



Strengths

- Production of high quality of natural aggregate .
- Mitigated environmental impact of reconstruction activities.
- Limited landfill disposal of earthquake debris

Weaknesses

- High environmental impacts due to the extraordinary demand of natural resources.
- Necessary preventive treatment of debris instead of faster landfill.

Treats

- Slow construction of recycling facilities
- Need for additional landfill to dispose earthquake debris.

Opportunities

- Quick production of materials needed for reconstruction.
- Most of the material needed for rebuilding process is present in the most affected area.
- Opportunity to create new infrastructure



1500

50%

2012

2.9 BIL

300 DT

\$ 1.7 TR

100,000

106,654

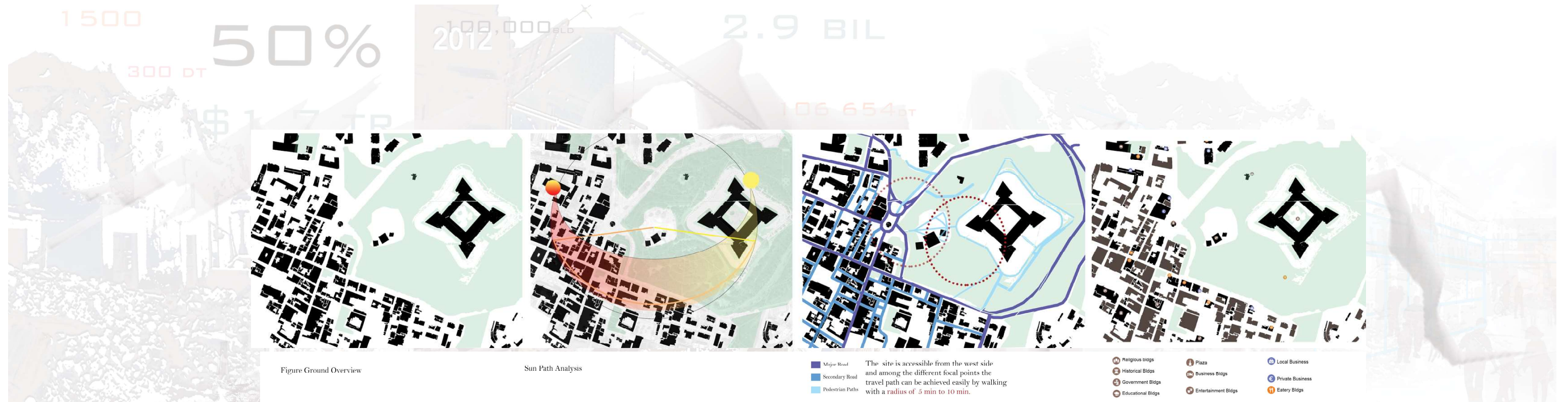
67,000 HML

SECTION I:

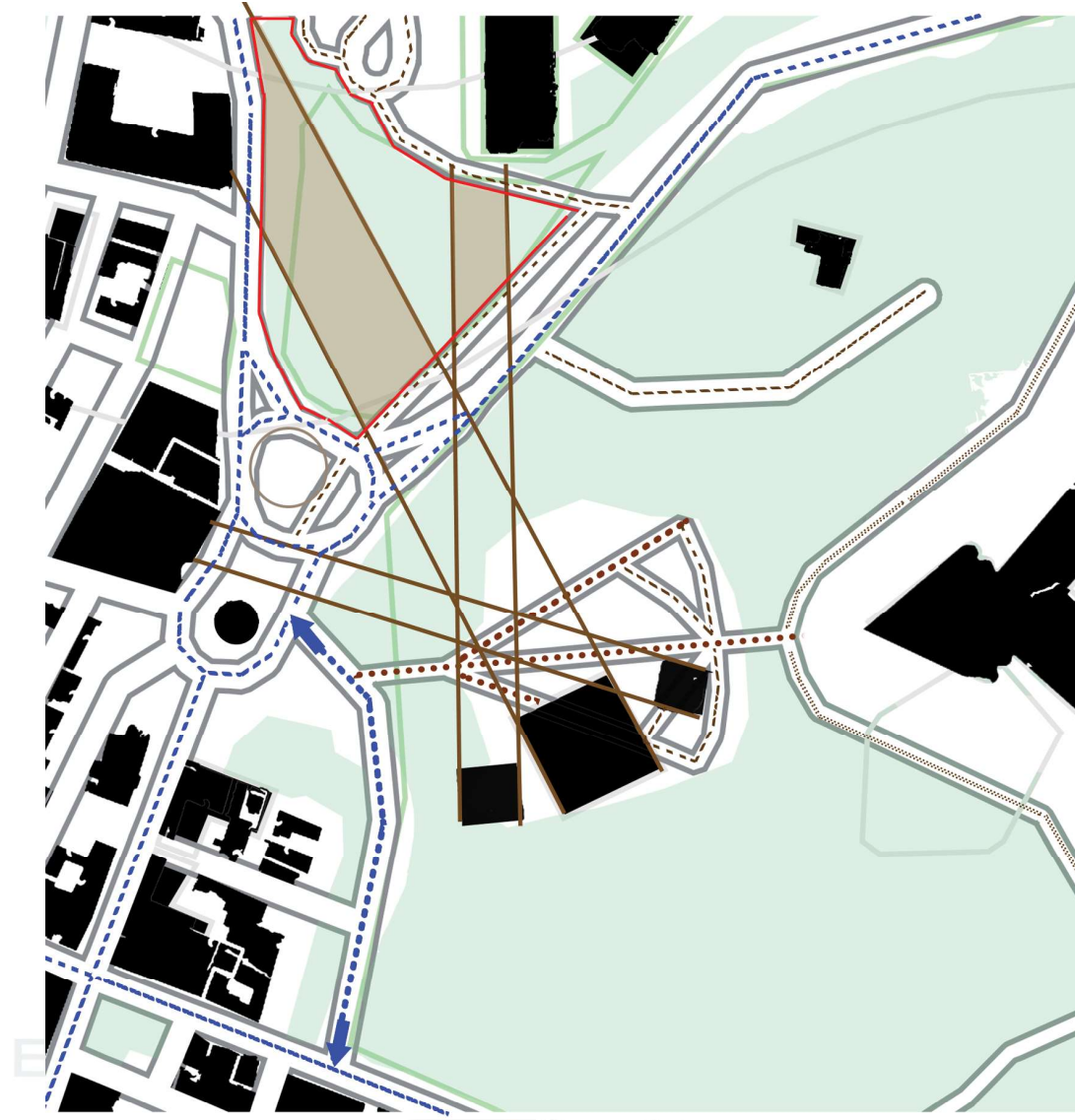
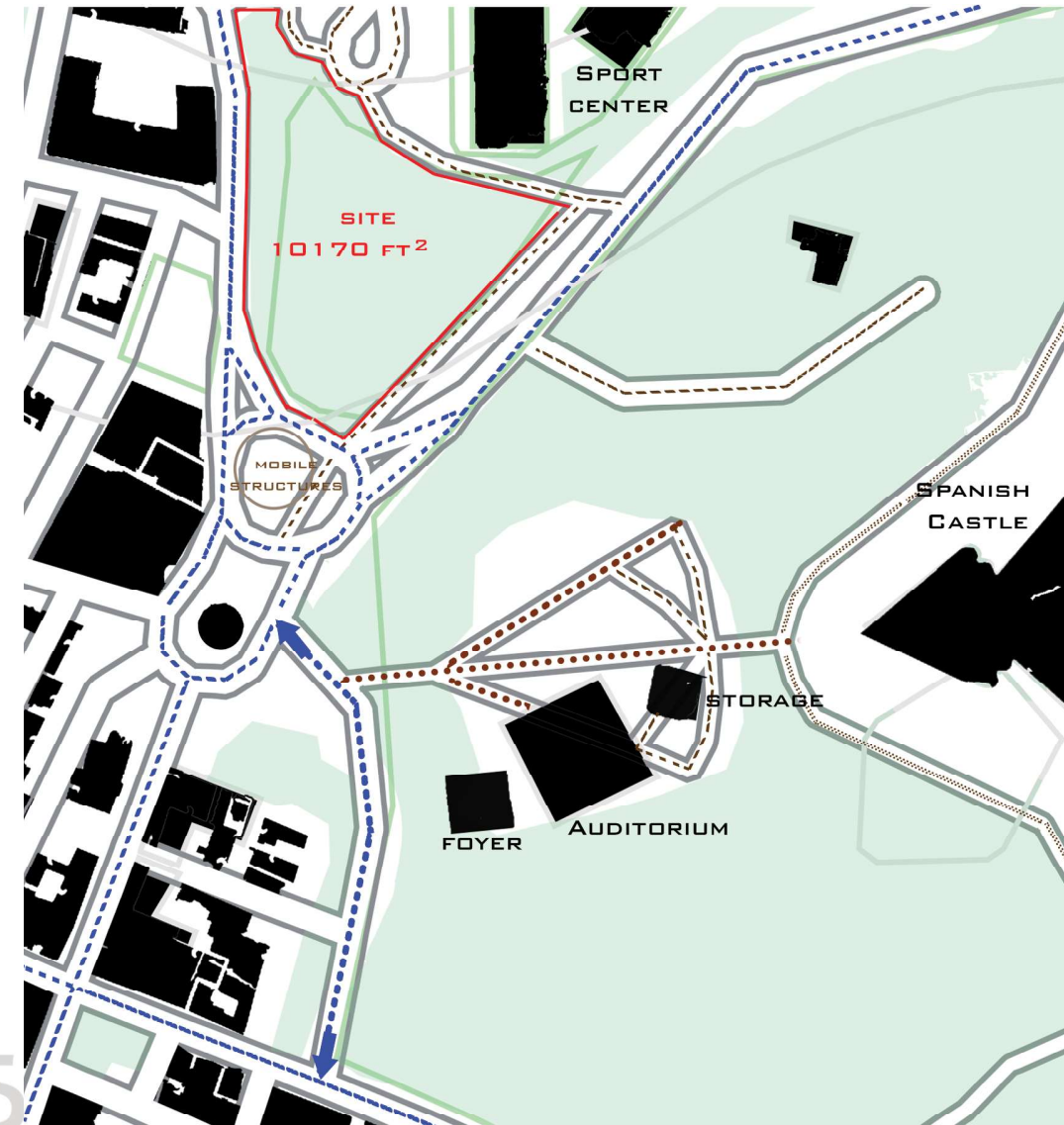
CH.4 - Design Analysis

Site Analysis

4.2.1. Site Plan: Physical Character Studies



4.2.3 Program and Spatial Explorations



- Proposal Site
- - - Existing vehicular paths
- . . . Existing pedestrian paths

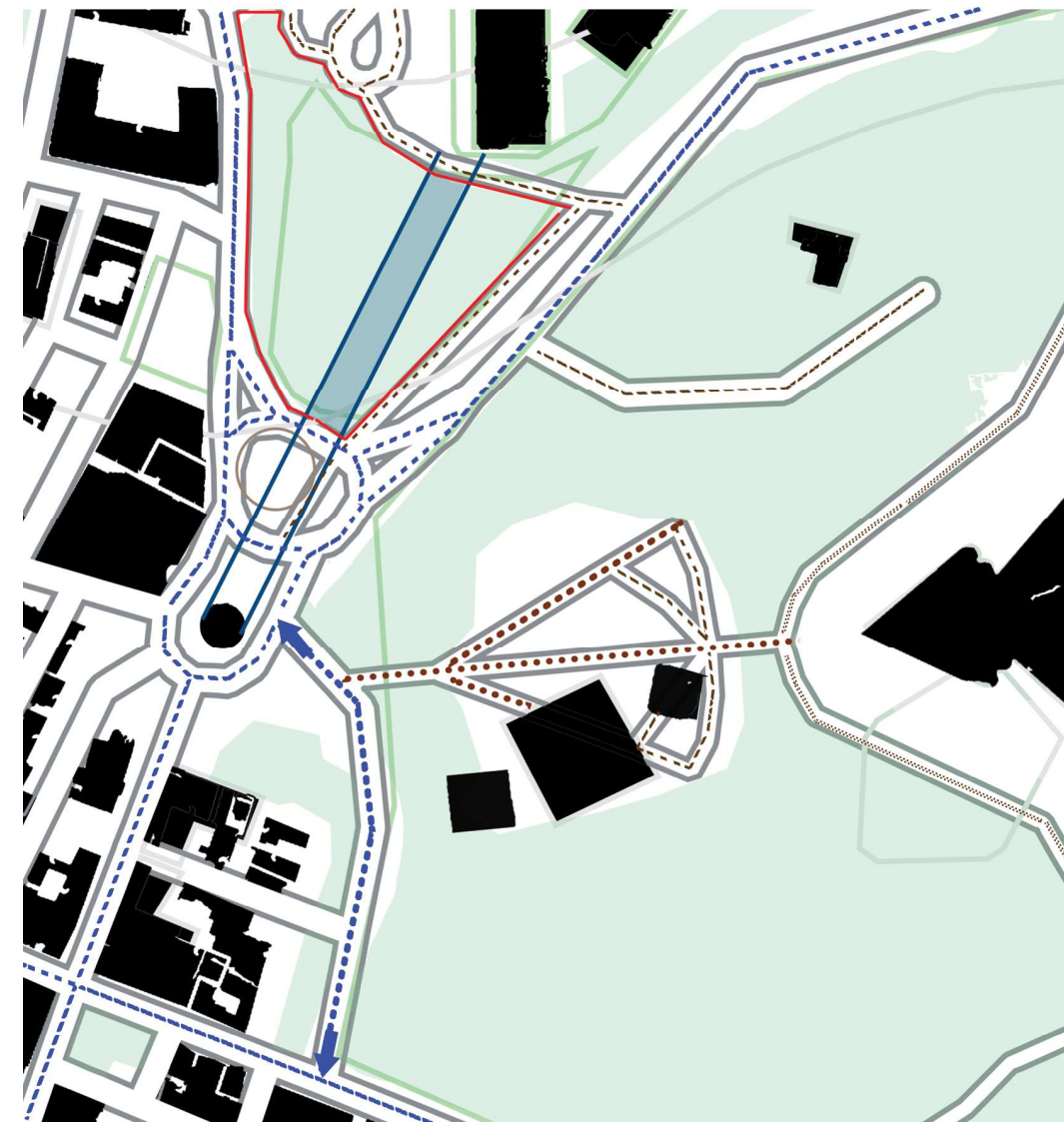
- Visual Connection from the Fountain plaza
- Visual Connection from the Auditorium
- Visual Connection within existing paths

- Future areas of construction

Within the site proposal, I highlight and overlap different component of the analysis that include visual connection, existing edges and paths. The intent of this analysis has to evolve the future structure in order to redefine the civic function of the historical city that have been broken by the overwhelming destruction of a past and future earthquake.

The Auditorium of the park is replacing the engagement and activity space that the Spanish castle used to play. As a important dwelling for the community in term of interaction and safety, the visual connection must maintain its openness.

Filtering the path and scale of the existing and surrounding building by creating possible path that are in connection with the physical and historical evidence of the town.



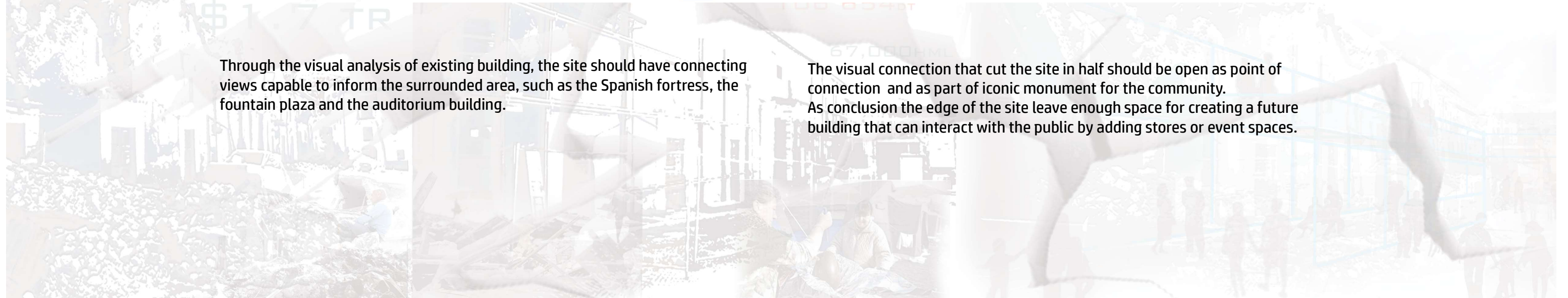
- Proposal Site
- Existing vehicular paths
- - - Existing pedestrian paths

- Visual Connection from th Fountain plaza
- Visual Connection from the Auditorium
- Visual Connection within existing paths

- Future areas of construction

Through the visual analysis of existing building, the site should have connecting views capable to inform the surrounded area, such as the Spanish fortress, the fountain plaza and the auditorium building.

The visual connection that cut the site in half should be open as point of connection and as part of iconic monument for the community. As conclusion the edge of the site leave enough space for creating a future building that can interact with the public by adding stores or event spaces.





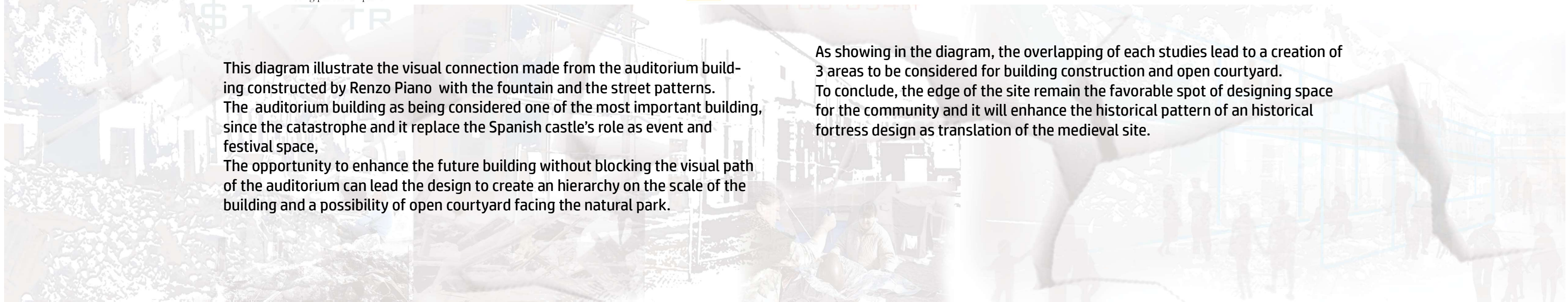
- Proposal Site
- - - - - Existing vehicular paths
- - - - - Existing pedestrian paths

- Visual Connection from the Fountain plaza
- Visual Connection from the Auditorium
- Visual Connection within existing paths

- Future areas of construction

This diagram illustrates the visual connection made from the auditorium building constructed by Renzo Piano with the fountain and the street patterns. The auditorium building is considered one of the most important buildings since the catastrophe and it replaces the Spanish castle's role as event and festival space. The opportunity to enhance the future building without blocking the visual path of the auditorium can lead the design to create an hierarchy on the scale of the building and a possibility of open courtyard facing the natural park.

As shown in the diagram, the overlapping of each study leads to the creation of 3 areas to be considered for building construction and open courtyard. To conclude, the edge of the site remains the favorable spot of designing space for the community and it will enhance the historical pattern of an historical fortress design as a translation of the medieval site.





1500

300 DT

50%

\$ 1.7 TR

2012

100,000

2.9 BIL

106,654

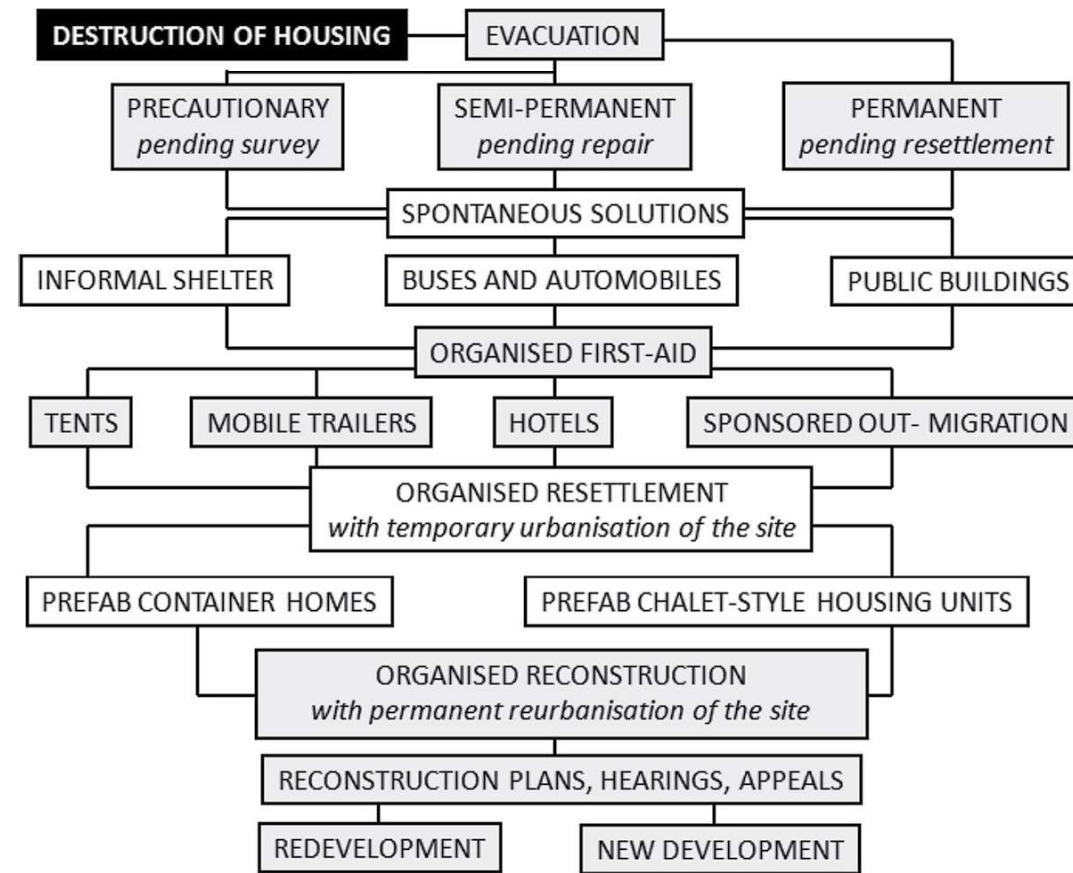
67,000 HML

SECTION II:

CH.1 - Practicum

Design Process

1.1. Theory: Application to Architecture- Full sequence of post-disaster shelter.



The Intermediate Term

Earthquake disasters commonly lead to massive demand for alternative housing, and correspondingly massive needs for structural survey of existing building stock to determine whether it is serviceable, capable of being rehabilitated, or needing to be demolished (Choudhury & Jones, 1996). It is usual, perhaps even normal, for there to be a sequence of shelter, which begins with emergency accommodation, probably in tents, proceeds to transitional shelter, in container homes or prefabricated buildings, and ends with full reconstruction, which may take more than 10 years if the damage is extensive and complex (Lizarralde et al., 2010).

In the wake of the L' Aquila earthquake, the Italian Government's policy on shelter was partially to avoid the intermediate stage. Although regional governments and charitable foundations donated prefabs, the main thrust of central government policy was to keep people in tents for up to seven months and rehouse them in complexes of buildings that are too substantial to be regarded as transitional, but too unusual to be described as permanent rehousing.

The Cost

A total of €1.6 billion (\$1.4 billion) was spent on constructing 5736 apartments in 19 complexes, the CASE project (Complessi Antisismici Sostenibili ed Ecocompatibili—Calvi & Spaziante, 2009). Anti-seismic design was embodied in the expensive mechanisms of base isolation underpinning some of the complexes. Although designed with modern environmental compatibility in mind, some of the complexes are not connected to wastewater treatment and discharge raw sewage directly into the Aterno River. Moreover, all were established on greenfield sites and some were built in pre-existing environmental conservation areas.

A year after the disaster the historic buildings at the center of the towns and L'Aquila city remained red zone area. The Government had organized a major program of buttressing, on a scale and of a sophisticated: wood, scaffolding, and electro-soldered steel buttresses were designed to last for a very long time. The missing element in the Italian Government's recovery policy is local participation.

The Lesson

L'Aquila earthquake of 6 April 2009 was a medium-power seismic event that caused a disproportionately large amount of damage and suffering. Whether short-term earthquake predictions are official or amateur there should be no room for inaction. Scientific processes of monitoring and alert need to be backed by firm emergency response mechanisms with a local basis. Safeguards against corruption and abuse of the system need to be instituted. The price of progress is in disaster risk reduction and vigilant for the future.

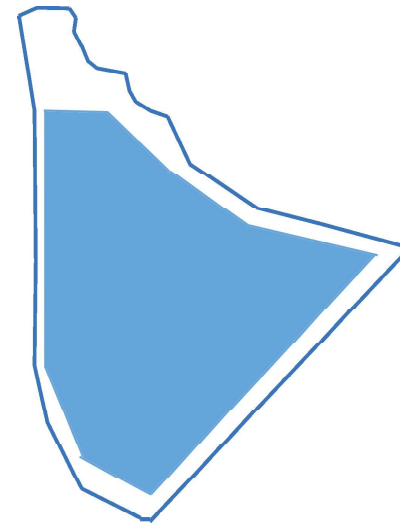
The Emergency Phase

In Italy its Achilles' heel is the failure to complete the system by fully articulating the means of planning for emergencies, managing them and dealing with disaster risk at all levels of government and society. The national guidelines for these processes are excessively complex, out of date and out of step with the current ethos of federalism. One can hardly escape the conclusion that not only has the Italian government's lack of interest in disaster management caused this predicament, but its desire to leave the system incomplete is a convenient means of retaining control. This situation shows how strong can be the tension between federalism—the desire to gain votes by ceding control to local administrations—and centralism—the desire to retain control by not ceding any such power (Hammer & Dovers, 2007).

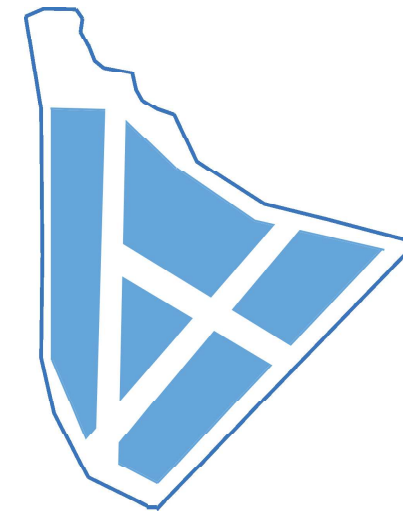
1.2. Site: Context and Conceptuality- Planning Strategies & Opportunities



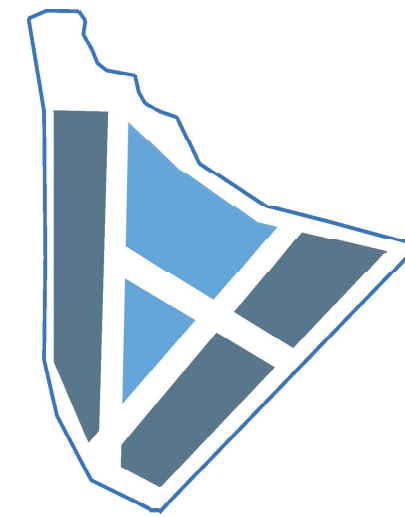
Site



Established set back

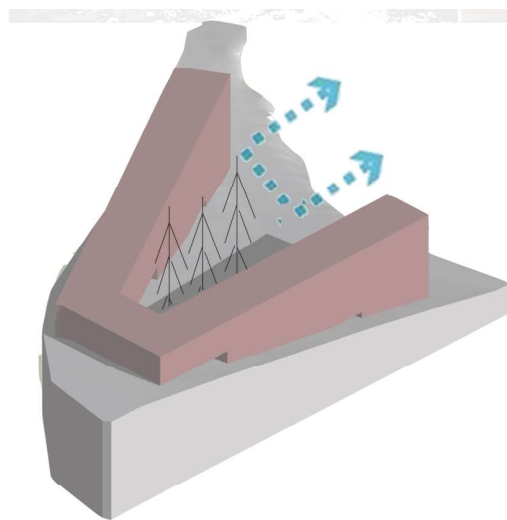


Public space and boulevard
provide hierarchy & orientation



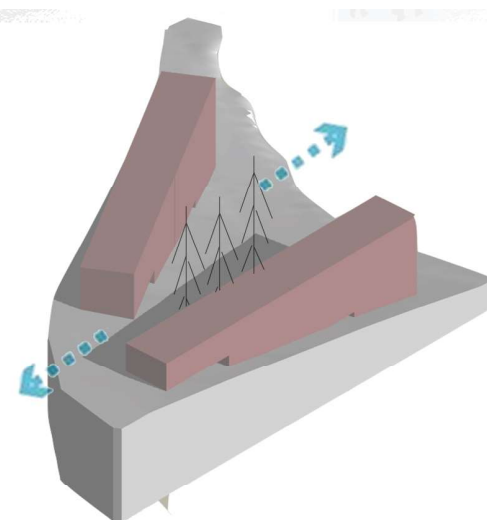
Building + Landscape

1.3. Spatial Explorations and Three dimensional Consequences



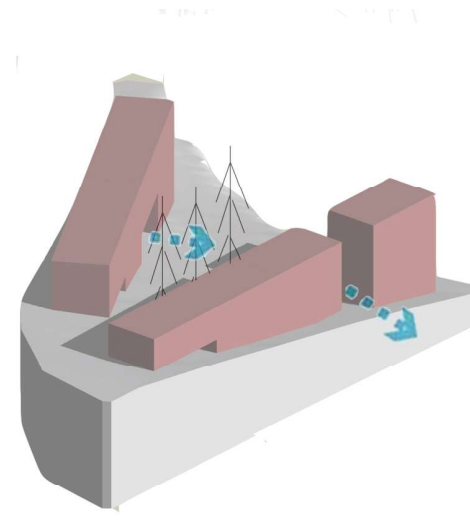
internal space
courtyard interaction

The design of internal space as open courtyard will welcome the surrounded public to be engaged on events.



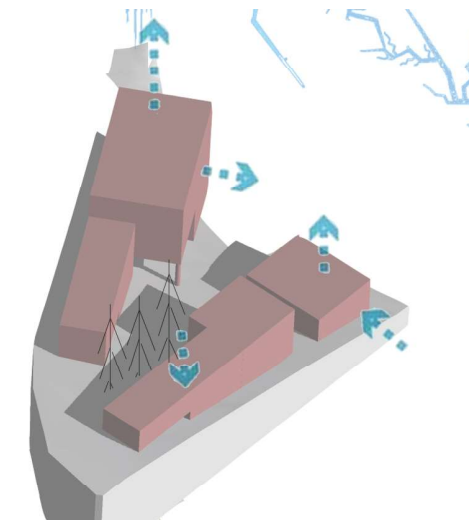
Horizontal axes visual connections

The main horizontal axes of visual connection will facilitate the recognition of important spaces in connection with the site.



Vertical axes opening connection

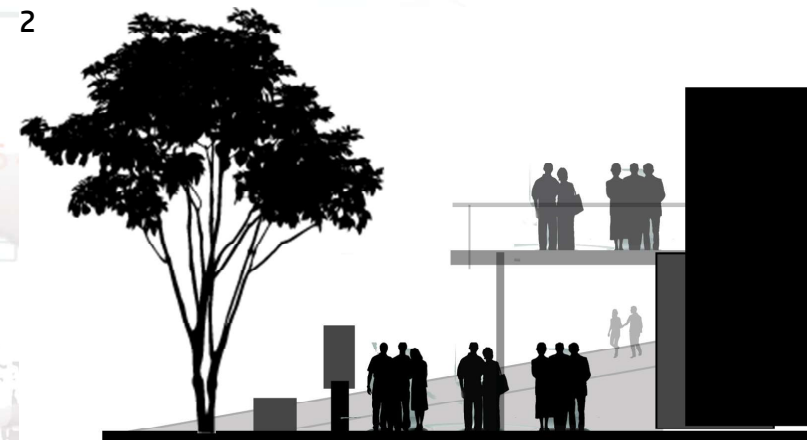
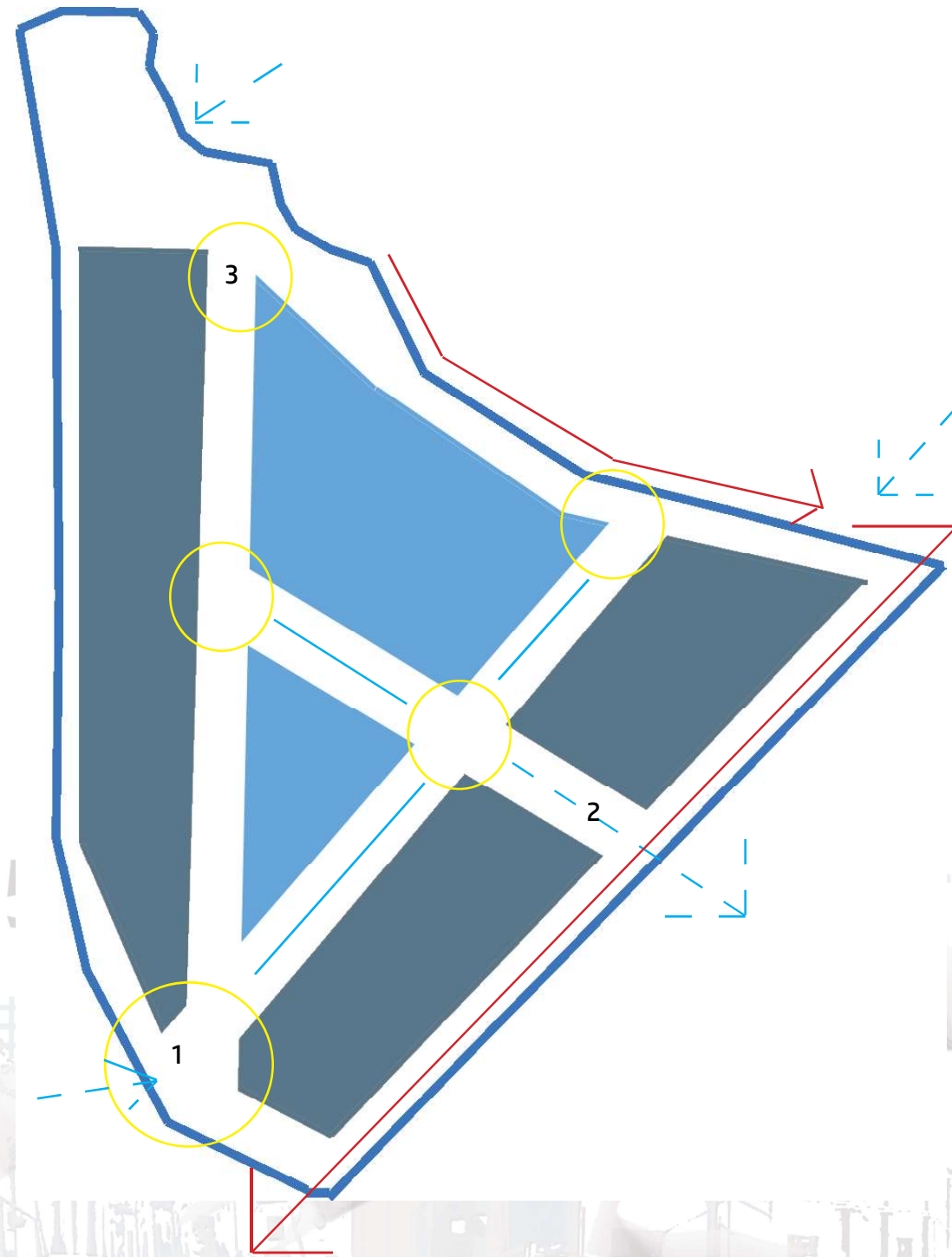
The vertical axes is in relation to the existing pedestrian and vehicular paths which will facilitate possible entry ways within the surrounded area.



Hierarchy

The hierarchy of the structure marked by the edge of the site will rule the schematic design of providing natural access to sun light and ventilation.

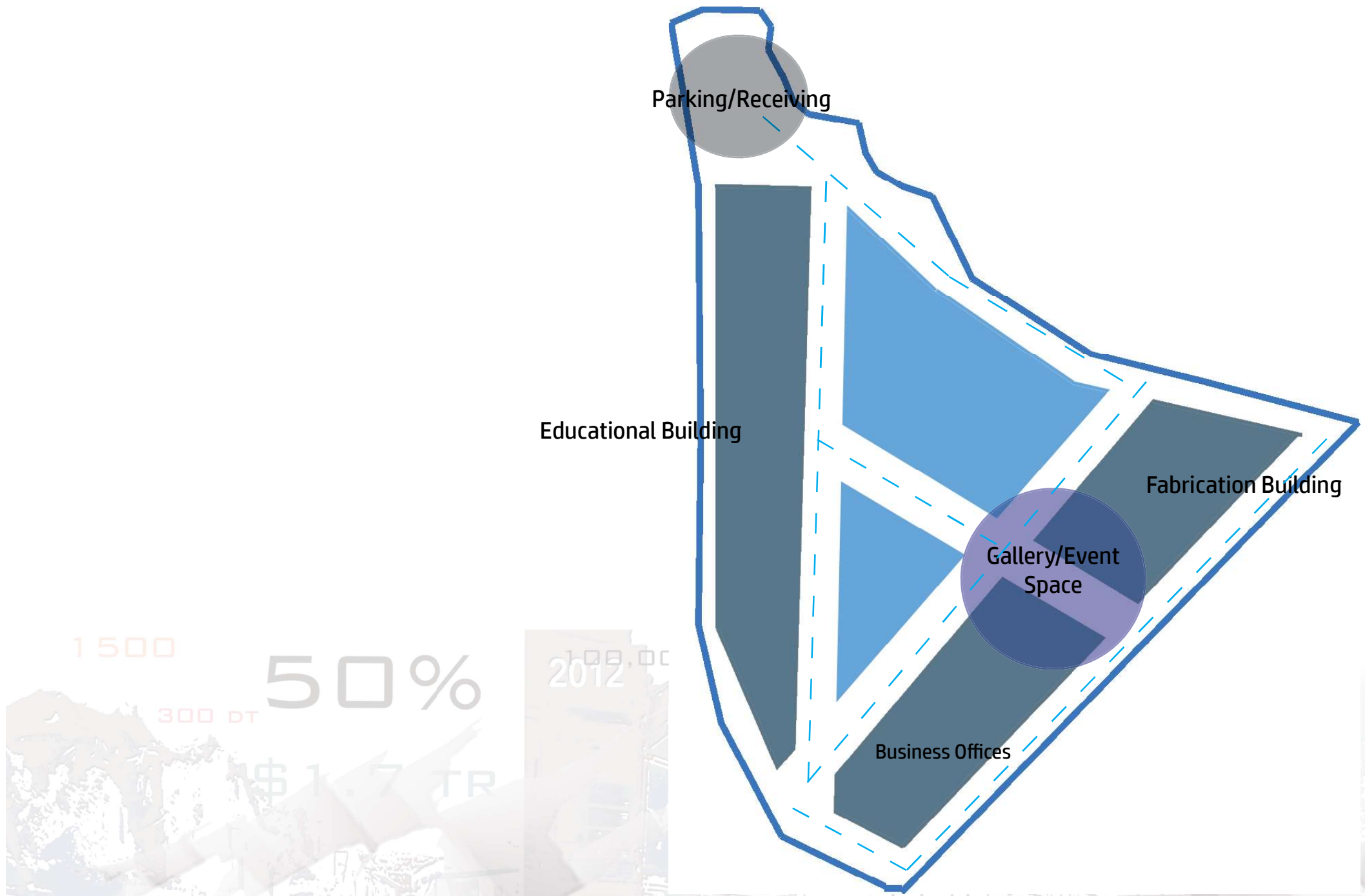
1.4. Program: Function and Circulation-Relative to Site and Context



Nodes/ Interaction point
Existing Ramp/ Walking pad

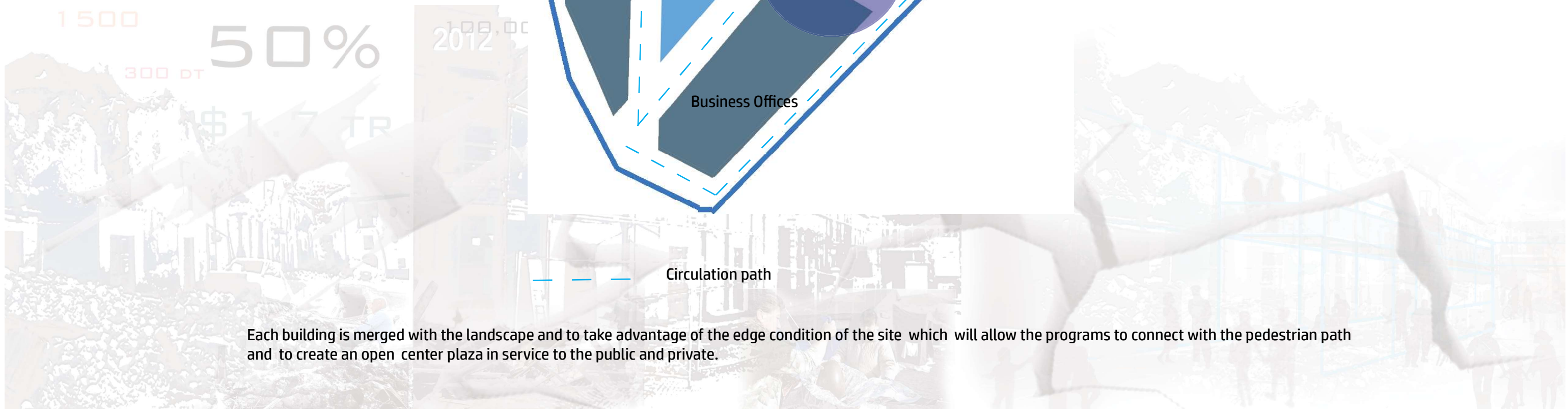
Entrances/ Exits

Future possibility of creating an educational campus in service for the community for any future calamity. Nodes of interaction are contributing in balanced visual connection and serve as median point within the site and future dwellings. Transitional area serves and connect each functional building by taking advantage of the existing topography.

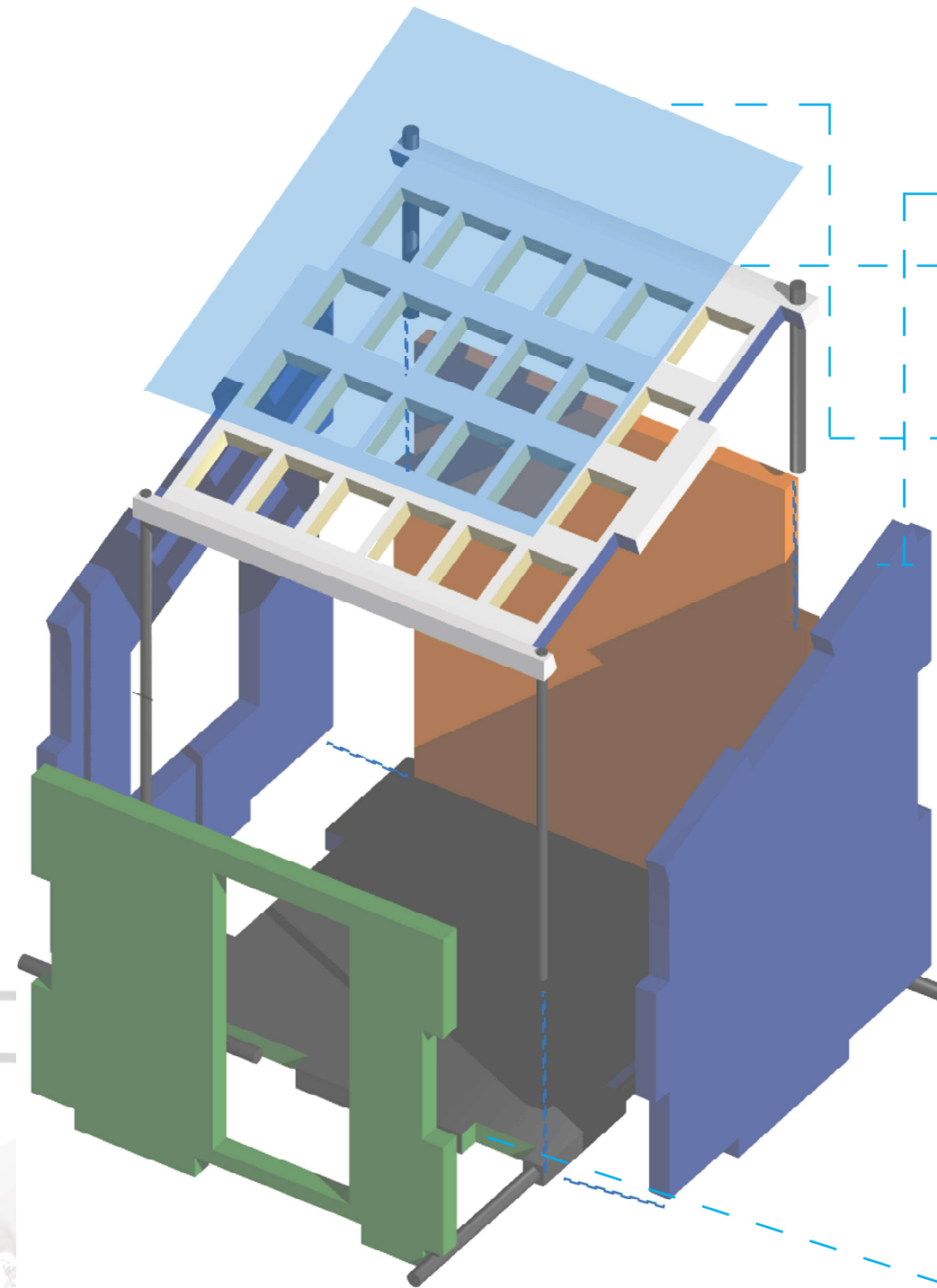


--- Circulation path

Each building is merged with the landscape and to take advantage of the edge condition of the site which will allow the programs to connect with the pedestrian path and to create an open center plaza in service to the public and private.



1.4.1. Program: Function and Circulation- Relative to Shelter Model

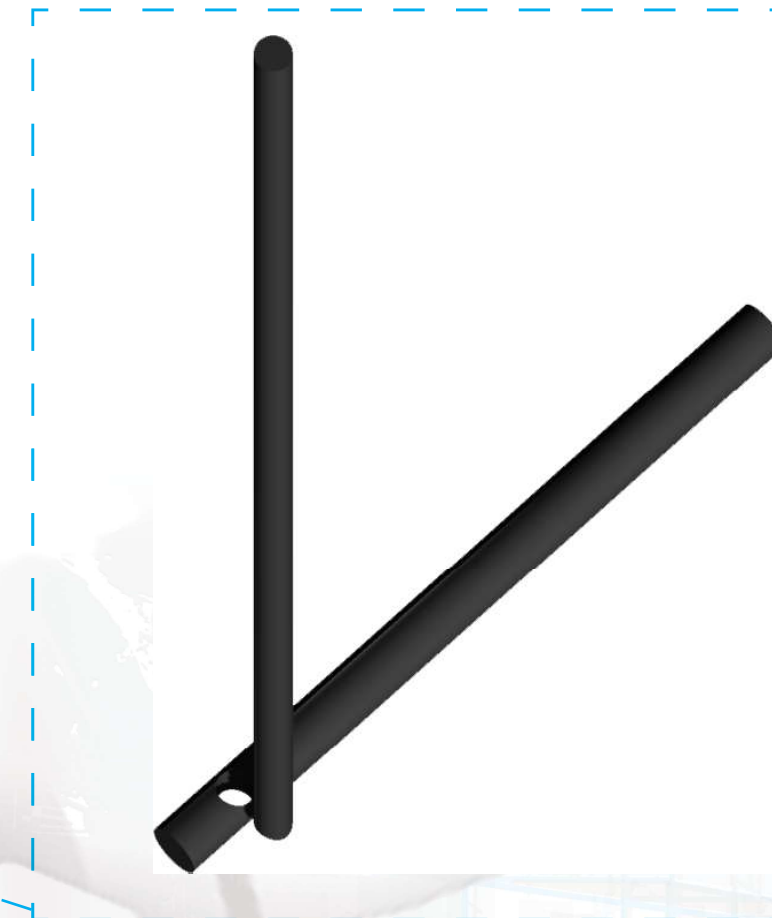


Light weight material intent for easy transportation and deployment to the site

Internal aluminum rod that connect each wall in few easy steps .

The application of composing the shelter will not take more than 30 min. for one module.

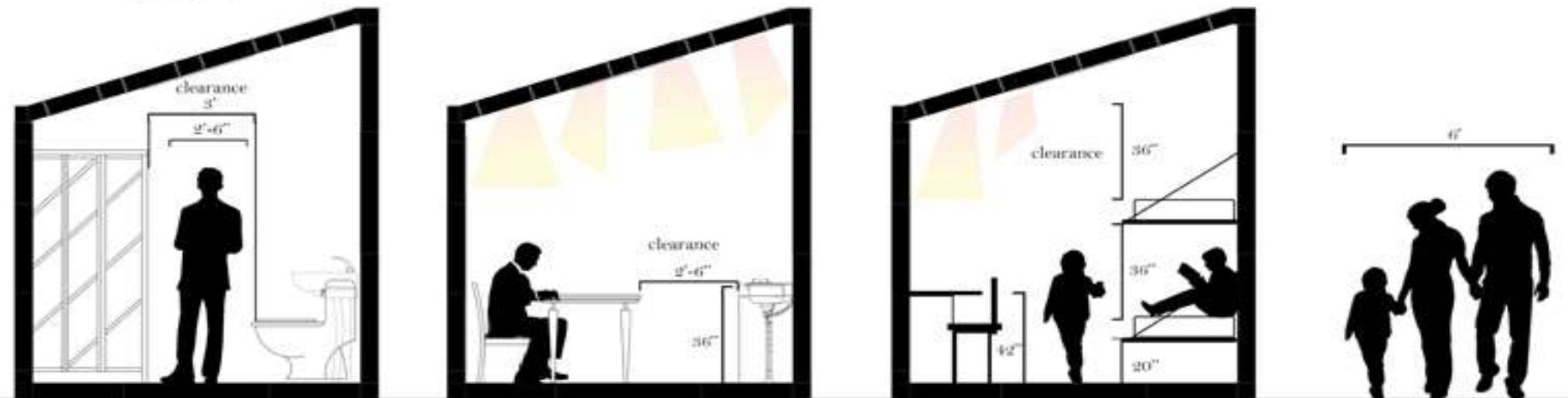
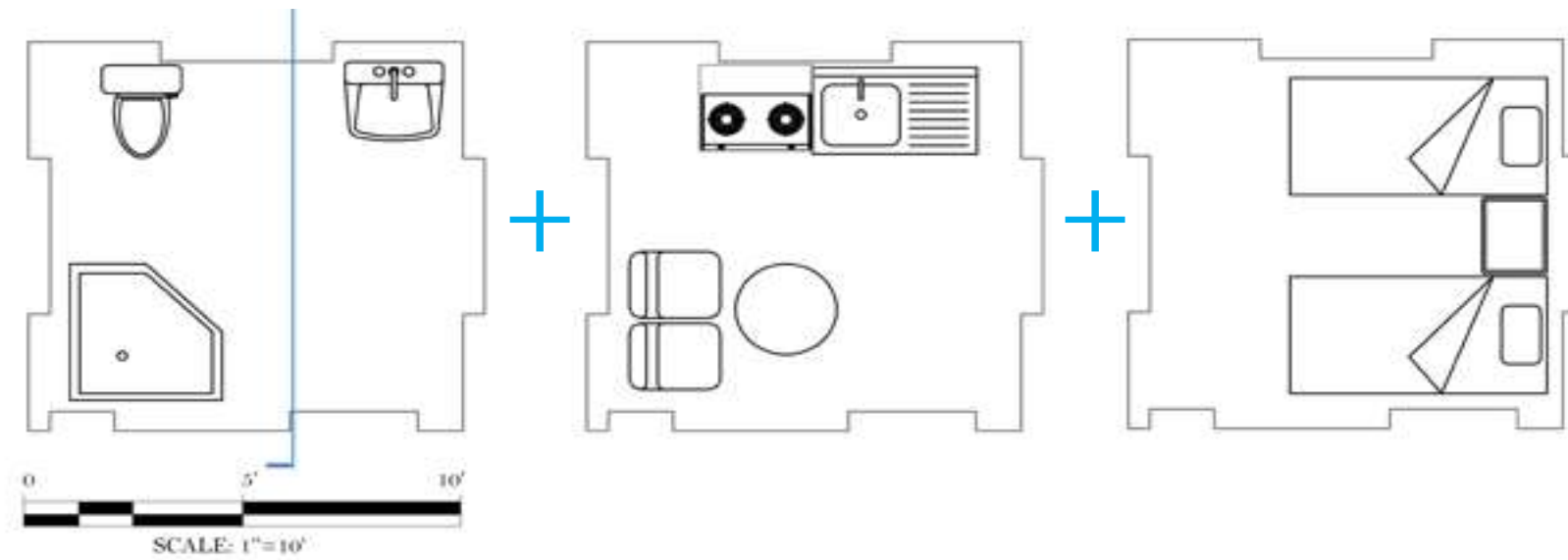
The roof is the only wall that will provide with natural light to the interior space which can be customizable by reducing or locking each squared opening . A thin layer of clear plastic will protect the opening of the roof.



Since the late nineties, United States went through a drastic change of creating functional modern design within domestic spaces. In fact, the making of modernism was focused on creating accessible and functional spaces by lighting up regular spaces in contrast of the lifestyle of many regular people of today.

As a common point of discussion, most European citizen is still stuck into the past, rather than evolve toward the evolution of modernism, in term of dwelling. Our lives are being modernized through the advance of technologies and consumer products, but the space that we usually occupied have been change very slowly, in accordance of what a space need.

Orthographic drawings of the deployable shelter



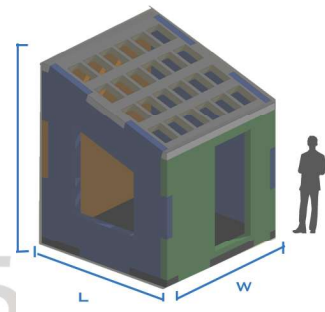
Space Distribution Basic Activities

- Bathing & resting space
- Eating and Living space
- Sleeping space

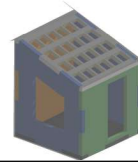
Future Possibilities

TYPOLGY MATRIX

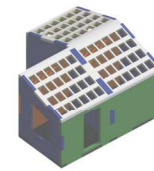
1 MODULE = 100 SF
10' W x 10' L x 11' H



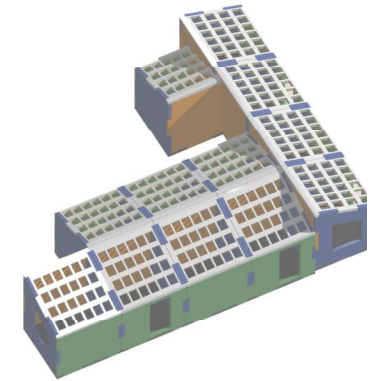
SINGLE MODULE



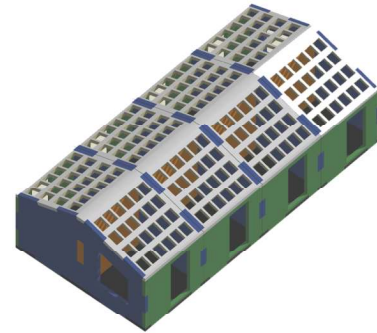
T- MODULE



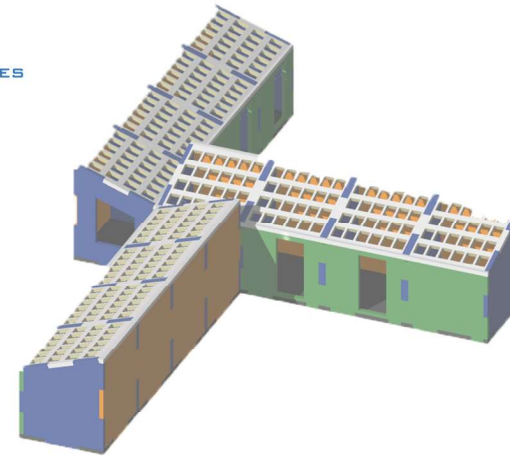
L/C- MODULE



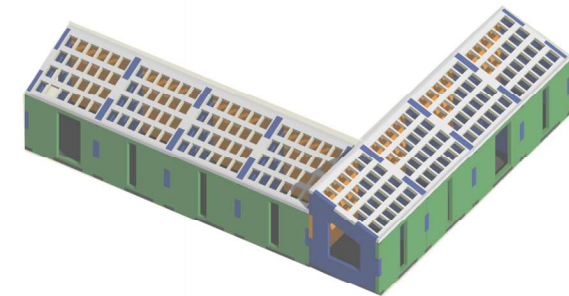
8 MODULES



16 MODULES



8 MODULES



The union of 3 module will contribute to satisfy a family unit of 4 people.

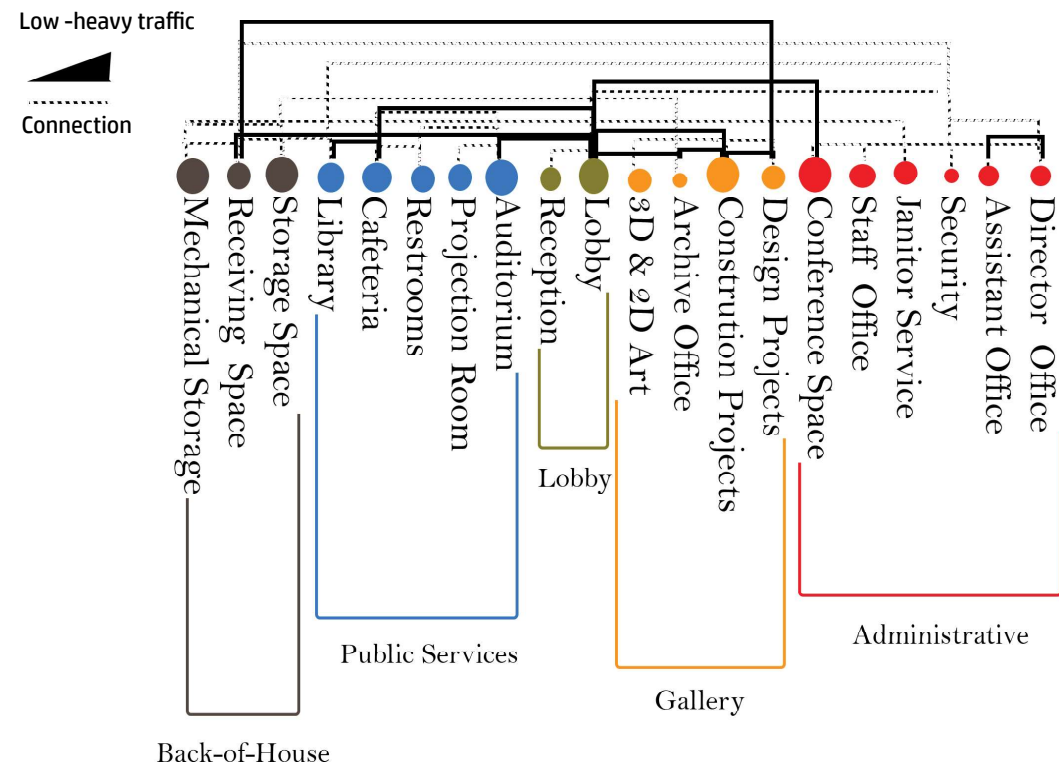
Prefab material included in the shelter will be light weight cardboard or plastic sustained by a light weight frame made of aluminum that interlock to each connection to secure the edges of each wall .

The union of multiple module will allow to create different layout and private internal courtyard.

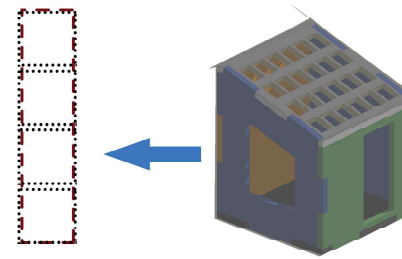
Each unit can be easily deployed and construct by leading the resident to be able to customize it on its own need.



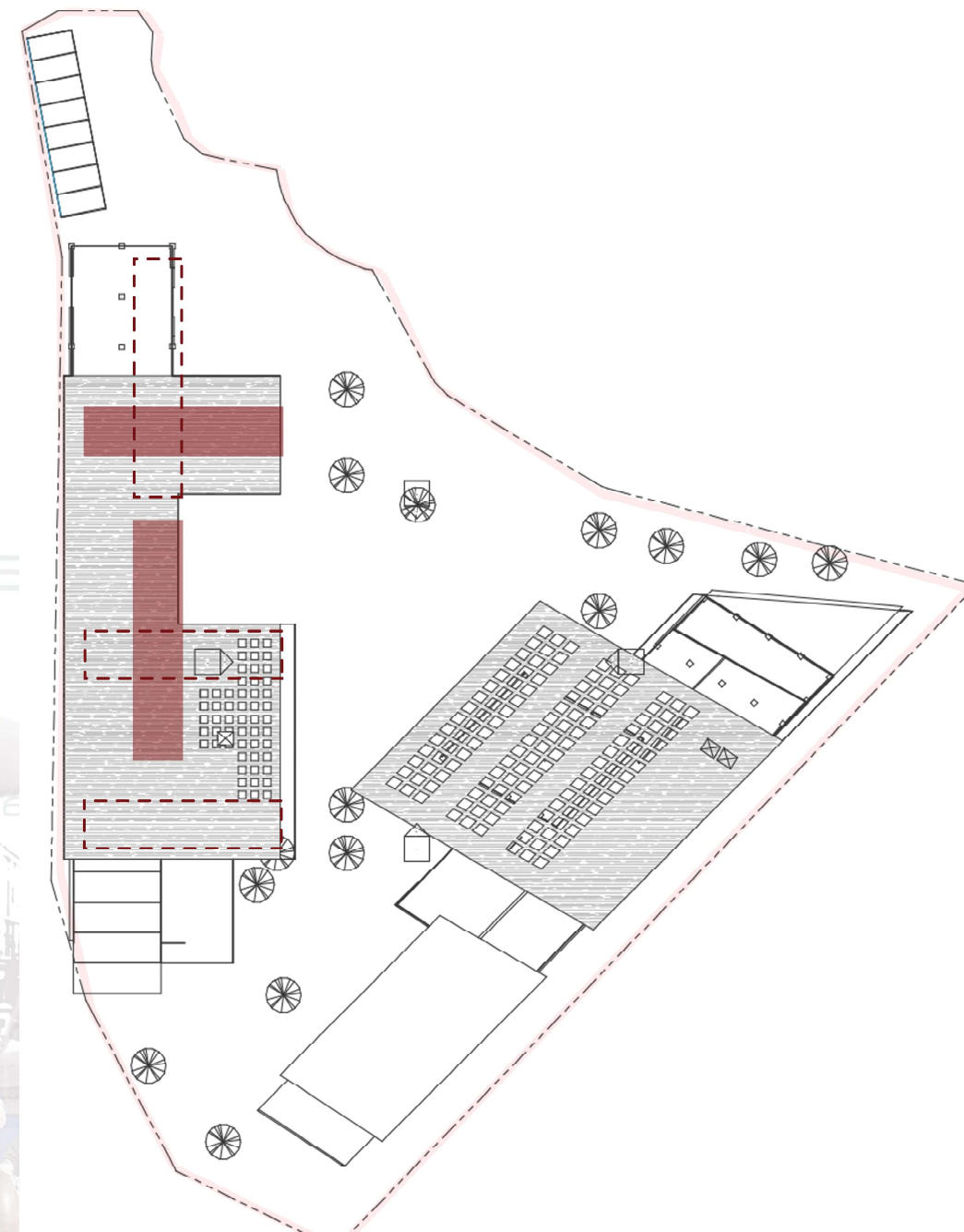
Program Distribution



4 MODULES
FOR A TOT
OF 10' X 40'



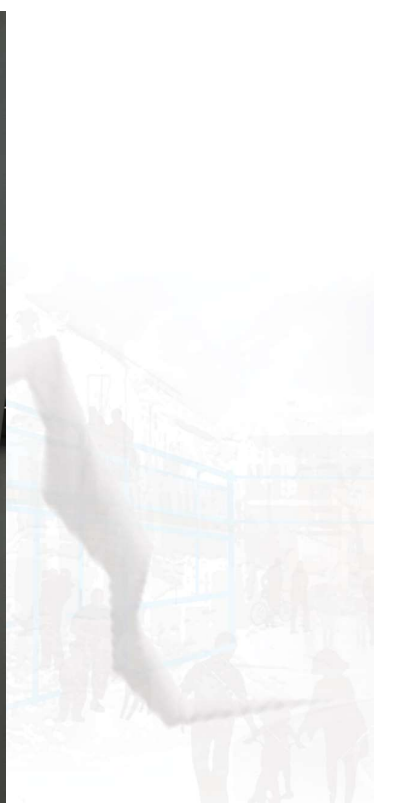
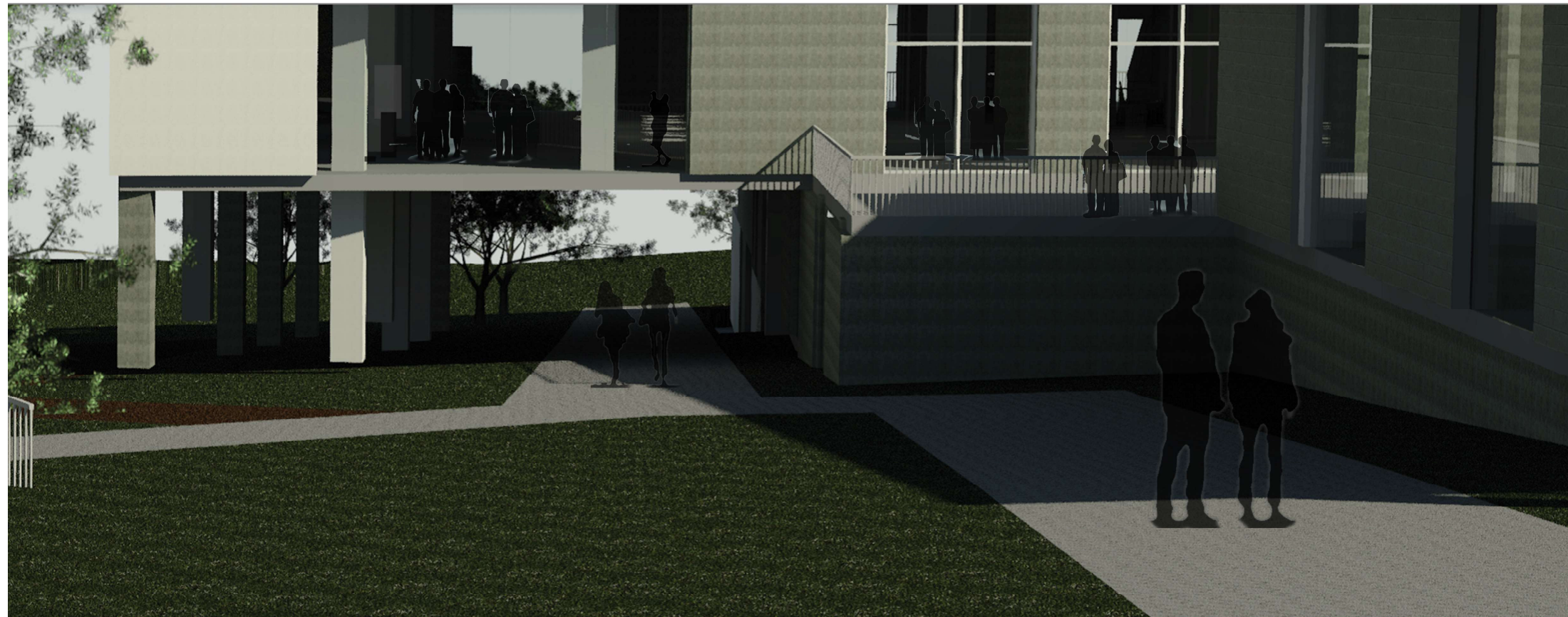
FUTURE POSSIBILITIES



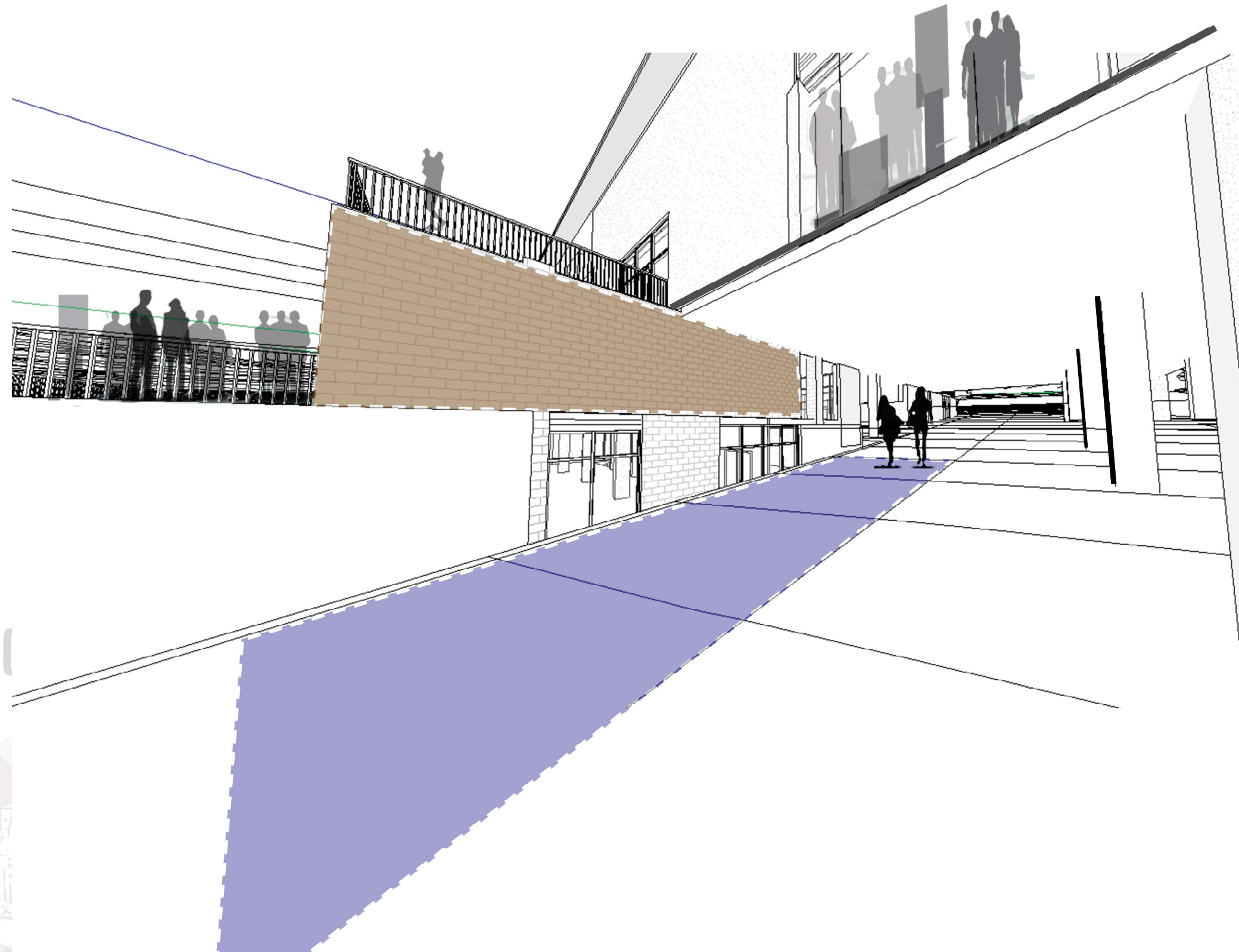
The program is split into three different building creations. Firstly, the educational building located at the west edge of the site which will host lecturing and learning educational fabrication of any project. The second building, the fabrication area, is where the project takes form situated at the east edge side of the site in connection with the natural landscape. The goal of the third building is to welcome the public to the gallery and event space where exhibitions and representation of different projects can be evaluated and demonstrated by architects, engineer, students and public.

The gallery building is a social gathering space where all different discipline can come together to share a common need, innovation. The functional program allow the public to be easy accessible from most of the edges of the site.

1.5. Space & Spatiality



1.6. Material & Skin



The design of this building in contrast of its material and tectonic creates a new engagement to the public. By activating different building scales, each space interacts with the pedestrian while informing the function of the space. Moreover, cantilever structure becoming living shelter or social point of interaction, and the overlapping of different material and structures contribute to create a dynamic space.

1.7. Systems Integration: Anti-seismic device

System Detail & Principle

A creation of a shock absorber is velocity dependent devices which depend by a piston, a piston rod and a cylinder pipe. Its form allows the future building to freely move during a natural calamity conditions while providing a displacement control and dissipation of forces during the unexpected movement caused by the event.

The flow of a fluid that travel from one chamber of the cylinder pipe to the other measure the resistance force which determine the damping feature of the shock absorber.

This devise allows the possibility to create and optimize the design of many building at risk of inevitable calamities.

Mode of Operation

$$F = C \times v^{\square}$$

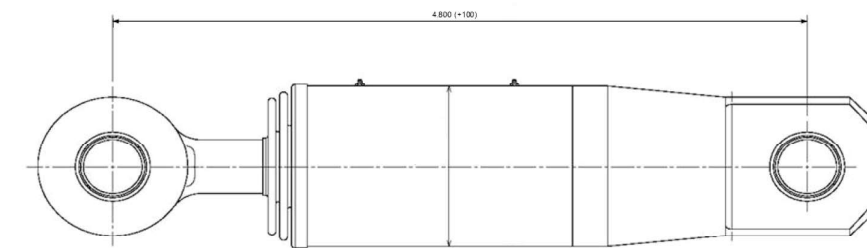
Where:

F: Maximum force [kN]

C: Damping constant [kN/(m/s) $^{\square}$]

v: Velocity [m/s]

\square : Damping exponent [-]



piston diameter: 1050 mm
rod diameter: 500 mm
stroke: 800 mm
operating pressure: 250 bar
test pressure: 400 bar
weight approx.: 28.000 kg

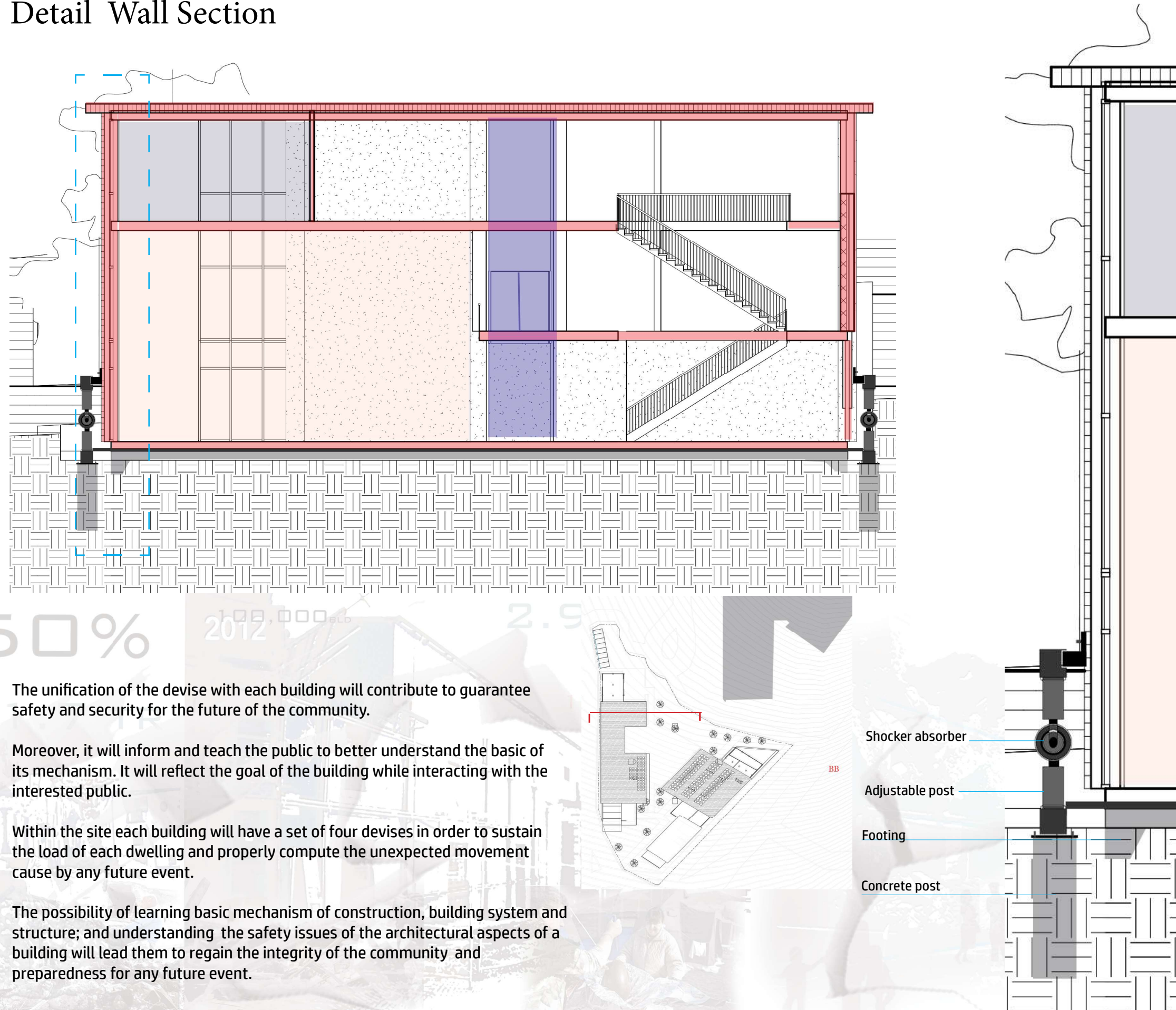
The fluid

The internal fluid used must be against aging and temperature resistance, in order to avoid overtime internal corrosion, so special additives is need it to maintain constant viscosity.

Benefits

- Significant increase in the safety of the structure and its users
- Longer lifespan of the devices due to finest quality standards for all components
- Applicable for new structures as well as retrofitting of existing ones

Detail Wall Section



The unification of the devise with each building will contribute to guarantee safety and security for the future of the community.

Moreover, it will inform and teach the public to better understand the basic of its mechanism. It will reflect the goal of the building while interacting with the interested public.

Within the site each building will have a set of four devises in order to sustain the load of each dwelling and properly compute the unexpected movement cause by any future event.

The possibility of learning basic mechanism of construction, building system and structure; and understanding the safety issues of the architectural aspects of a building will lead them to regain the integrity of the community and preparedness for any future event.

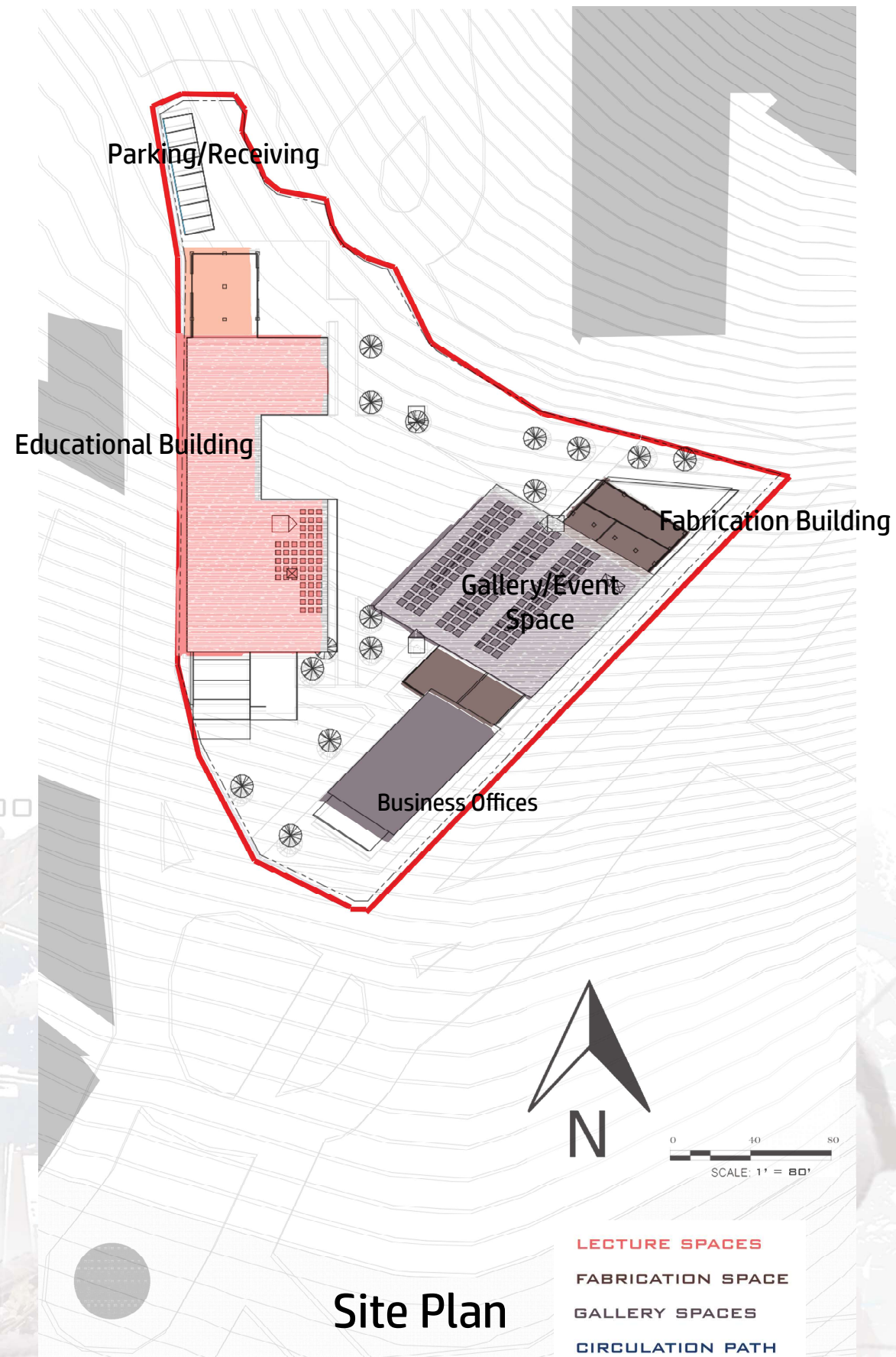
Shocker absorber

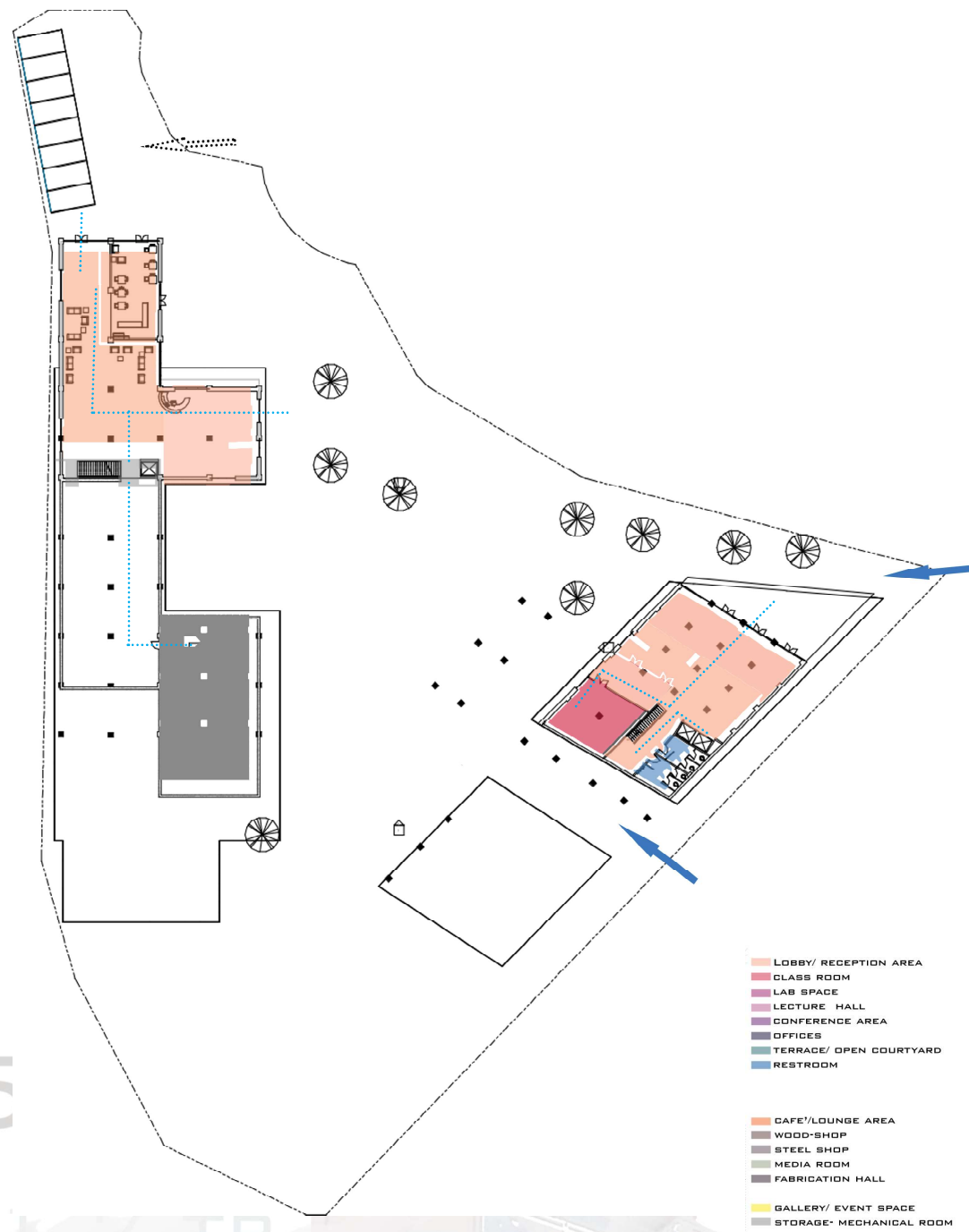
Adjustable post

Footing

Concrete post

1.8. Final Documentation- Orthographic Rendering





Sub Terrain Level 1

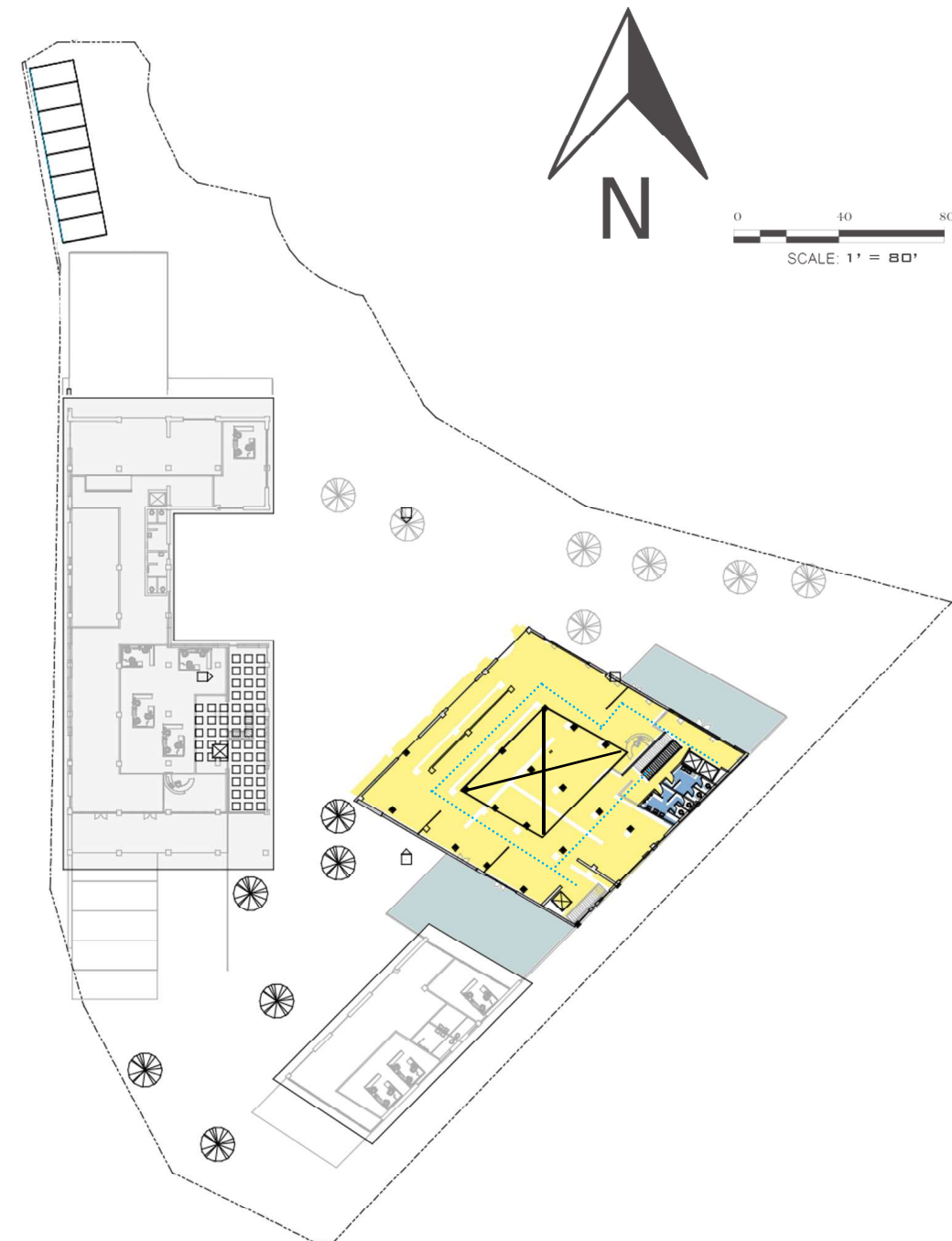
It will include:

- a 1/3 of the lecturing building to become a lobby area in connection with a cafeteria and mechanical storage, in order to welcome and interact with the lowest edge of the site facing the north.
- The fabrication building first level will accommodate a wood shop and class room.

Sub Terrain Level 2

It will include:

- In the educational level few classroom and the lecture hall.
- In the fabrication level class room/ media room, steel shop and mechanical storage.

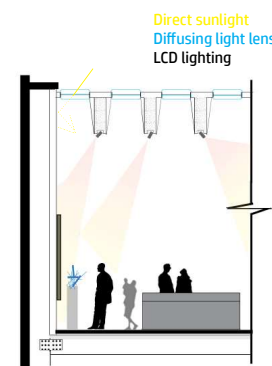
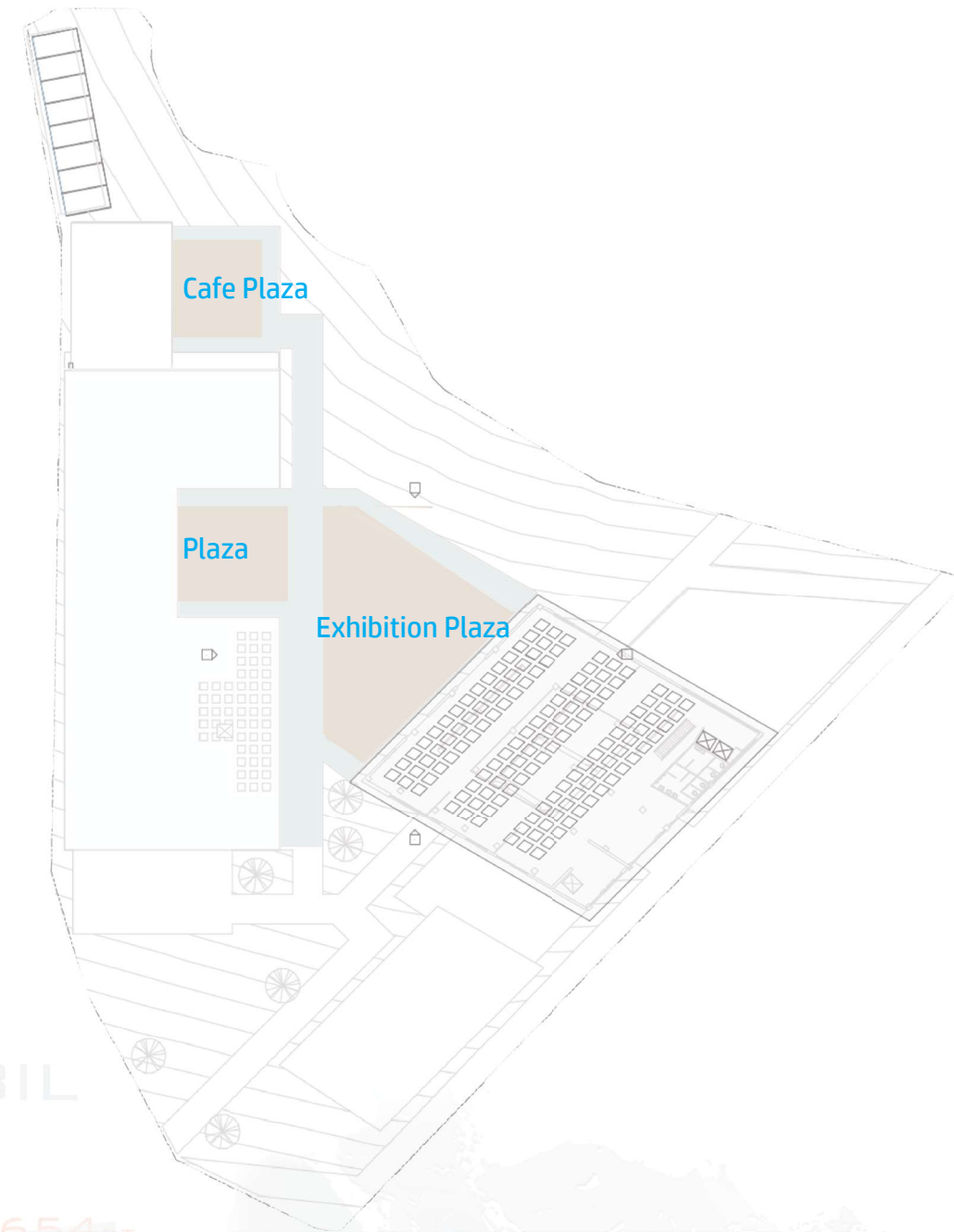
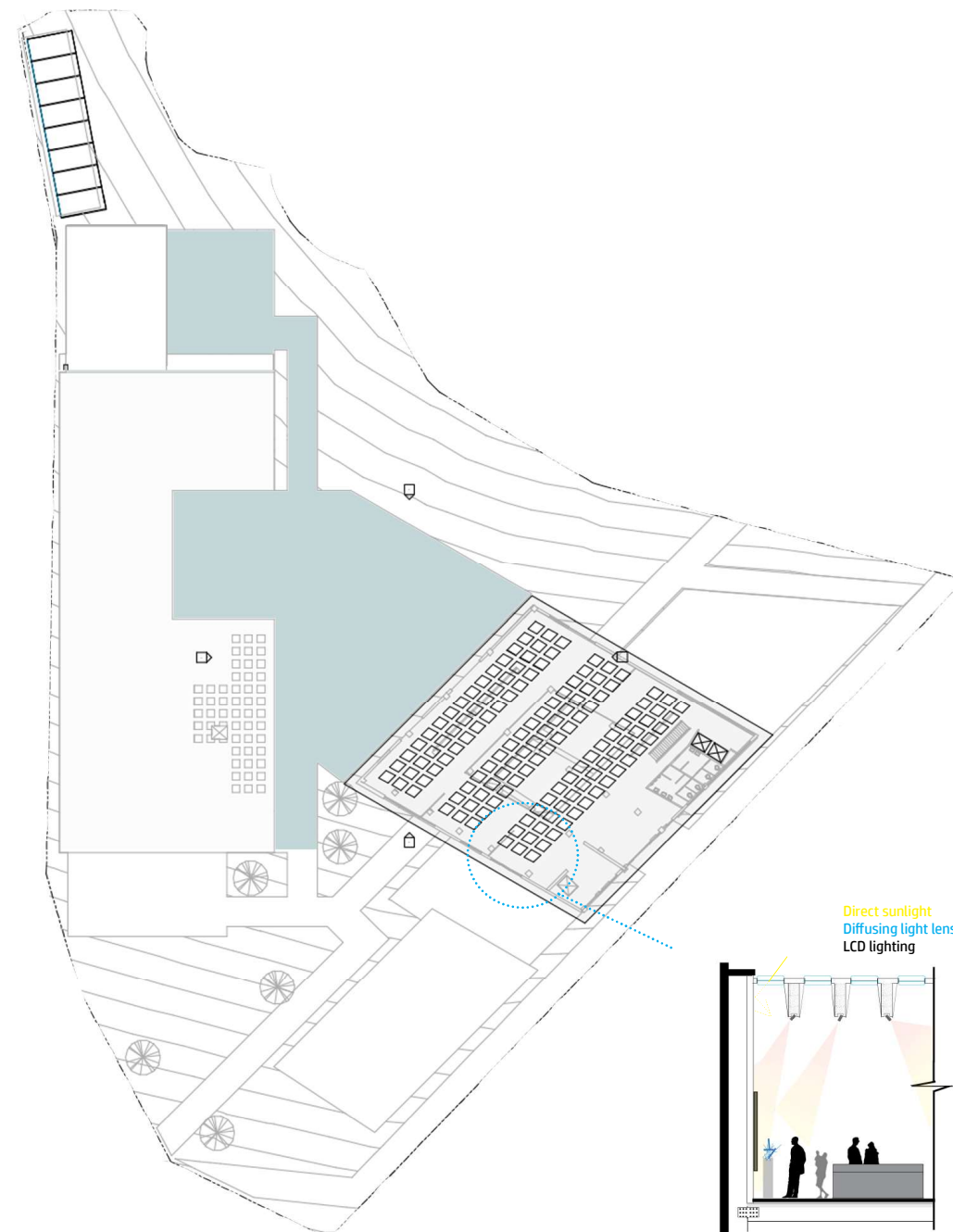


Ground Floor

- It will include:
- Most of the offices and lab spaces connected with the first floor of the gallery space.
 - Open patio and terraces can play the role of outdoor courtyard to show case any projects during the favorable seasons.

First Floor

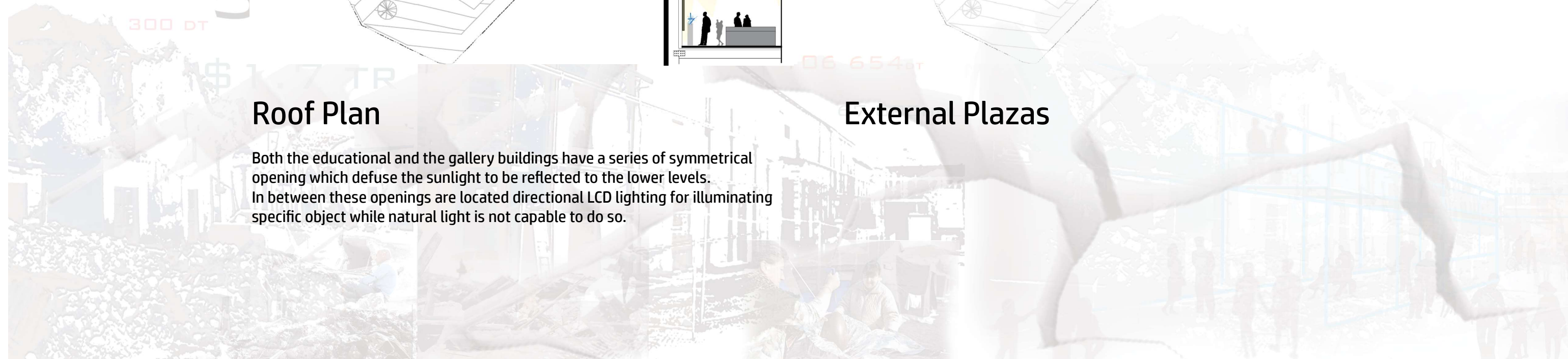
- It will include:
- The majority of the area is dedicated to the second level of the gallery space that overlook the first floor, in order that the opening of the roof can flow the natural light through each level.

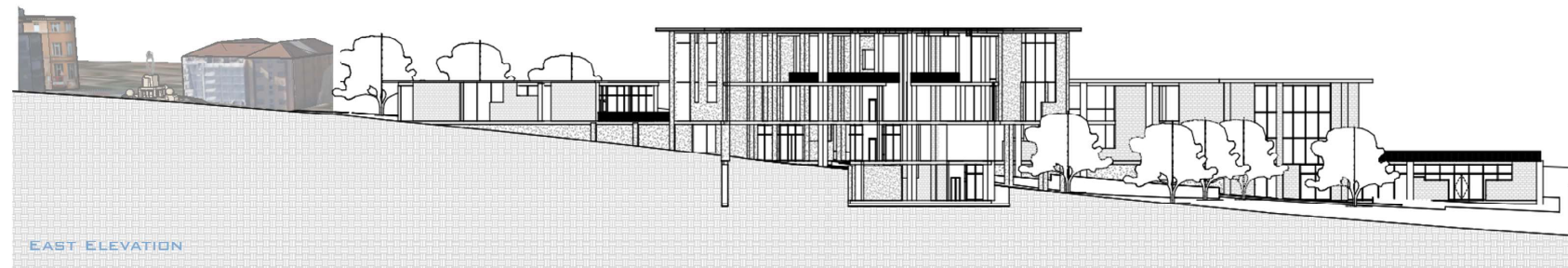
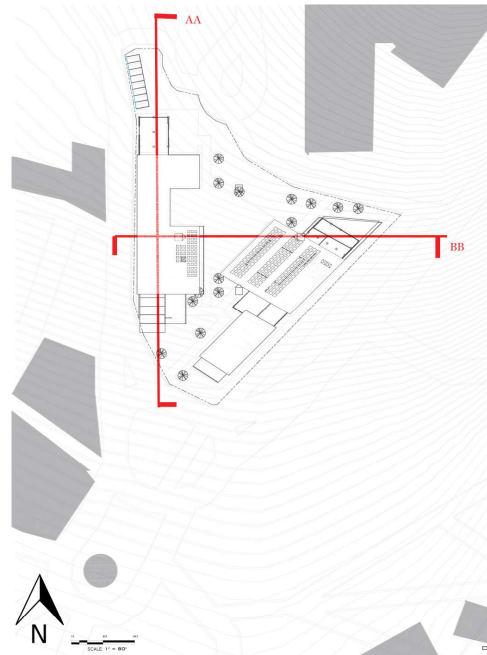


Roof Plan

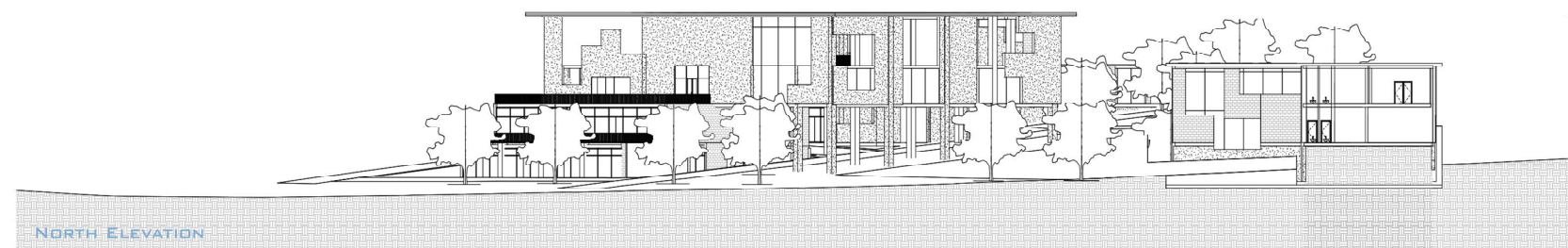
Both the educational and the gallery buildings have a series of symmetrical opening which defuse the sunlight to be reflected to the lower levels. In between these openings are located directional LCD lighting for illuminating specific object while natural light is not capable to do so.

External Plazas

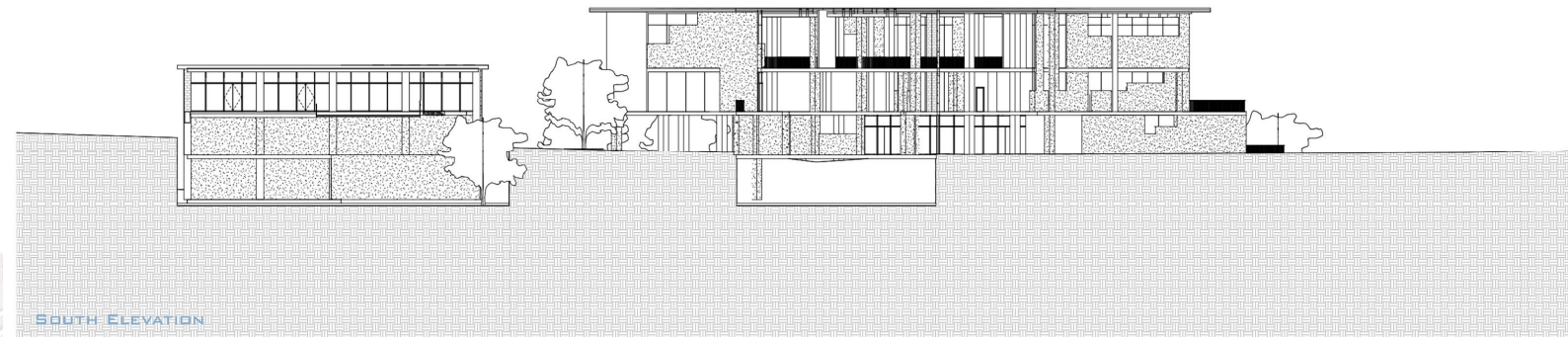




EAST ELEVATION



NORTH ELEVATION



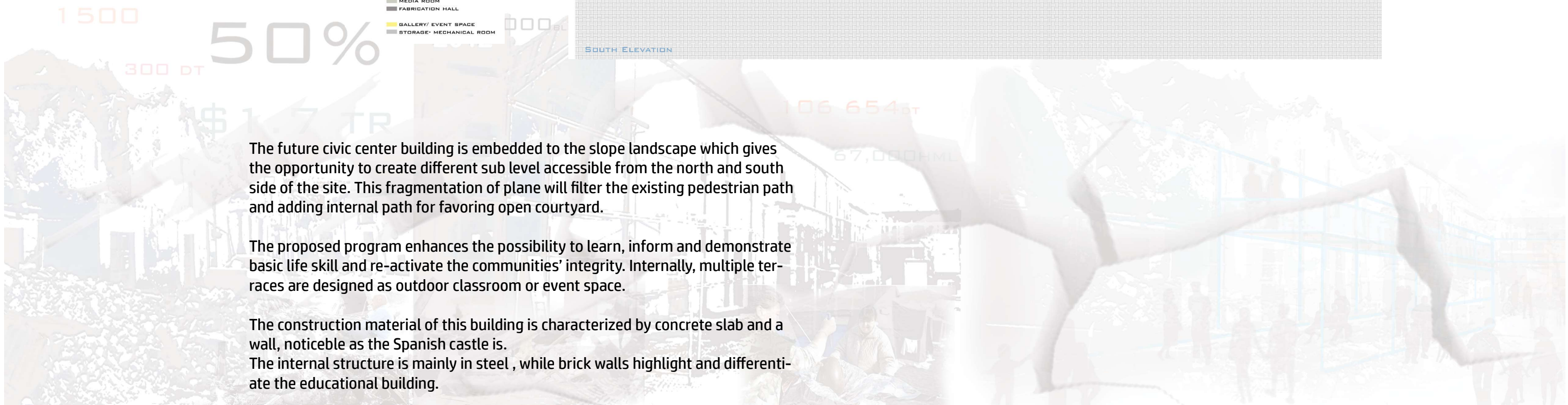
SOUTH ELEVATION

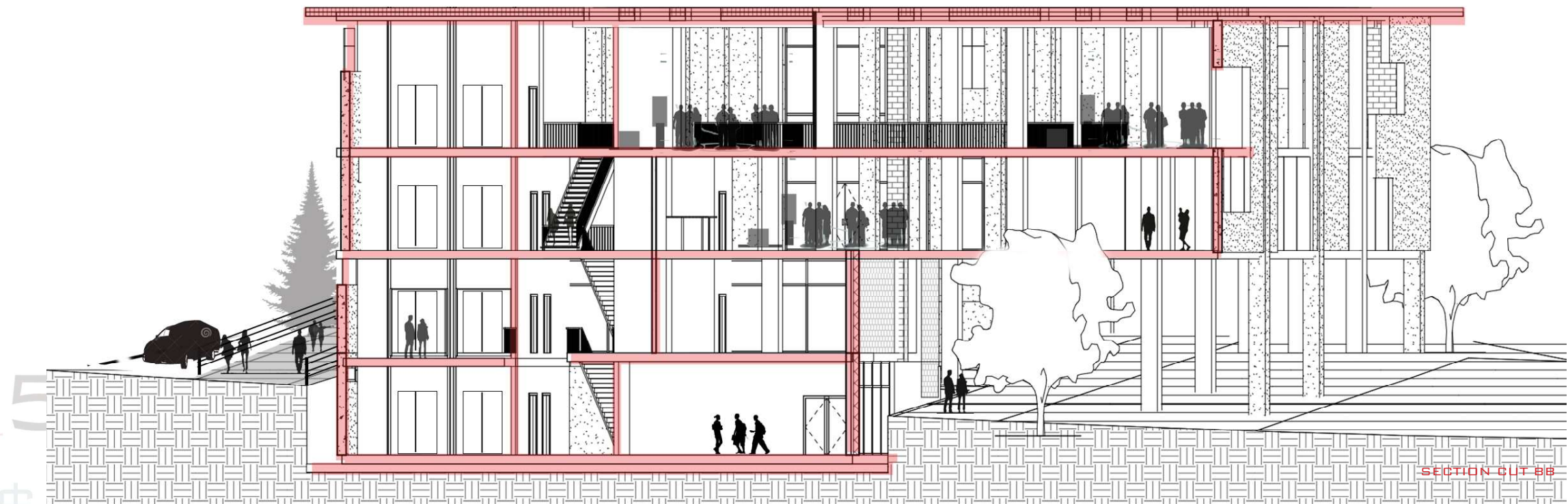
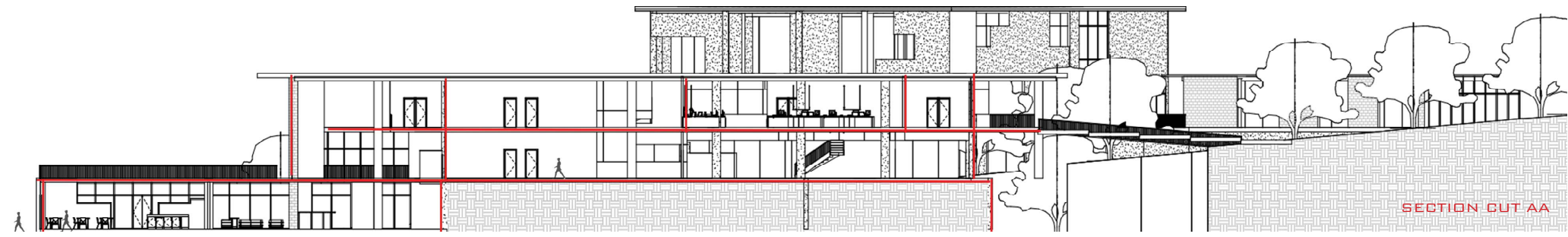
- | | |
|-------------------|--------------------------|
| LECTURE SPACES | LOBBY/ RECEPTION AREA |
| FABRICATION SPACE | CLASS ROOM |
| GALLERY SPACES | LAB SPACE |
| CIRCULATION PATH | LECTURE HALL |
| PRIVATE VS PUBLIC | CONFERENCE AREA |
| | OFFICES |
| | TERRACE/ OPEN COURTYARD |
| | RESTROOM |
| | CAFE/LOUNGE AREA |
| | WOOD SHOP |
| | STEEL SHOP |
| | MEDIA ROOM |
| | FABRICATION HALL |
| | GALLERY/ EVENT SPACE |
| | STORAGE- MECHANICAL ROOM |

The future civic center building is embedded to the slope landscape which gives the opportunity to create different sub level accessible from the north and south side of the site. This fragmentation of plane will filter the existing pedestrian path and adding internal path for favoring open courtyard.

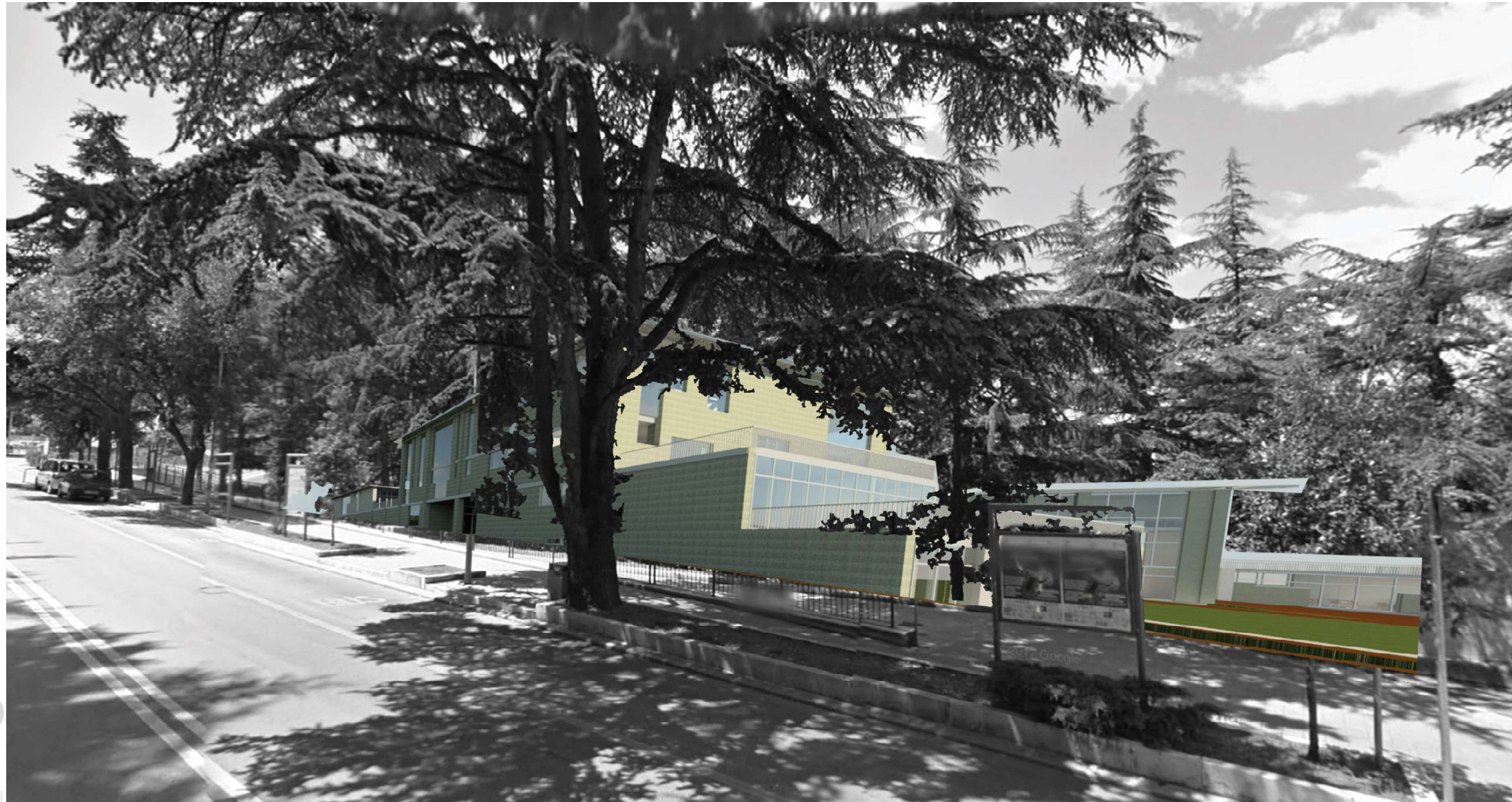
The proposed program enhances the possibility to learn, inform and demonstrate basic life skill and re-activate the communities' integrity. Internally, multiple terraces are designed as outdoor classroom or event space.

The construction material of this building is characterized by concrete slab and a wall, noticeable as the Spanish castle is. The internal structure is mainly in steel , while brick walls highlight and differentiate the educational building.





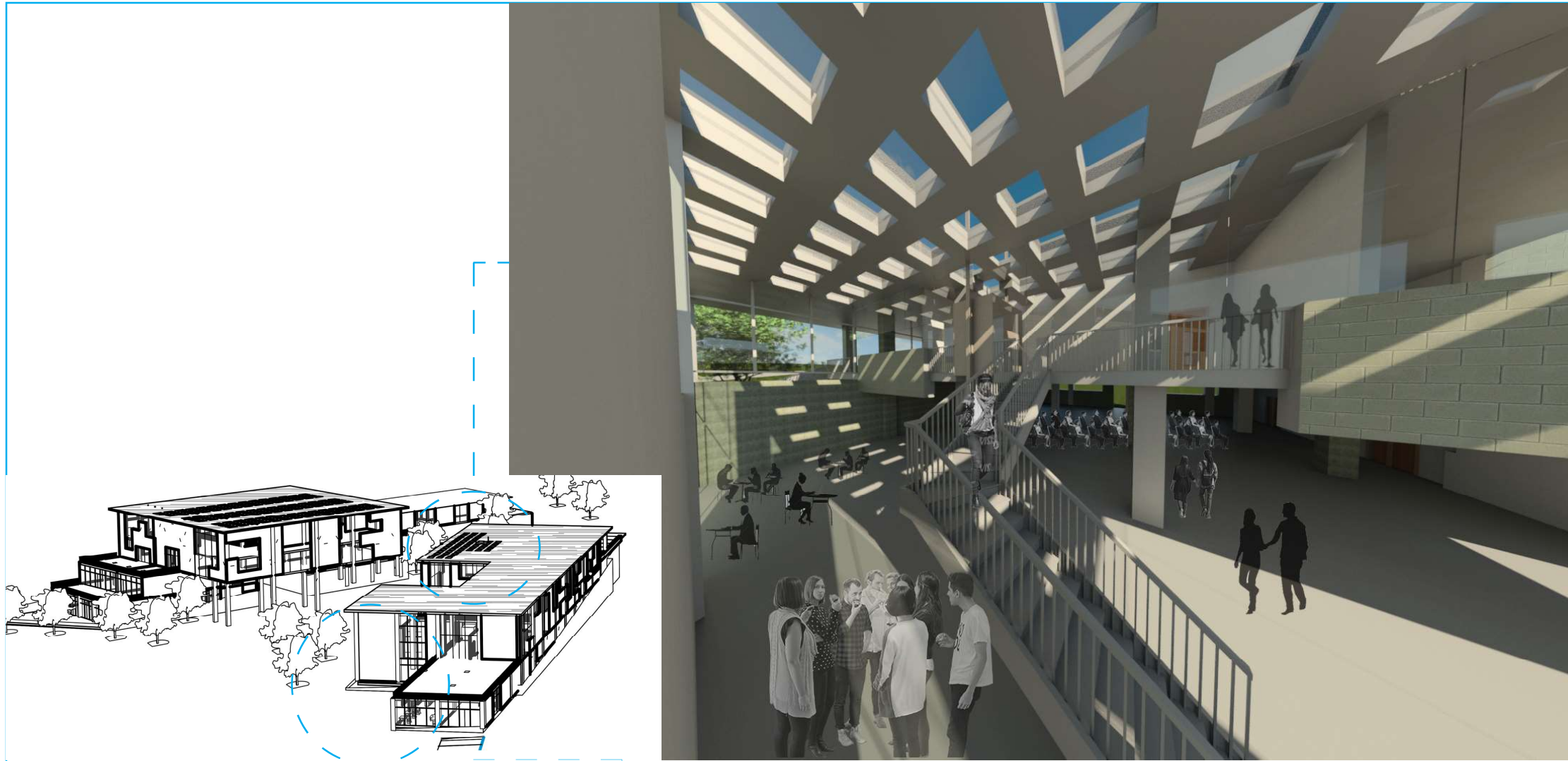
Rendering Drawings

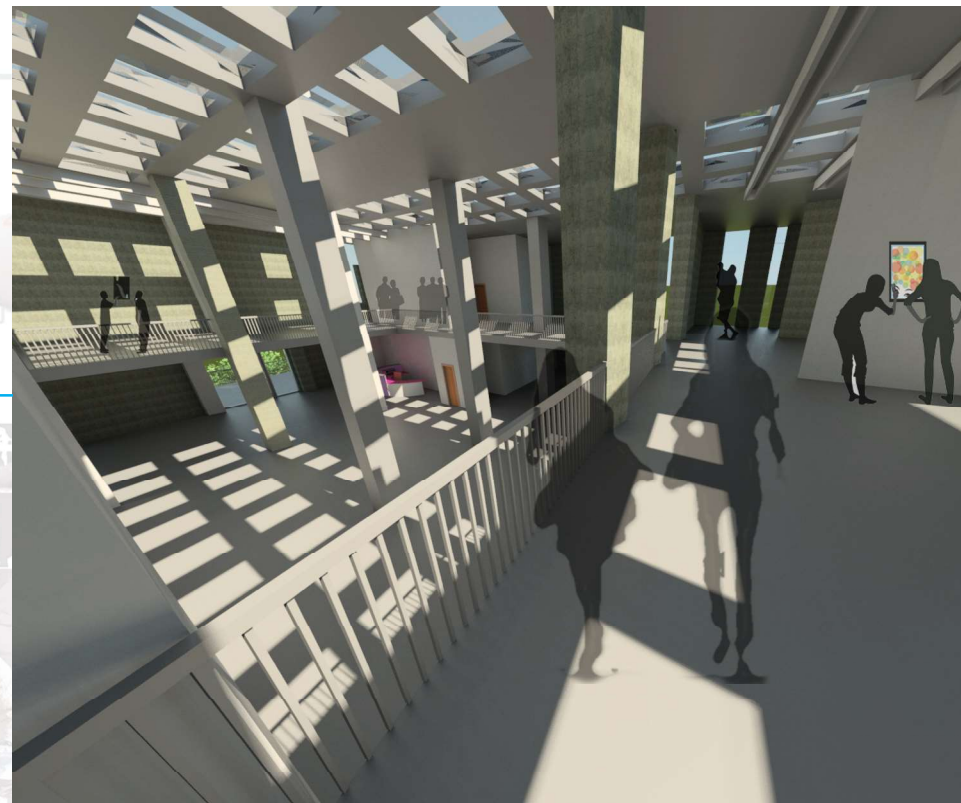
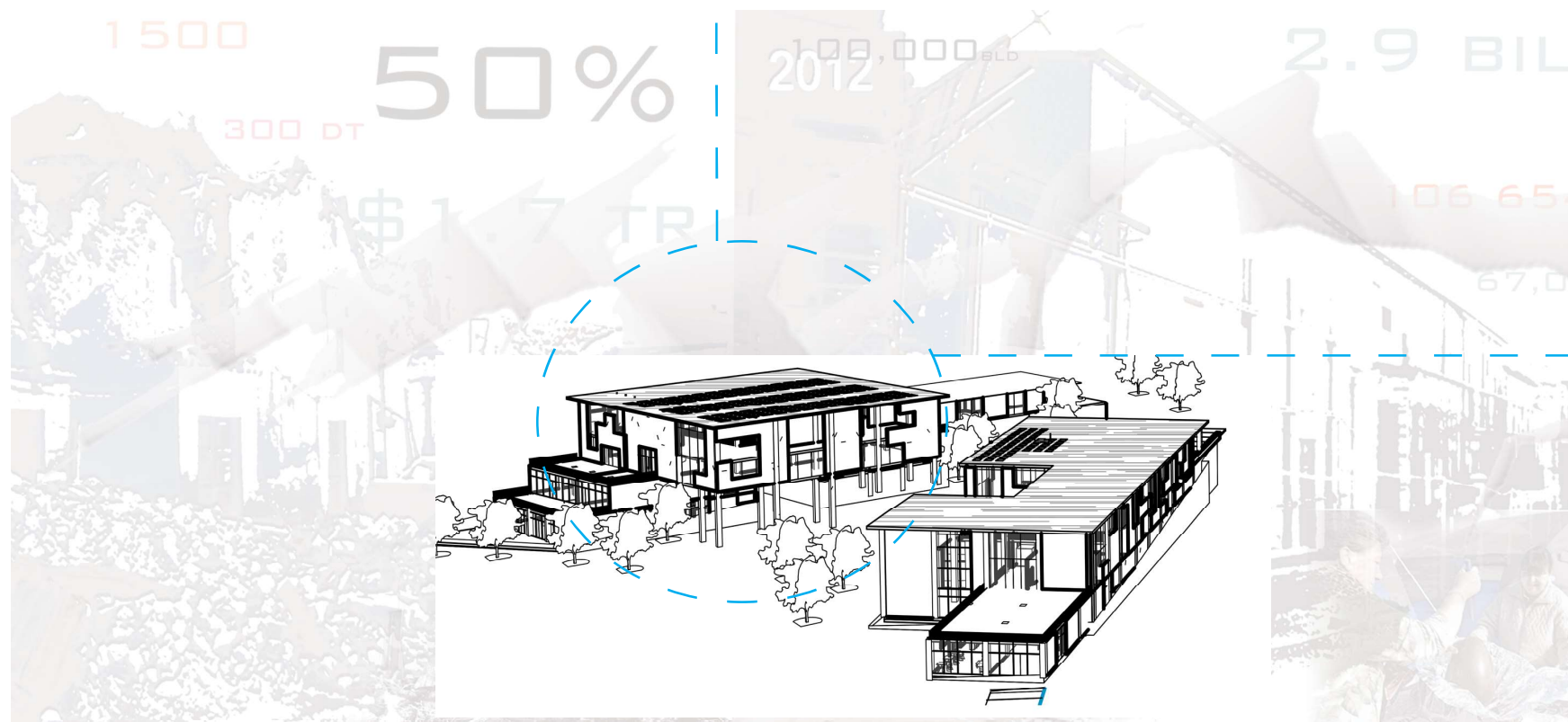




Composition Model









1 500

50%

2012

2.9 BIL

300 DT

\$ 1.7 TR

100,000

106 654 DT

67,000 HML

SECTION II:

CH.2 - Critical Response

Critical Response



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2.1. Reflections by Student

During the course of the year, finding a considered issue for thesis was a little challenge, but after the ending of this chapter of my student life, I am proud of my outcome. This thesis is well connected with my personal background and experiences, the suffering and the psychological negativity that a natural catastrophe can cause is overwhelming during the process of my research.

As I started my journey, I knew that my purpose of this research is to find valuable solutions that can alleviate these negative circumstances, but how to do so was the challenge part. During the process of the research, I found really interesting the discovery of different interventions regarding earthquake resistance building, but in most of them did not fulfill my scope. Being able to design an innovative structure capable to interact with the public as daily basis of their life and engaged the community to understand safety skill, is my goal.

Thank the intervention made by Renzo Piano with the Auditorium del Parco closed to the Spanish fortress, I was capable to take part on the second face of giving back what the community have lost, and considering his approach of using simple geometrical trio of cube that tests the efficiency and expressiveness of spaces that were generated by need and necessity, gave me the possibility to create my interpretation.

This thesis was able to work on physical and environmental conditions in creating innovated way of construction that will contribute for the long run of a community. The scope of creating a didactic building able to teach, inform and demonstrate the basic mechanism of anti-seismic structure, will bring positive architecture and hands-on experience for students, architects, researchers, engineers which all share the need to help and grow innovative and adaptive solution for a specific site.

At the end the target of this thesis was to apply concept of resistant building in an innovated way of construction with the intent to create and re-activate the integrity and social point of interest for the community by the integration of informing and teaching. I am feeling satisfied at the end of this journey and knowing that I am leaving the academic life of architecture with my mark, give me the strength and the power to achieve the impossible.





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Int. J. Disaster Risk Sci., 3 (2012), pp. 45–55

Disaster Resilience: A National Imperative (2012)

Description

No person or place is immune from disasters or disaster-related losses. Infectious disease outbreaks, acts of terrorism, social unrest, or financial disasters in addition to natural hazards can all lead to large-scale consequences for the nation and its communities. Communities and the nation thus face difficult fiscal, social, cultural, and environmental choices about the best ways to ensure basic security and quality of life against hazards, deliberate attacks, and disasters. Beyond the unquantifiable costs of injury and loss of life from disasters, statistics for 2011 alone indicate economic damages from natural disasters in the United States exceeded \$55 billion, with 14 events costing more than a billion dollars in damages each.

One way to reduce the impacts of disasters on the nation and its communities is to invest in enhancing resilience--the ability to prepare and plan for, absorb, recover from and more successfully adapt to adverse events. *Disaster Resilience: A National Imperative* addresses the broad issue of increasing the nation's resilience to disasters. This book defines "national resilience", describes the state of knowledge about resilience to hazards and disasters, and frames the main issues related to increasing resilience in the United States. It also provides goals, baseline conditions, or performance metrics for national resilience and outlines additional information, data, gaps, and/or obstacles that need to be addressed to increase the nation's resilience to disasters. Additionally, the book's authoring committee makes recommendations about the necessary approaches to elevate national resilience to disasters in the United States.

Increasing National Resilience to Hazards and Disasters: The Perspective from the Gulf Coast of Louisiana and Mississippi: Summary of a Workshop (2011)

Description

Natural disasters are having an increasing effect on the lives of people in the United States and throughout the world. Every decade, property damage caused by natural disasters and hazards doubles or triples in the United States. More than half of the U.S. population lives within 50 miles of a coast, and all Americans are at risk from such hazards as fires, earthquakes, floods, and the wind. The year 2010 saw 950 natural catastrophes around the world--the second highest annual total ever--with overall losses estimated at \$130 billion. The increasing impact of natural disasters and hazards points to increasing importance of resilience, the ability to prepare and plan for, absorb, recover from, or more successfully adapt to actual or potential adverse events, at the individual, local, state, national, and global levels.

Assessing National Resilience to Hazards and Disasters reviews the effects of Hurricane Katrina and other natural and human-induced disasters on the Gulf Coast of Louisiana and Mississippi and to learn more about the resilience of those areas to future disasters. Topics explored in the workshop range from insurance, building codes, and critical infrastructure to private-sector issues, public health, nongovernmental organizations, and governance. This workshop summary provides a rich foundation of information to help increase the nation's resilience through actionable recommendations and guidance on the best approaches to reduce adverse impacts from hazards and disasters.

Architecture for Humanity

- **Design Like You Give A Damn: Architectural Responses To Humanitarian Crises**

"The greatest humanitarian challenge we face today is that of providing shelter. Currently one in seven people lives in a slum or refugee camp, and more than three billion people--nearly half the world's population--do not have access to clean water or adequate sanitation. The physical design of our homes, neighborhoods, and communities shapes every aspect of our lives. Yet too often architects are desperately needed in the places where they can least be afforded. Edited by Architecture for Humanity, *Design Like You Give a Damn* is a compendium of innovative projects from around the world that demonstrate the power of design to improve lives. The first book to bring the best of humanitarian architecture and design to the printed page, *Design Like You Give a Damn* offers a history of the movement toward socially conscious design and showcases more than 80 contemporary solutions to such urgent needs as basic shelter, health care, education, and access to clean water, energy, and sanitation. Featured projects include some sponsored by Architecture for Humanity as well as many others undertaken independently, often against great odds. *Design Like You Give a Damn* is an indispensable resource for designers and humanitarian organizations charged with rebuilding after disaster and engaged in the search for sustainable development. It is also a call to action to anyone committed to building a better world." -- Jacket.

- **By Kate Stohr Design Like You Give a Damn {2}: Building Change from the Ground Up (1st Edition)**

Design Like You Give a Damn [2] is the indispensable handbook for anyone committed to building a more sustainable future. Following the success of their first book, Architecture for Humanity brings readers the next edition, with more than 100 projects from around the world. Packed with practical and ingenious design solutions, this book addresses the need for basic shelter, housing, education, health care, clean water, and renewable energy. One-on-one interviews and provocative case studies demonstrate how innovative design is reimagining community and uplifting lives. From building-material innovations such as smog-eating concrete to innovative public policy that is repainting Brazil's urban slums, Design Like You Give a Damn [2] serves as a how-to guide for anyone seeking to build change from the ground up.

Fogo Island Artist Studios Saunders Architecture

Fogo Island, a small secluded island off the coast of Newfoundland, is an elemental place of subtle and abiding beauty - a place where time is not obliterated by the circulation of everything.

We have chosen to find new paths by leading with the arts. We want to create structures that respect where we've come from and dignify this landscape that is so fragile yet so fearsome. We want structures that touch our imaginations and help maintain a connection between our past and our future.

/The Shorefast Foundation

Fondazione Renzo Piano - Auditorium del Parco

L'Aquila boasts an important music tradition, maintained by numerous institutions involved in promoting and producing classical and symphony music.

The April 2009 earthquake compromised all the venues that hosted such music events.

The concert hall which used to host the performances of Società Barattelli is located within the 16th-century Spanish Fort, a monumental example of military architecture whose structures were severely damaged by the earthquake. The idea of building a temporary concert hall while the Fort is under restructuring belongs to Claudio Abbado, after a trip to L'Aquila in June 2009 to direct a concert with his Mozart Orchestra. The new temporary Auditorium was entirely financed by the Province of Trento, which also coordinated its construction, and was designed by RPBW together with Atelier Traldi.

RPBW and Renzo Piano himself worked pro bono in this project. The new Auditorium is located near the Castle, in the part of the park enclosed between the Castle itself and the Piazza della Fontana Luminosa. The new structure is physically near the old one so as not to interrupt the public's habitual regular attendance at this popular and much loved venue

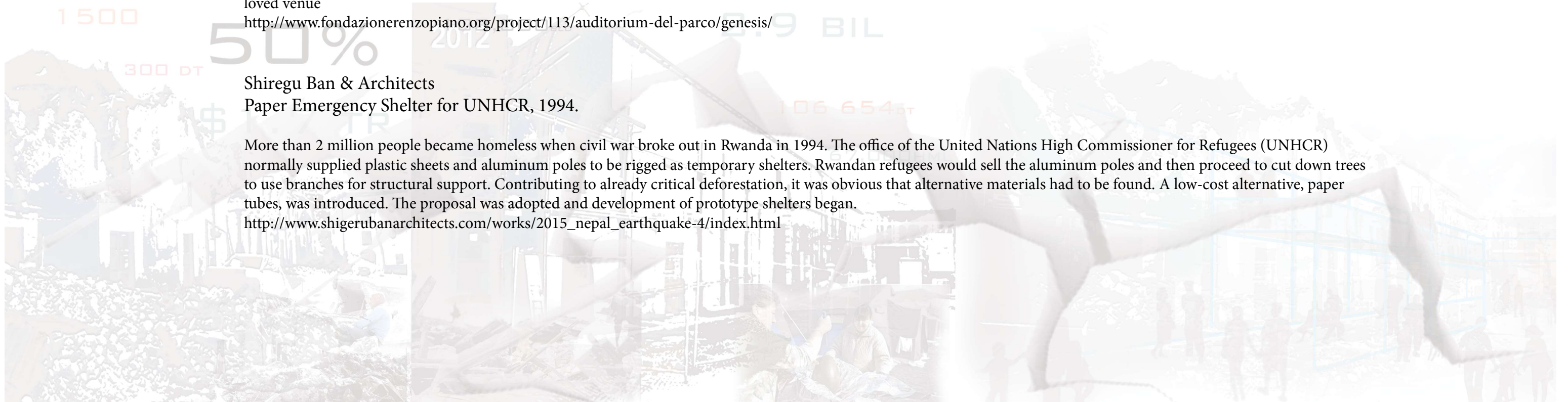
<http://www.fondazionerenzopiano.org/project/113/auditorium-del-parco/genesis/>

Shiregu Ban & Architects

Paper Emergency Shelter for UNHCR, 1994.

More than 2 million people became homeless when civil war broke out in Rwanda in 1994. The office of the United Nations High Commissioner for Refugees (UNHCR) normally supplied plastic sheets and aluminum poles to be rigged as temporary shelters. Rwandan refugees would sell the aluminum poles and then proceed to cut down trees to use branches for structural support. Contributing to already critical deforestation, it was obvious that alternative materials had to be found. A low-cost alternative, paper tubes, was introduced. The proposal was adopted and development of prototype shelters began.

http://www.shigerubanarchitects.com/works/2015_nepal_earthquake-4/index.html





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