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ARQ3551 Taller de Investigación y Proyecto 2o Semestre 2020
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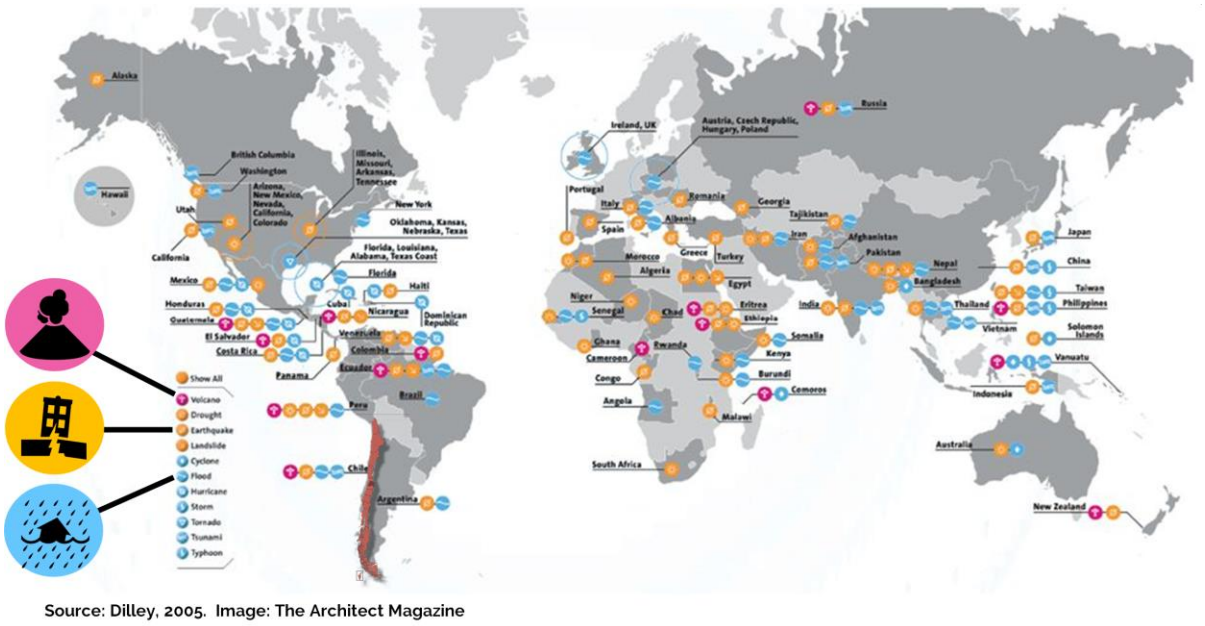
MULTI-HAZARD SANTIAGO: Underlying Factors for Resilience Assessment, Integrated Planning and Design



Source: Dilley, 2005. Image: The Architect Magazine

Fig. 1 Chile in the World Map of Hazards (based on Diley, 2005. Map: The Architect Magazine)

Chile is widely known for being a hazard-prone country, the most exposed to natural disasters among OECD members, and listed in the ten countries most exposed to multiple hazards (fig. 1). At the same time, the country has been able to address successfully some of the most notorious disastrous events, such as earthquakes successfully, and has developed a sound culture for building practices and public awareness. However, the growing occurrence of other events, such as droughts, landslides, tsunamis, is leading the country to extend this awareness to multi-hazard exposure and is currently in need of a comprehensive framework for multi-hazard assessment and strategic planning to be embedded in its knowledge repositories, institutional frameworks, public policies, and population awareness.

When discussing underlying risk variables in a developing country, it is unavoidable to confront the reproduction of the fundamental traits of developing societies: development and equity; access to opportunities and essential services; extractive and environmental degradation; local scientific and technological development; and democratic or instrumental government governance structures.

In this studio, we address the issue of multi-hazard exposure in Chile for the case of the capital Santiago, by systematically studying the underlying disaster risk factors and integrated planning for resilience (UNDRR 2015, Garrido and Saunders 2019). The Hypothesis from which the studio starts is that the city responds correctly to these challenges through the study of four research and design topics: Underlying Risk Factors; Integrated Assessment; Integrated Planning for Resilience; Urban and Architectural Design.

1. INTRODUCTION

Disaster management and strengthening urban resilience are directly related to an adequate understanding of the factors that condition disasters. These underlying factors of risk management are highlighted in disasters, but often due to their omnipresence and scale, they are not the subject of preventive actions. It is for this reason that a high recurrence of events can help to visualize these factors and components more clearly. In the case of Chile, the diversity of hazards and the high recurrence of events transform the country into a laboratory for managing risk and resilience.

These characteristics have been enhanced in the last year as a result of the social outbreak that began on October 18, 2019. High levels of inequity and high costs of living, along with a series of other social demands, have triggered a process of social reform with unexpected violence and destruction of public and private facilities and infrastructure. This situation had put in tension the response capabilities of the State and civil society. The main cities became territories of concentration of social mobilizations, being recognized as the representation of the neoliberal model and its impacts on the quality of life of people and their development opportunities.

In this context, the Studio aims to explore the physical and social support of the city of Santiago that is related to its level of resilience and risk management capabilities. The multidimensional view seems to be especially pertinent at times like today when the planet is facing the Coronavirus crisis. This global phenomenon is testing urban systems, institutional structures, governance, and the way societies have chosen to function.

2. CONTENTS

The contents of the studio will be thus organized in three groups.

UNDERLYING DISASTER RISK FACTORS

The Study has the following objectives in line with the Sendai framework:

Addressing underlying disaster risk factors through disaster risk-informed public and private investments is more cost-effective than primary reliance on post-disaster response and recovery and contributes to sustainable development.

Addressing underlying risk factors cost-effectively through investment versus relying primarly on post-disaster response and recovery

Reducing exposure and vulnerability, thus preventing the creation of new disaster risks, and accountability for disaster risk creation. Focused on tackling underlying disaster risk drivers, such as the consequences of poverty and inequality, climate change and variability, unplanned and rapid urbanization, poor land management and compounding factors such as demographic change, weak institutional arrangements, non-risk-informed policies, lack of regulation and incentives for private disaster risk reduction investment, complex supply chains, limited availability of technology, unsustainable uses of natural resources, declining ecosystems, pandemics and epidemics.

COMPREHENSIVE ASSESSMENT AND INTEGRATED PLANNING FOR RESILIENCE

The Sendai Framework for Action identified land use planning and legislation as a priority action for disaster risk reduction (DRR). It is necessary to enhance the holistic understanding of the factors and components that determine resilience. To do this, we work on mechanisms for multidimensional risk mapping and on exploring structural / non-structural measures to reduce exposure and limitations.

The Studio will explore actions at the local and metropolitan level to assess a more efficient level of risk reduction. The work will consider decision-making at the local level will be limited by economic policies and policies, especially in periods of high uncertainty such as the current one. (Burton, Deierlein et al. 2017, Garrido and Saunders 2019)

URBAN AND ARCHITECTURAL DESIGN.

Thus, the general question of the Studio is:

How does urban and architectural design to reinforce the capabilities of urban communities to recover from adversity to continue projecting the future?

Specific questions subordinated to the previous one are:

What are the social, cultural, technical and material dimensions? What do the underlying irrigation factors mean from an urban and architectural point of view? What opportunities does this multi-hazard perspective offer? How does it translate into an urban and architectural project that incorporates the aforementioned dimensions?

New questions arise from this definition. What is it and what potential does it have as an urban and architectural project? How is a resilient city different from any other city? And other questions will continue to arise collectively and individually during the problem / question / hypothesis iteration process.

3. APPROACHES

Four approaches to these issues will be emphasized:

DEVELOPMENT AND EQUITY

To a large extent, urban networks, with their structuring connections, and ramifications over time, have been a significant factor in urban form and extent (Dupuy 1998). For this reason, it is relevant to recover the concept of the network and its association with the extension of the city. To ask questions that have probably been overshadowed by those raised by other more contemporary manifestations of urban growth. The significance and importance of urban networks are often neglected in city analyzes. Emerged strongly since the early twentieth century, its presence in the city has been establishing itself as a structural support for urbanization. Based on processes with a high technological component and rapid evolution, networks have permeated cities on their surface and underground, guaranteeing communication, the transfer of basic services and urbanization. In this sense, they can be understood as inhibitors of travel and,

consequently, as connecting elements of the city, by linking their activities and making feasible the installation of urban activity in new territories or consolidating the possibility of more intensive use.

ACCESS TO OPPORTUNITIES AND BASIC SERVICES

Currently in Chile, urban planning and therefore the regulations related to buildings located in risk areas, are governed by the following legal instruments: the Political Constitution, General Law of Urbanism and Constructions (LGUC), General Ordinance of Urbanism and Constructions (OGUC), Inter-Communal Regulatory Plans (PRI) and Communal Regulatory Plans (PRC), of which the last one, in normal situation, takes approximately 7 years to be managed and approved, time that decreases considerably (to 2 years) in a situation of catastrophe, thanks to the State of Emergency declaration issued by the President of the Republic within the framework of the Earthquake and Catastrophe Law, facilitating the incorporation of the new risk antecedents provided in the situation.

EXTRACTIVISM AND ENVIRONMENTAL DEGRADATION

In mitigation and adaptation actions against climate change problems, an innovative management of water resources within the built environment is essential to integrate risk prevention measures and response to extreme events with the design of buildings and urban spaces in dialogue with the need to restore ecological balances, thus reinforcing the resilience of the urban system. Numerous international architectural and urban projects based on an innovative management of water resources based on ecological criteria, (Innovative Water Concepts, Water Sensitive Urban Design) ethical and social show how this approach can be considered effective in urban regeneration processes It can be implemented with significant changes in the relationship between the built environment and the natural territorial context (Hoyer et al 2011). These examples, through a rational use of natural resources and the reduction of the vulnerability of physical and social systems, show how it is possible by combining interventions to rebuild existing buildings to trigger an improvement in the quality of life, in response to the challenges of climate change.

LOCAL SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT

Addressing knowledge as a leverage towards development and the incrementation of added value to raw material production is far from being common sense in Latin America. At the same time, the critical reflection on scientific technological problems is severely limited by a contemporary attitude that almost does not discuss technology or its cultural, historical, philosophical or sociological edges, and abandons itself to good faith in a technology that is supposedly innocuous or good, which progresses linearly towards a future better facilitated by technique, which impacts unidirectionally on society, which in turn is subject to the consequences of such changes without recognizing in them other factors than those of the supposed neutrality or naturalness of the scientific-technical change. An introductory discussion of these issues can be found in manuals such as "Philosophy of Technology: An Introduction" (Dusek, 2006).

4. CASE STUDY

The studio will work in the context of the Santiago Metropolitan area. Students will develop individual proposals for urban and architectural projects according to the Master's program they are taking. In each case, the studio questions take on different scopes.

The studio considers the participation of activities that will have the support of the ArcDR3 initiative, initiated by the International Research Institute of Disaster Science (IRIDeS) at Tohoku University, Japan and xLAB at University of California Los Angeles (UCLA).

The Santiago case is pertinent due to its strategic importance in the country, Chile's Metropolitan Areas covers 2.1% of the national territory, contains 41% of the country's population, 49% of GDP, and 41% of employment (OECD 2017b). Santiago, as a capital city, articulates the most extensive interregional urban system. Together with Valparaíso, San Antonio, San Felipe - Los Andes and Rancagua, the regional system is identified as Central Macro Zone (Fig. 2).

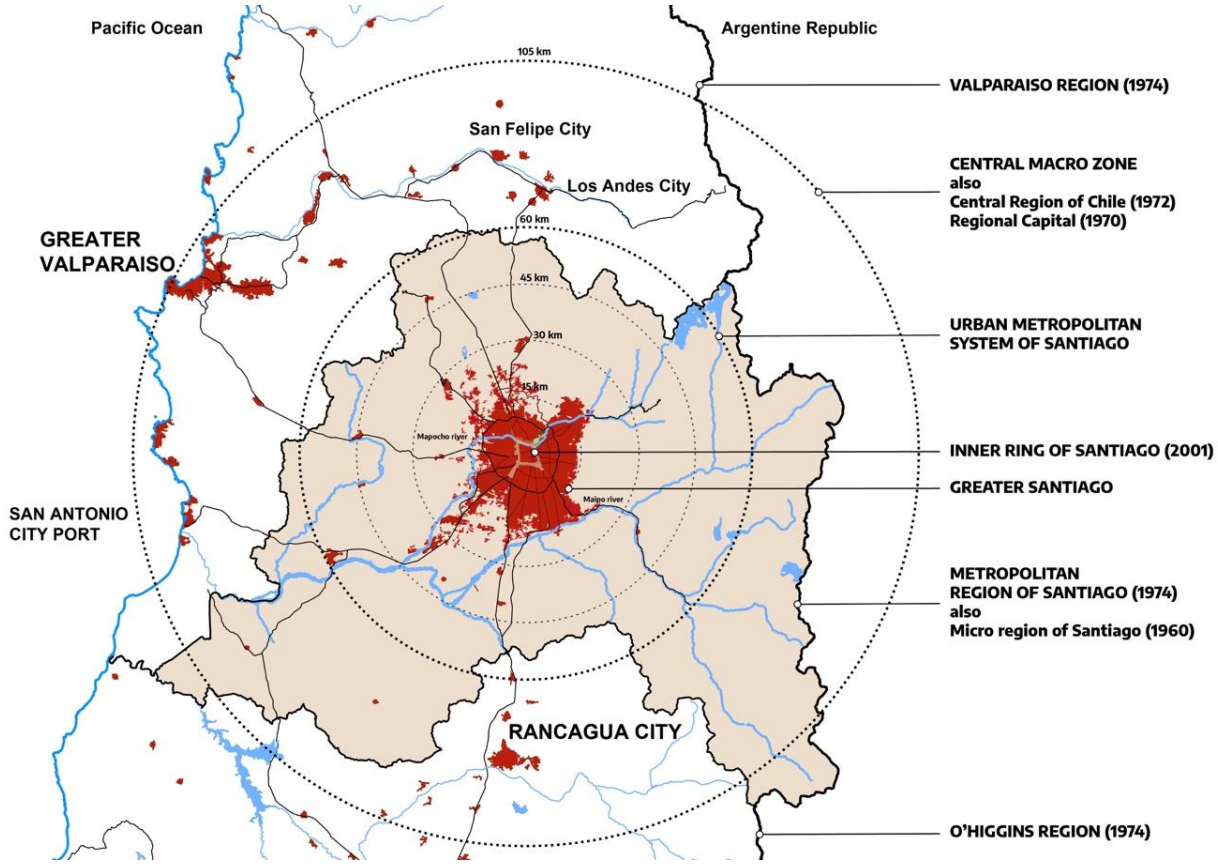


Fig. 2 Central Macro Zone of Santiago. Source: Moris 2019

Figures 3 and 4 show the urban structure of the city of Santiago with high levels of urban segregation, where the most affluent areas (in blue) have the highest concentration of urban attributes (Indicator of Territorial Well-being). Unlike peripheral areas with low local urban attributes that depend on public transport infrastructure to access areas with employment, education, public goods, and services.

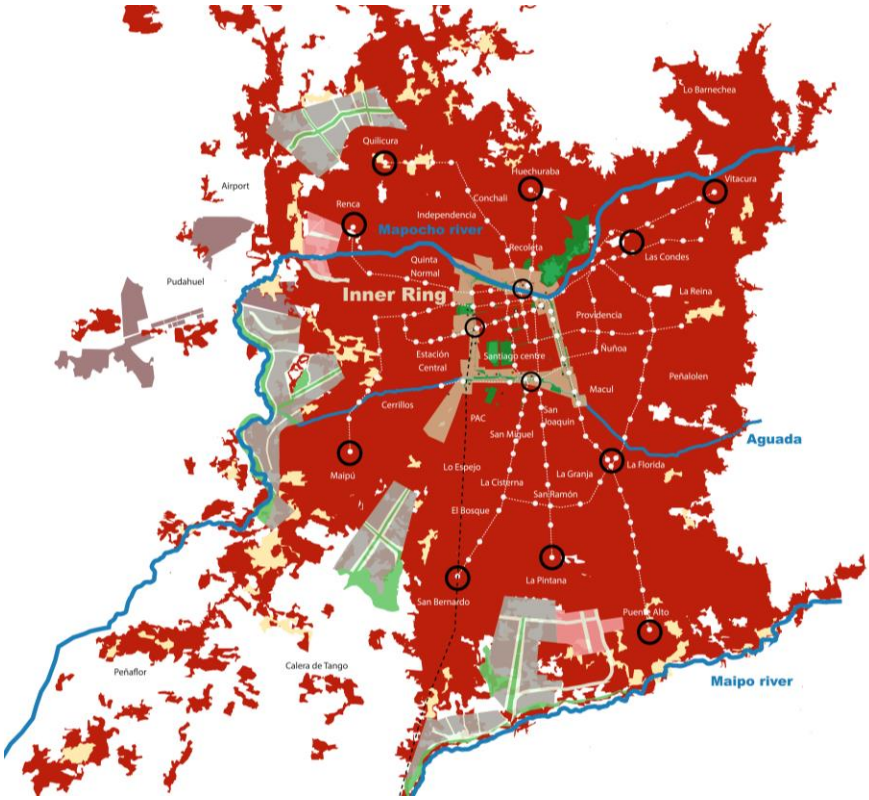


Fig. 3 Greater Santiago. Source: Moris 2019

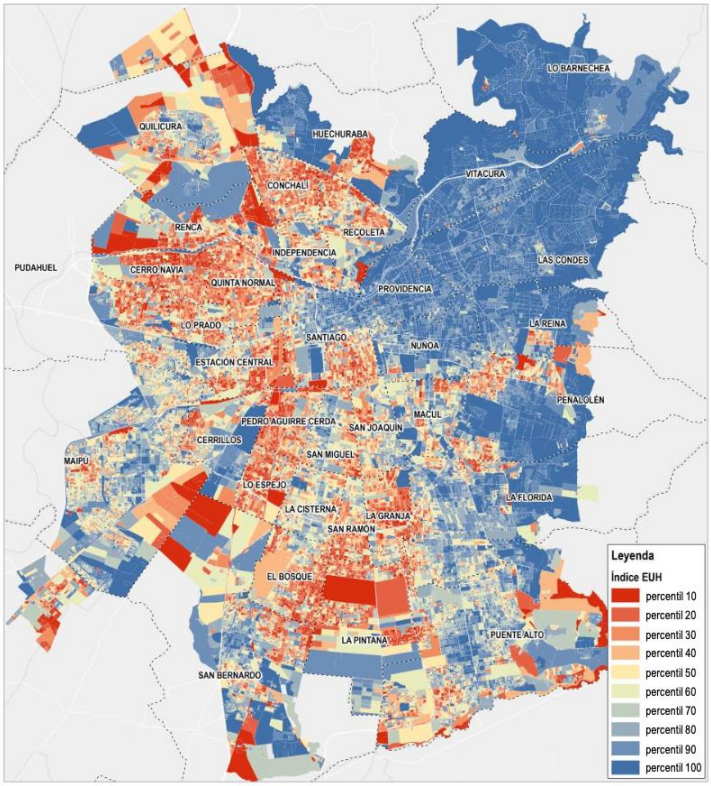


Fig. 4 Territorial well-being indicator. Source: CCHC & CIT UAI 2018

5. OBJETIVES

General Objective

To formulate a sustainable architecture and energy / urban design problem within the scope proposed by the workshop, link it with the associated disciplinary areas, explaining the problems to be solved or the general meaning of the project, and precisely define its theoretical universe.

Specific objectives

- To understand and articulate the phenomena and factors that condition urban - architectural processes, the relationships between the subject and the place of research and project, and the urban sustainability conditions in which it is inscribed.
- To define research and project objectives, possible working hypotheses, and a work plan clearly showing its relevance, interest and feasibility.
- To prepare an argument with the background and methods necessary to give the investigative dimension of the project based on the points already exposed.
- To develop an urban and architectural project as a platform for critical reflection for the discussion of the topics investigated.
- To explore the instruments of representation that are considered pertinent both to the analysis and to the formulation of the project in writings, diagrams, mappings, plans, models or others.

6. METHOD

The work methodology includes the stages and tools necessary to address the knowledge, exploration and development of the proposed topics, in terms of critical reflection on the problems to be addressed, the formulation of relevant questions within the identified problem and the development of urban and architectural project strategies relevant to the issues raised.

The work will be elaborated in three fields:

a) Underlying Risk Variables;
b) Integrated Assessment;
c) Strategic Planning for Resilience;
d) Urban and Architectural Design.

Stages of Work and Tools

Stage 1. Identification and Formulation of the Problem to Investigate / Project (Thesis + Project) Research / reading and bibliographic discussion / identification of a problem / formulation of a specific question that has its own interest and is conducive to the project

Stage 2. Field Work to recognize the validity and relevance of the Previous (Thesis + Project) Articulation of the formulation of the problem with its cultural - social dimension - material / case study / field trip

Stage 3. Formulation of the Nucleus of Research and Urban - Architectural Project (Thesis + Project) It must be relevant and raise an interest and feasibility in the double registration Research and Project

Stage 4. Development of the Urban-Architectural Project (Project) Project development of the relevant issues in order to demonstrate the relevance, interest and feasibility in project registration

Stage 5. Proto-Thesis in 1500 words (Thesis) Argument development with the appropriate tools to the questions posed / demonstrate the relevance, interest and feasibility in the research record

Stage 6. Synthesis and Exam (Thesis + Project) Synthesis of Stages 4 and 5 integrating the issues, relieving and verifying the coherence of the proposal and the work in total

The specific tools to use are:

- Background data collection
- Bibliographic discussion
- Mapping and statistics
- Analysis of actors
- Project development (Master Plan and Urban Design / Architecture)

Supporting Course

The Studio will work with an Optional Specialty Courses (OPR-E), recommended for all students:

ARQ 3541: Representation in the Urban Project, Prof. Christian Saavedra (MPUR). The course studies the ways in which the urban project has been represented to date, establishing the relationship between the urban project and its representation to make visible the city visions and ideas that underlie the urban project. The different logics of the projects and their particular form of representation are the subject of this course in the sense of an operational illustration and a form of knowledge and analysis in the disciplinary field of the urban project. The analysis of operations, processes and analytical systems of urban design is integrated with the analysis of the emphasis of representation according to the different city models of the project. In this new version, the course emphasizes the REPRESENT / INVESTIGATE / PROJECT relationship, with a theoretical-practical focus on the Workshop Project and its different phases of study and formulation.

7. CALENDAR

The above is organized in the academic calendar of the semester as follows:

Week 1 04 Aug General Presentation of the Workshop and Work Plan / Formulation of Task 1

Stage 1. Identification and Formulation of the Problem to Investigate / Project (Thesis + Project)

Week 2 11 Aug Bibliographic discussion based on designated and proposed texts

Week 3 18 Aug Identification Relevant problem and Research Question based on the above

Week 4 25 Aug Research Proposal and Project

Stage 2. Field Work to recognize the validity and relevance of the Previous (Thesis + Project)

Week 5 01 Sep Preparation Field Trip Documentation

Week 6 08 Sep Field Trip verification relevance Research Proposal and Project

Week 7 15 Sep Field Report and iteration Research Question

Stage 3. Formulation of the Nucleus of Research and Urban - Architectural Project (Thesis + Project)

Week 8 22 Sep Formulation 1: Research Core

Week 9 29 Sep Formulation 2: Nucleus of Urban-Architectural Project

Week 10 06 Oct Formulation 3: Integration and association with related topics - Interim Exam

Stage 4. Proto-Thesis in 1500 words (Thesis)

Week 12 20 Oct Proto-Thesis in 1500 words: Problem / Question / Hypothesis

Week 13 27 Oct Holiday

Week 14 03 Nov Proto-Thesis in 1500 words: Substantiation of the Hypothesis - Document

Stage 5. Development of the Urban-Architectural Project (Project)

Week 15 10 Nov Proposal Urban Design - Architectural / Synthesis

Week 16 17 Nov Proposal Urban Design - Architectural / Development

Week 17 Nov 24 Urban Design Proposal - Architectural / Delivery Planning

Stage 6. Synthesis and Exam (Thesis + Project)

Sem 18 01 Dec Final Exam with Presentation of Thesis in PPT and Project in 9 Sheets DIN A1

8. EVALUATION AND GRADING

The evaluations will be weekly or biweekly according to the progress of each work with a note for each task of equal weight, the average of which results in the grade of the Workshop in the Intermediate Exam and Final Exam. The grades of the tasks will have the same weight, notwithstanding that the evaluated contents include those of the preliminary tasks.

The works will include:

- Exercises for Reading, Written Argumentation and Discussion
- Problem Formulation and Research Project
- Group and Individual Documentation and Design Exercises
- Intermediate Exam
- Architectural Project - Urban

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