INVESTIGATING THE "ALTERA FORMA URBIS", THE SECRET STRUCTURAL URBAN FORM OF ANCIENT ROME, BY APPLYING A SUSTAINABLE INNOVATIVE ARCHITECTURAL DESIGN METHODOLOGY FOR THE CHALLENGES OF THE CONTEMPORARY BUILT ENVIRONMENT

Maurizio Crocco, Andrea Moneta

INVESTIGATING THE "ALTERA FORMA URBIS", THE SECRET STRUCTURAL URBAN FORM OF ANCIENT ROME, BY APPLYING A SUSTAINABLE INNOVATIVE ARCHITECTURAL DESIGN METHODOLOGY FOR THE CHALLENGES OF THE CONTEMPORARY BUILT ENVIRONMENT

◆ ◆ ◆

The enquiry is based on work by Italian archaeologist Giuseppe Lugli, architect Pier Maria Lugli and Professor Gianfranco Moneta about the "Altera Forma Urbis" of Rome as a hidden, "secret" structural urban form in the shape of a star, to reveal the interconnections with its contemporary form. Through a case study, the paper argues that applying Moneta's Analysis-Design Interaction methodology (ADI), an historical-morphological process-based analysis to the "Altera Forma Urbis" can be an effective framework to correctly inform the sustainable evolution of the built environment, and consequently, a tool to design architecture which respects the identity of place.

1. INTRODUCTION

The enquiry is based on the work of Italian archaeologist Giuseppe Lugli and architect Pier Maria Lugli about the "Altera Forma Urbis" of Rome, which investigates the hidden, "secret" structural urban form of Rome in the shape of a star. Analyzing the nodes, axes, and vertices of the star it is possible to recognise that all main buildings (including the Coliseum, Baths and temples) and all consular roads of ancient Rome have not been randomly placed; instead, they are located in the crucial points of the star which are defining its shape. The work was further extended in the 1990s by Professor Gianfranco Moneta at University La Sapienza (Rome), revealing a correspondence of Rome's contemporary structure, main buildings, and roads, with an extended version of the star reaching the seven-mile radius of the city. This was an important confirmation of the close interrelation between the morphology of the place, the roads and settlement typology and their evolution for two millennia.

This study is focused on the application of the principles of the "Altera Forma Urbis" on the contemporary built environment of Rome to test Moneta's methodologies using an international architectural competition in the Tuscolana district as case study. The final goal was to challenge current urban and architectural design practice with alternative, sustainable approaches which utilises the role of memory and heritage, emphasizing the interaction of architectural composition with history. The article is aimed at answering the following research questions: Can the "Altera Forma Urbis" be an effective framework to correctly inform the sustainable evolution of the built environment? Can the application of Analysis-Design Interaction methodology (ADI), an historical-morphological process-based analysis, support the design of sustainable architecture which respect the identity of place?

The article reviews the current practice of urban and architectural design and the authors' professional work and research about the application of Moneta's Analysis-Design Interaction methodology (ADI), an historical-morphological process-based analysis developed since 2005 by the authors with Archabout, a research collective based in Rome, Italy. A case study related to a recent international architectural competition for a development in the Tuscolana district of Rome has been the opportunity to test the methods and to compare the research outcome with other design proposals.

Using the support of "Altera Forma Urbis" framework and ADI method, the research was aimed at evidencing how urban and architectural design could be summoned as an action of use and re-use of the place and its components: those present at the time of the activity, and those hidden, no longer visible but which still condition the present state of the place. The research team developed an alternative design proposal for the competition aimed at enhancing the relationship with history and the Genius Loci (the character of the place). All finalist design proposals, instead, ignored the relationship with the context, proposing architectures that are detached from the historical context and heritage: the winning proposal is unaware of and indifferent to the physical, social, and historical differences that characterize Tuscolana's area of intervention.

2. THE ALTERA FORMA URBIS ROMAE

At its zenith, Rome stood as the capital of the mightiest among ancient empires, boasting an estimated population of one million individuals from approximately 100 BCE to 200 CE. During this era, it claimed the distinction of being the largest city ever witnessed in the annals of human history. Comprehending the evolution of this sprawling metropolis, as well as the factors contributing to its immense growth, the mechanisms by which it sustained itself, and the daily lives of its inhabitants amidst significant historical developments, remains a matter of paramount importance for historians and archaeologists. A pivotal source of invaluable insights for addressing these inquiries is the Severan marble plan of Rome, commonly known as the Forma Urbis Romae. This colossal cartographic masterpiece, measuring roughly 18 by 13 meters (approximately 60 by 43 feet), was meticulously crafted between the years 203 and 211 CE. It was etched onto 150 marble slabs meticulously placed on a wall within the aula of the Templum Pacis.[1] Remarkably, this monumental map offered an intricately detailed representation of the city's topography, delineating the ground plan of every architectural element within the ancient urban landscape. These ranged from temple complexes and entertainment venues to the intricate network of aqueducts, warehouses, residences of the elite, shops, modest chambers, and even the internal staircases that wove through this remarkable ancient city. The research stemmed from the studies of Italian archaeologist G. Lugli and his son, prof. P. M. Lugli on the

Altera Forma Urbis, the "secret" form of ancient Rome which was reconstructed by decoding the description of the Pomerium (the sacred boundary around the city of Rome)[2], that Plinius Major made in his Naturalis Historia in 73 CE. Plinius tells about the measurement of Rome's perimeter at the distance of the first mile from the centre of Rome. Plinius states that in his time, Rome was encompassed within a perimeter of 13,200 passus[3], a measurement larger than the circumference of the first mile (11,000 *passus*) and even of the Aurelian Walls built two centuries later. This non-correspondence of distances resulted quite unusual, being ancient romans well-known for their precision. This historical puzzle was then inherited by Lugli's son in the 90s.[4]

Plinius also provides a series of data regarding the distances of the 37 gates of the city, measured in a straight line from the "Miliarium"[5] in the Roman Forum, for a total of 20,765 passus, i.e. 30,705 metres. However, Plinius points out that 12 of these 37 gates need to be counted only once, implying that they were external gates compared to other more ancient ones, probably the gates of the Servian Walls which by his time were now incorporated by the expansion of the city. The interpretation proposed by Lugli suggests the existence of 17 external toll gates and 20 gates belonging to the Servian Walls set back from the new city limits. There were in fact 17 accesses leading to Rome from the outside, just as there will be 17 gates of the Aurelian Walls built two centuries later and still almost entirely existing today.

Based on Plinius description and cryptic clues that allowed the identification of significant measurements, gates positions, and dates in the calendar and history of Rome, P. M. Lugli proposed that the perimeter Plinius was talking about was not a circumference but a polygonal shape in the form of a star symbolising the *sun*, formed by three triangle with the same centre in the Forum Pacis and differently oriented.[6] Lines linking the polygon's vertices and inflections were oriented to astronomical, astrological and geographic points , that were important in the oldest history of Rome. The vertices and inflections were marked by the 17 accesses to Rome from the outside. Lugli was then able to graphically re-create the hypothetical *secret* form of Rome in the shape of a 8-point star as direct reference to the symbol of the Sun: the image of the brightest star reflected in the Eternal City. Supporting this hypothesis is also the fact that Nero had represented himself in the guise of the sun god Phoebus crowned with rays in the "Colossus", a colossal bronze statue inside his Domus Aurea, a statue then moved in front of the Flavian amphitheater -the *Colosseum*- whose construction began with the first of the emperors of Flavian family, Vespasian. Lugli suggests that the *star/sun* symbolic form could have been outlined by emperor Nero as an ideogrammatic model of his Urban Plan for the reconstruction of Rome after the famous fire in 65 CE.

 The 8-point star has its vertical axis aligned with ancient towns of Vejo (North) and Tellena (South), has a perimeter of 13,200 *passus* (19,518 m) and is inscribed in a circumference that reaches the first mile of the Consular Roads.[7] The star could have been generated by an initial esoteric triangle oriented towards Vejo,

with a possible evolution in the Augustan era (1 BCE) adding another triangle in the opposite direction, which resulted in a six-point star that eventually evolved again into the Altera Forma Urbis of the eight-point star as described by Plinius Major in 73 CE (Fig. 1). The three triangles were all centred on the Forum Pacis and, specifically, exactly in the place where the Forma Urbis Romae was positioned. Other aspects are confirming the hypothesis: all vertices of the star are oriented on settlements or astronomical points relevant for the history of Rome. To name a few: "Mons Albanus", "Praeneste", sunrise and sunset of 21st April (Rome's foundation anniversary), sunrise and sunset of summer and winter solstices (Fig. 2).
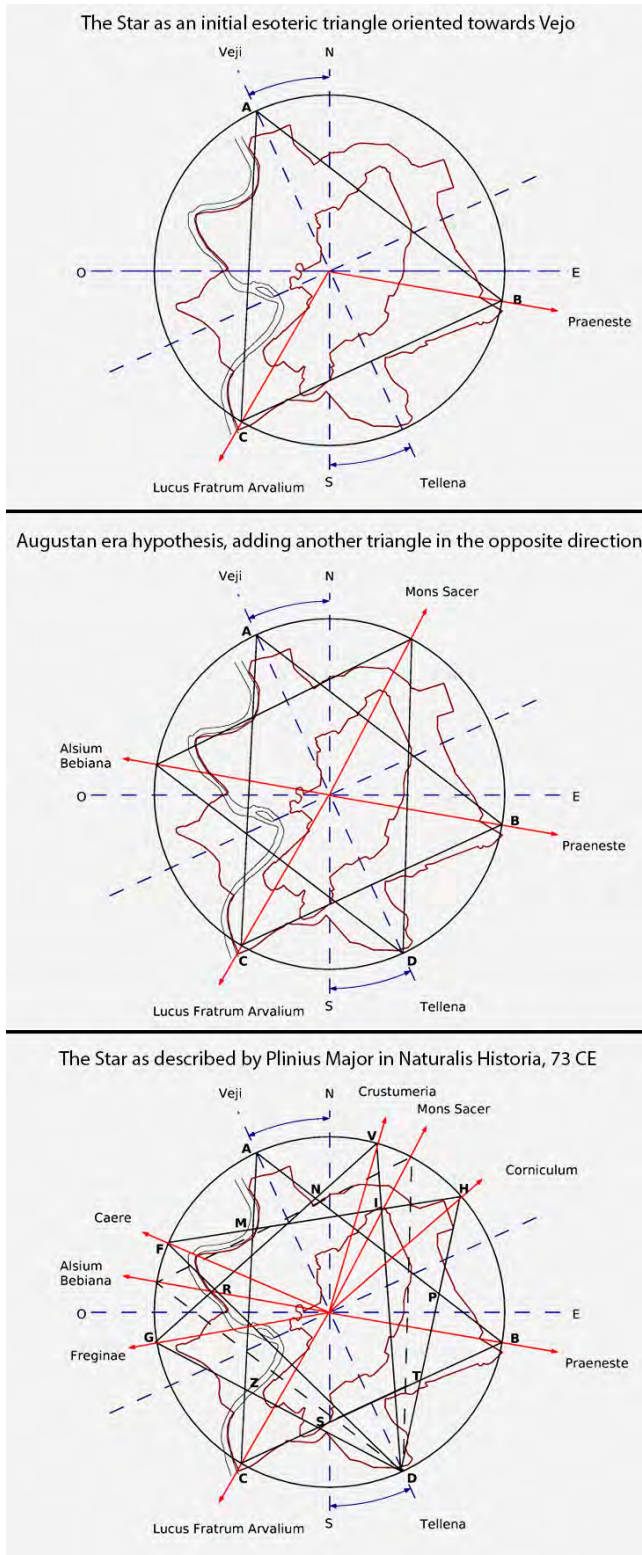
Fig. 1: The hypothesis of the evolution of the Star from the Republican to the Augustan era (Source: M. R. Leante, *L'interazione analisi progetto. Area studio: Roma. Progetto di un centro servizi per la produzione cinematografica*, 2006 (Available at: https://xoomer.virgilio.it/maleante/tesi.html)

Fig. 2: The Star's astronomical and territorial alignments (Source: M. R. Leante, 2006)

Furthermore, Lugli noticed that all main monuments of ancient Rome were aligned on the generating axis of the star and that extending the star to its fifth mile some correspondence could be found with Renaissance and Baroque era's topographical alignment and to some modern and contemporary alignments too. This fascinating research was further developed by Gianfranco Moneta's architectural research at University La Sapienza, where he hypothesized the permanence of this ideal form of Rome in the historical evolution of the urban grid extended to the seventh mile, which includes the GRA (Rome's ring road) and its current urban configuration. Bringing the eight-pointed stellar structure of the ancient perimeter to the current urban scale, was key to identify Rome's polycentric structure, composed of nodes and relationships able to provide hints and guidelines for possible urban interventions, both on the consolidated city, and in the areas of new expansion (Fig. 3). Research was developed through several architectural design projects with the module of Architectural Design at the University La Sapienza, testing the hypothesis of the connection with the Altera

Forma Urbis, utilising Moneta's Analysis-Design Interaction methodology to read and acknowledge the *star of Rome* during the design process. Some of the images used in this paper are part of Moneta's research and they had been developed by architect Mario Rosario Leante for his thesis during the master's in architectural design, which was supervised by prof. Gianfranco Moneta and prof. Andrea Moneta.
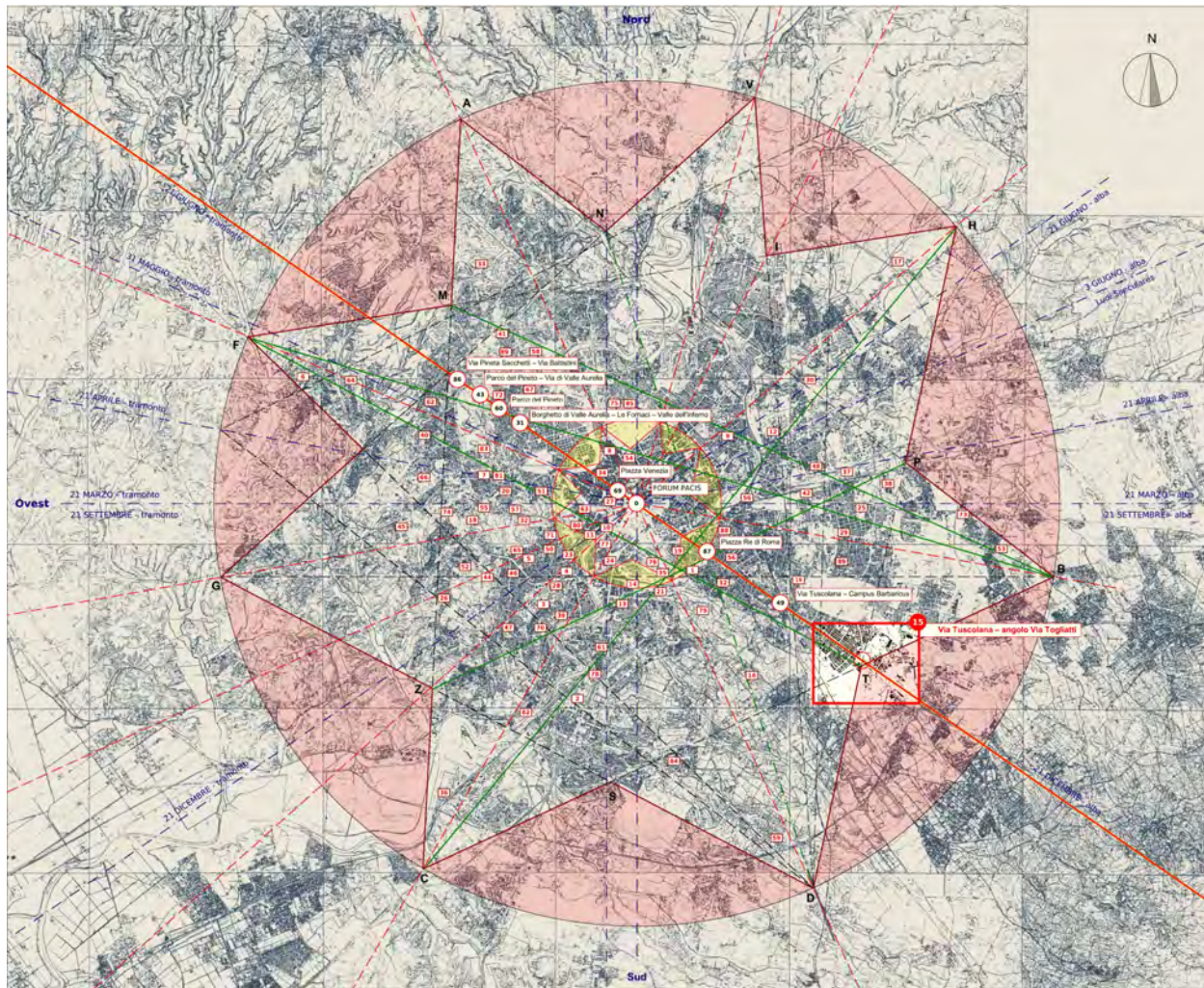

Fig. 3: The *Star of Rome* in its first mile (area in yellow) and its extension to the seventh mile (area in red), with evidenced Tuscolana area of study (red box) and its landmarks aligned on astronomical axis of the December 21 sunrise and June 21 sunset (Source: G. Moneta research mentioned in M. R. Leante, 2006)

3. ANALISY-DESIGN INTERACTION METHODOLOGY

The Analysis-Design Interaction methodology (ADI) was conceived and developed by Professor Gianfranco Moneta's research between 1980s and 2000s within CIRTER (inter-university research centre about territory

studies) and his module of Architectural Design at the Faculty of Architecture of University of Rome "La Sapienza". ADI was conceived as a tool to read and interpret the natural and anthropic elements of territory, their process of use, reuse, and transformation, with the final goal to use these elements for sustainable urban and architectural design. This methodology is rooted in the longstanding research of Italian architect Saverio Muratori who put the basis, between the 50s and 60s in Italy, for a morphological school of urban design and studies on anthropology of the territory that are becoming relevant today in the quest for sustainability.[8] ADI is rooted in Muratori's urban morphology approach, and further research of his disciples G. Cataldi and G. Caniggia in Italy, and M. R. G. Conzen in UK on typo-morphological analysis.[9] ADI in fact, considers the form of territory and settlements as a temporary phase in a never-ending process of transformation, where the environment acts as a stable heritage of the civilisation. ADI is aimed at reading and understanding the historical structure of territory and settlements as integral part of the character of the place (Genius Loci) through a diachronic and synchronic analysis. These two analyses, combined together, could then be used to interpret and design a territory, an urban settlement, an urban space. ADI methodology is able to go beyond the present chaotic picture through a morphological analysis which follows the evolution of the territory and settlement; thus, identifying new sequences of meaning, new material and immaterial spatial configurations which are truly sustainable and respectful of places because conceived in a critical relationship with history and memory. The design activity in ADI is directly connected with the analysis and it is here considered as an action of use or re-use of the place/territory and its components; some components are present at the moment of the activity, others are no longer visible, but they are still conditioning the actual state of the place/settlement/territory. Analysing and revealing models of use/re-use of the territory, ADI identifies the *form of transformations*, a crucial aspect that can inform -at different scales- both urban design and architectural design. ADI methodology phases are: 1) The territory considered as a global architecture: the aim is to 'read' the territory through an historical-morphological analysis of both territorial and urban areas' transformations during the years; 2) Transformations and re-use: Morphological analysis the territory and landscape to identify invariant historical structures as a series of *systems* interacting with their continuous process of transformations, i.e. territorial grids, boundaries, settlements and *pathways:* ridge paths, half-ridge paths, valley paths; 3) Systems and sub-systems: Overlay of historical periods to understand the relationship between physical environment and anthropic *systems*, historically; 4) The structure of the *element*: To utilize diachronic and synchronic reading of *models of use* of places/territory to identify *elements* as particular form of transformation; This crucial phase is aimed at identifying the relation between *systems* and *elements,* to recognise *models* as structures of historical use of the territory that are still present, in whole or in part, in it; then, in the design project, to prefigure a reconfirmation, a reinforcement and reuse with new functions of these *forms* that thus constitute the basic material for the design process. 5) Between memory and future: To apply *models of use* and *processual re-use* of places in urban and architectural design re-utilizing historical territorial support and, at

the same time, re-constructing a structure of interdependences.

4. CASE STUDY: TUSCOLANA PROJECT

Archabout is a multidisciplinary research collective founded in 2008 by architects and scenographers from Rome, Italy with a common ground of being collaborators of prof. Gianfranco Moneta at the University of Rome "La Sapienza". They co-founded the Cultural Association Archabout as a laboratory of studies and production to continue thirty years of architectural design theory and practice of prof. Moneta at the Faculty of Architecture, towards the challenges of our contemporary world.[10] Archabout's manifesto considers architecture as a critic methodology that –redefining the notion of transformation process – recovers the relationship between site, memory and design, with a focus on the Analysis-Design interaction, to explore and apply new technologies and the relation with historical models. Currently, Archabout members are architect Maurizio Crocco (CEO) and architect Andrea Moneta, of whom are active researchers and academics in the field of architecture, urban planning, and site-specific performance. In December 2019, Rome's City Council released a call for the regeneration of the Tuscolana railway area for the "Reinventing Cities" competition, which is part of C40 global network of the world's leading cities that are united in action to confront the climate crisis.[11] The competition unfolded in two phases between 2020 and 2021. In the first phase, Archabout participated in partnership with SCUP social cultural association, which had a direct connection with the Tuscolana district and inhabitants since many years, and their workspaces located within the competition area. Archabout and SCUP initiated a participatory design workshop to generate a design project for the aforementioned competition. Even though our team was not shortlisted for the second phase, we decided to continue the grassroots participatory design experience. This decision was aimed at addressing the apparent lack of attention to the crucial aspect of participation, which was initially intended to be a defining element of the competition's design process. The main issue which the team identified in the competition guidelines as imperative was the need for an inclusive and comprehensive community participation in the architectural design and urban regeneration of the site. We identified a lack of attention to the diverse needs and requirements of the residents in the Tuscolana railway station area as the common problem of all other top-down regeneration design proposals and similar competitions. These competitions, in fact, often overlooked essential aspects, such as services, socio-cultural spaces, and affordability. We embarked on this participatory journey because we consider co-governance as the key to strengthening local democracy and involving more individuals in co-creating sustainable urban environments. This process empowers citizens to influence policy creation, fostering trust and transparency in local government. Additionally, designs created with the involvement of local communities address a broader spectrum of pertinent issues, resulting in more diversity and enhanced cultural sustainability. Both Archabout and SCUP hold critical views concerning the cultural approach of C40 and the Reinventing Cities initiative. These programs seek innovative solutions and

formulas for sustainable zero-impact buildings that are essentially replicable anywhere to address climate issues. We do not believe that sustainable design can rely solely on the application of technical engineering solutions, such as Natural Light Orientation, Energy Maximization, and specific materials. All the projects submitted to C40 competitions in different cities worldwide display a substantial homogeneity, characterized by exposed structural frames made of concrete or wood, extensive glazing, and the presence of trees on rooftops and in loggias. We question the feasibility of promoting this green-washed version of the *international style* which is unaware and indifferent to the physical, social, and historical character that distinguish different locations. It is essential to question how such architectural approaches can genuinely be considered sustainable. The issue with such standardized solutions is that they do not work uniformly across different contexts. As explained by the ADI methodology in the previous chapter, the architectural intervention becomes sustainable when it acknowledges the fundamental elements derived from both diachronic (historical) and synchronic (contemporary) readings of the local context. We firmly believe that it is crucial to transform the narrative of the design approach to the built environment. We advocate for a more modern vision of territory—one that is not merely consumed but lived in, maintained, and respected, rooted in its histories and contributing to the well-being of its residents. Participatory design should always encompass the use and reuse of both visible and hidden elements within a *Place*.

The work for the competition involved an initial analysis to recognize the historical, functional, and physical aspects that shaped the area of intervention using ADI, the longstanding research on the morphology of Rome developed within the module of Architectural Design of prof. Gianfranco Moneta at University of Rome La Sapienza. ADI methodology focuses on *elements* as self-contained territorial entities interconnected through *pathways*. These *pathways* should be acknowledged and strengthened to facilitate genuine urban regeneration. To comprehend the dynamics of transformations in the project area, it was imperative to conduct both diachronic historical analysis and synchronic studies. This helped us grasp the typical natural and anthropic elements and their permanence throughout the processes of use, reuse, and transformation. These elements should serve as indispensable foundational materials for the design project, thereby transcending an outdated cultural approach that segregates functional and physical domains.[12] In this vision, *locations* need to be interpreted as *landscapes*, in line with the principles of Landscape Ecology, which defines a location as a system of interrelated ecosystems in a given environment.[13] To understand the scope of the design intervention, it was necessary to begin with an analysis of a larger context; in this case, the considered context is the city of Rome. The close connection between the structure of places and urban morphology generates a typical resulting *form*. From the outset, a hierarchy of *pathways* is established: those on the ridges, exclusively pertinent to local areas, and those in the valleys, also with local relevance. When paired with ridge pathways, they form the dual-entry roads to the settled area and have territorial relevance as interchange structures between various populations surrounding Rome, including the Etruscans, Latins, and Sabines. This

structure progressively solidified from the republican era (509 – 27 BCE) to the imperial period (31 BCE – 380 CE). The historical layout of the city, up to the present day, is predominantly the one established by the late-Imperial city use model. Although the form remains almost unaltered, its functionality has partially declined.[14]

From its origins until the Imperial era, radial routes of the consular roads tended to progressively merge into a broad coordinated system. Particularly, the eastern radial routes (Salaria, Nomentana, Tiburtina, Prenestina) converged into a network forming a *fan-shaped road network*. Its edges are primarily formed by the Via Salaria, dating back to the Republican period, and later by the Flaminia-Cassia and Labicana-Campana (Casilina) roads to the North, and to the East.[15] To the West, it was strengthened the system consisting of Etruscan pathways leading to the Tiber ford and then merging into the final stretch of the Via Aurelia, and the pathway of Latin populations, the Via Latina first and the via Appia later. However, this system was also connecting other pathways to link the city with the sea (Portuense, Magliana, Ostiense, Ardeatina). The two primary systems, eastern and western, pertain to the vast area. These are road systems composed of pathways that reach the borders of the Empire: Cassia, Flaminia/Casilina, and Aurelia/Appia. They enclose the Forum structures, creating a *dual hyperbolic form* that typifies the city (Fig. 4). This form establishes an effective relationship between the territorial road system and the urban system in the central areas, known as the 'open' Forum system, emphasizing the city's territorial dimension. This identified form declined during the medieval age; however, the urban road structure, despite being used differently, has essentially retained its original layout to the present day. The concept of a double hyperbolic form and structure for Rome was a brilliant insight by Gianfranco Moneta.
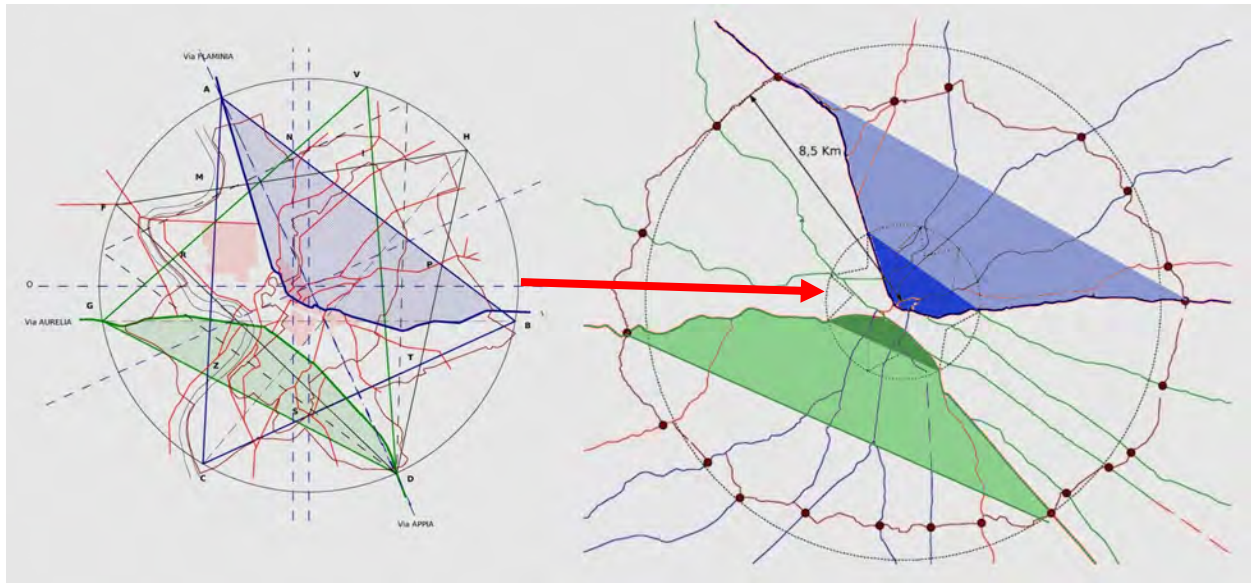
Fig. 4: The dual "hyperbolic" form (Eastern in blue, Western in green) within the *Star* of Rome at the first mile (left) and its extension at the seventh mile (right) (Source: authors' elaboration of M. R. Leante, 2006)

The linear layouts of the "Altera Forma Urbis" were examined for the area of the competition, specifically the astronomical axis of the winter solstice, which partially aligns with the Tuscolana route, pointing toward the volcano of Mons Albanus, which is a significant place in Rome's origins from both geological and anthropological perspectives. The identification of the *element* is characterized by the presence of two fundamental systems of relations crucial for Rome's form and transformations. Immediately North of the intervention area is Via Casilina, a part of the primary road system of the Eastern Hyperbole. To the immediate South is Via Tuscolana, which, together with Via Latina, is one of the oldest ridge routes that generated the city of Rome—the *Latin ridge* (Fig. 5, 6, and 7). Through a diachronic analysis based on historical cartography and a synchronic overlay mapping operation, was possible to comprehend the *form of transformations* of this specific *element*.
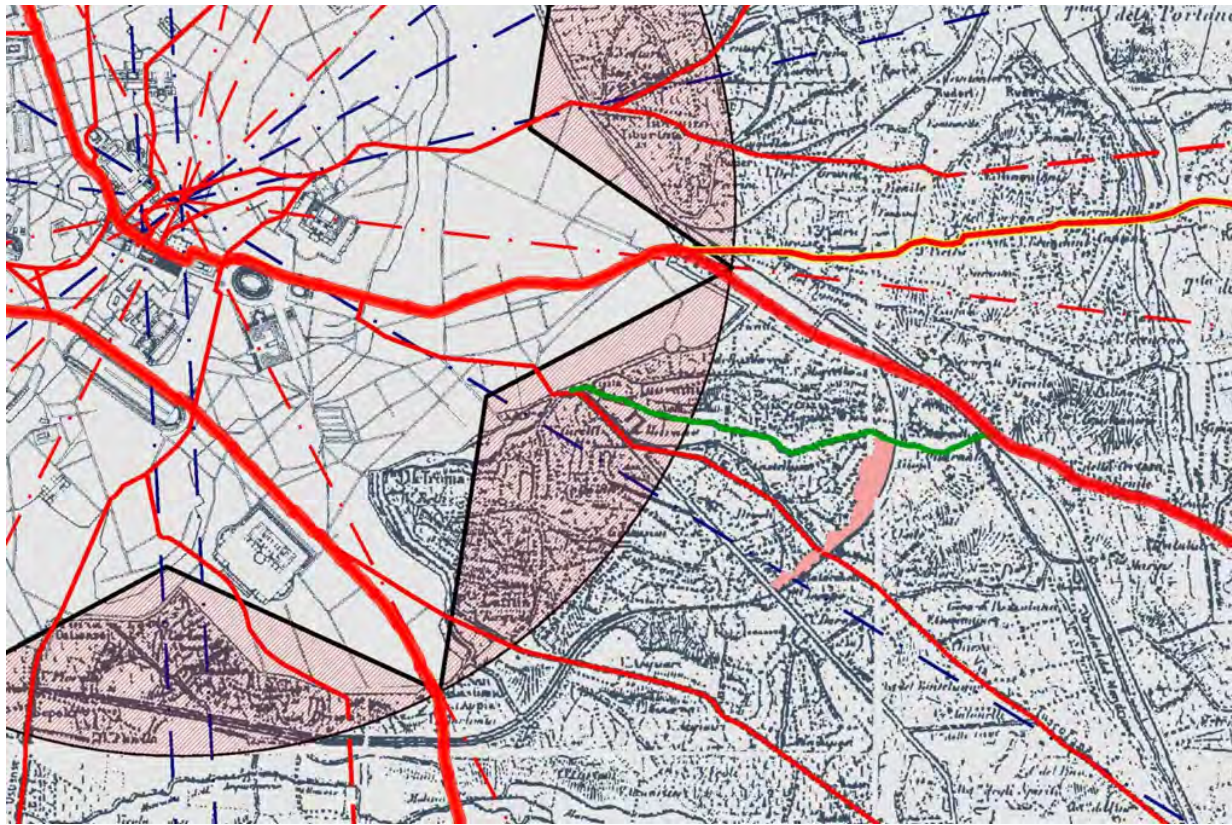

Fig. 5: The area of the competition (centre-right, highlighted in pink) falls within the Aurelian Walls, the Tuscolana/Appia Nuova and Casilina (Labicana) roads, and the Via dei Canneti (highlighted in green), alongside the railway axis. The Via dei Canneti represents a typical element of Rome's urban morphology, serving as a connecting road between two adjacent consular roads, primarily following a valley path (Source: elaboration by M. Crocco on 1876 cartography by Istituto Geografico Militare, Roma, F.150 della Carta d'Italia, IV.S.O.)
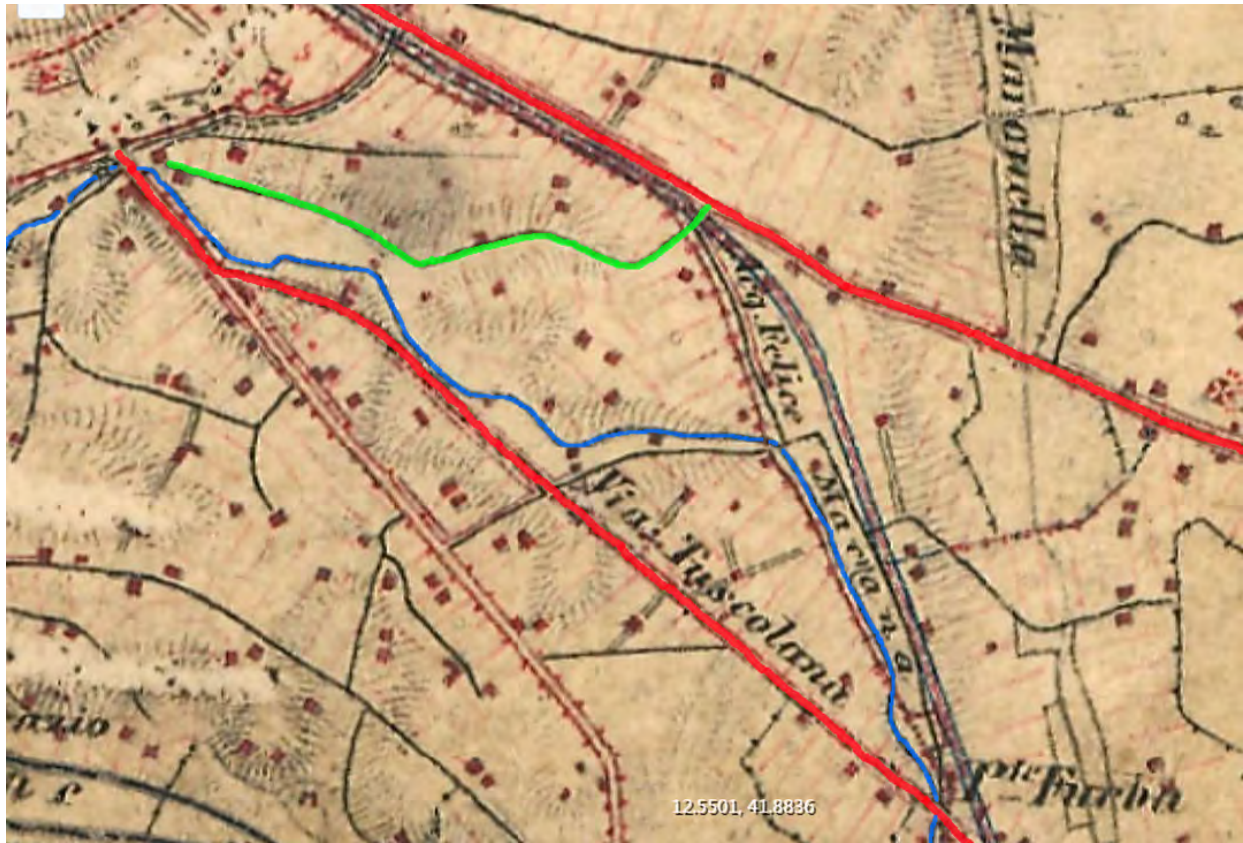
Fig. 6: Casilina axis (in red, top), part of the Eastern Hyperbole, exiting from Porta Maggiore; Tuscolana road (in red, bottom) exiting from Porta San Giovanni to Porta Furba; in blue, the Felice Sistino aqueduct; in green, Via dei Canneti; in brown, the scattered built-up areas of villas and mills with pathways system. (Source: elaboration by M. Crocco on map of Papal States and Tuscany, 1841–1843 [B VII a 384-11] (Available at https://maps.arcanum.com)
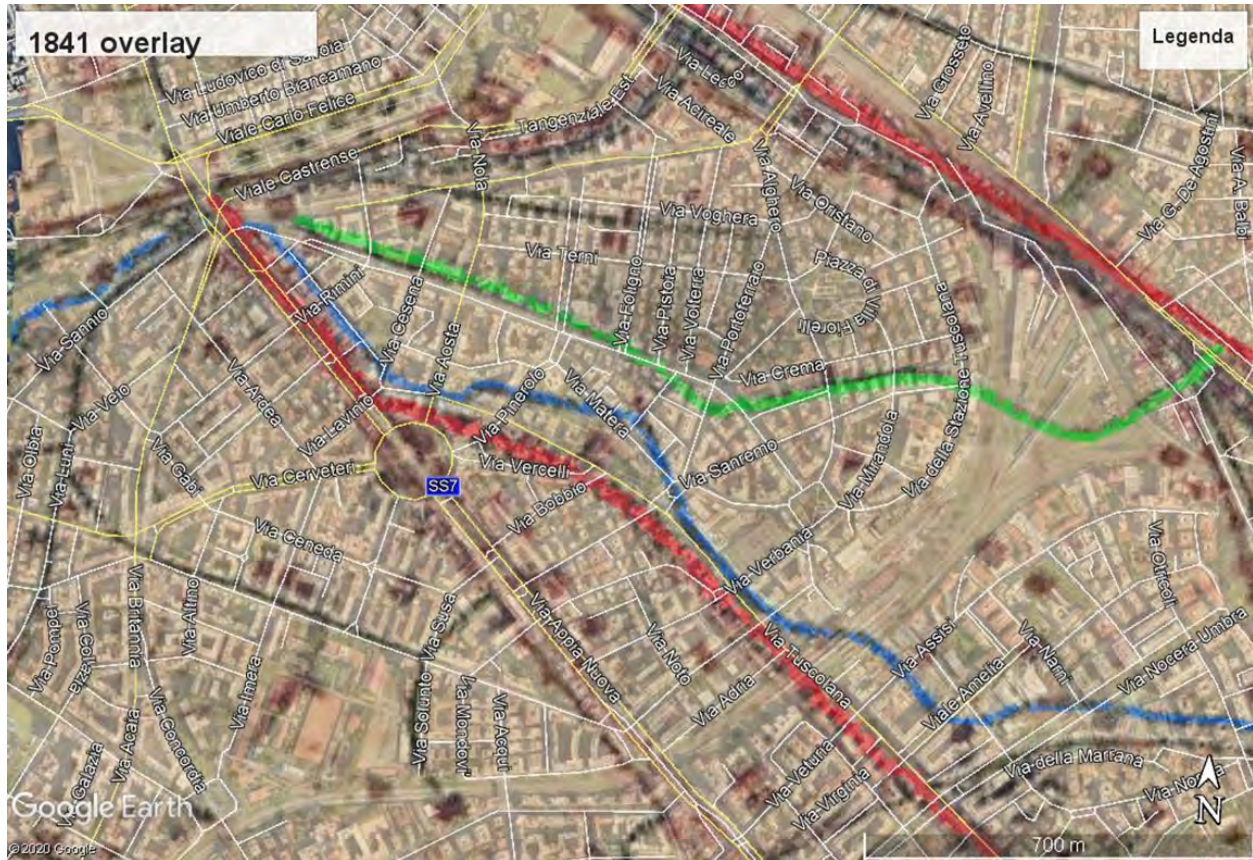
Fig. 7: Overlay of the 1841 map on actual map of Rome (Source: elaboration by M. Crocco on Papal States and Tuscany, 1841–1843 [B VII a 384-11])

The principles of ADI were consistently applied to the Tuscolana project within a participatory approach. Through a series of meetings and activities, the local community evaluated different vital aspects of the area completing a questionnaire. They provided insights and proposals that align with the discussions held during the participatory laboratories (Fig. 8).

Fig. 8: Participatory process with Tuscolana inhabitants (Source: personal archive, 2022)

The project programmatically rejects intensive and speculative building developments that have already characterized the area over the past century. Instead, the project aligns with the strong morphological values inherited from a long history of transformations. The primary objective of the project was to reconstruct the interrupted historical route of Via dei Canneti with a pedestrian and cycling bridge over the railway ditch to reconnect paths and parts of the city divided by the railway trench. The Project proposed a compact city settlement model characterized by functional diversity and pedestrian-friendliness. It included paved and green public pedestrian spaces, semi-public and public inner courtyards, public services, social housing, small-scale commerce and craftsmanship spaces, and innovative hubs.[1]

Specifically, the architectural project of the competition area was conceived as a project for urban spaces, not just buildings, which should instead contribute to creating the system of *urban voids*. The project envisions an organic system of pathways, squares, and strictly public green areas that generate an urban place promoting and facilitating encounters and socialization. This system occupies 40,000 square meters of the total 50,000 square meters of the area and is intended to become a new neighborhood and urban center.

---

[1] Project Area: 50,000 square meters; Built Area: 35,000 square meters. Average Building Height: 10 meters, 2 levels.

The Casilina road, which structurally defines our project area, constitutes one of the arms of the previously described Eastern Hyperbolic structure. The intervention area is strongly morphologically related to the Casilina road system, even though it is currently physically separated from the railway track. The assembly of six maps from the Gregorian Cadastre provided valuable indications for reconstructing the form of the Tuscolano part before its urbanization in the 20th century: the ancient connection route between Via Tuscolana and Casilina (Via dei Canneti), the scattered built-up areas, the inter-farm pathways, the form and texture of the land plots – all of which serve as fundamental material for the architectural project. From a morphological perspective, the project constitutes an urban polarity morphologically linked to the Casilina road, creating greater definition and strengthening the figure of the Eastern Hyperbole (Casilina-Cassia/Flaminia), a primary system at the territorial scale and connecting with the Tuscolana System. Overlooking the "valley" of the Acqua Mariana ditch, in an elevated position (*acroterius*), the Tuscolana road is primarily a *ridge path* from the *Tusculum Sanctuary*, a sacred place for Latin peoples, to the ford on the Tiber River, and to the Tiber Island. It partly coincides with the astronomical alignment of the December 21 sunset and June 21 sunrise of the Altera Forma Urbis. This positioning has its reference in the oldest memories of the settlements at the origin of Rome. The project thus envisages the construction of a rich and diversified functional mix, capable of promoting processes of interaction and exchange among the involved actors/residents. This aspect is particularly translated into the identification of a diverse functional mix with no predominant functions, guaranteeing a social framework which ensures generational, typological, and functional diversity; temporary settlements alongside permanent ones; new forms of cohabitation, co-working, and shared services in an open and transversal manner. This is done to avoid the so-called sum of functions and to prioritize interaction among the functions themselves.

Another central aspect in this regard concerns the concept of a "Borgo" (neighborhood) that the project aims to create. The Project's Master Plan envisions an urban texture consisting of solid and void spaces, where the quality and design of public spaces encourage interaction among the parts and give rise to new forms of relationships, including the use of public spaces. The presence of services accessible to the adjacent neighborhood and the project's focus on pedestrian-friendly design ensure a dimension of proximity and accessibility that aligns with the idea of a 15-Minute City. The project thus establishes a clear distinction between the structures for urban mobility: a bike path, a railway axis, and its green ring connecting areas without structuring new morphologies, and the systems, subsystems, and elements derived from historical-morphological analysis that, on the other hand, form the foundational materials for the formal genesis of the project itself (Fig. 9, 10)
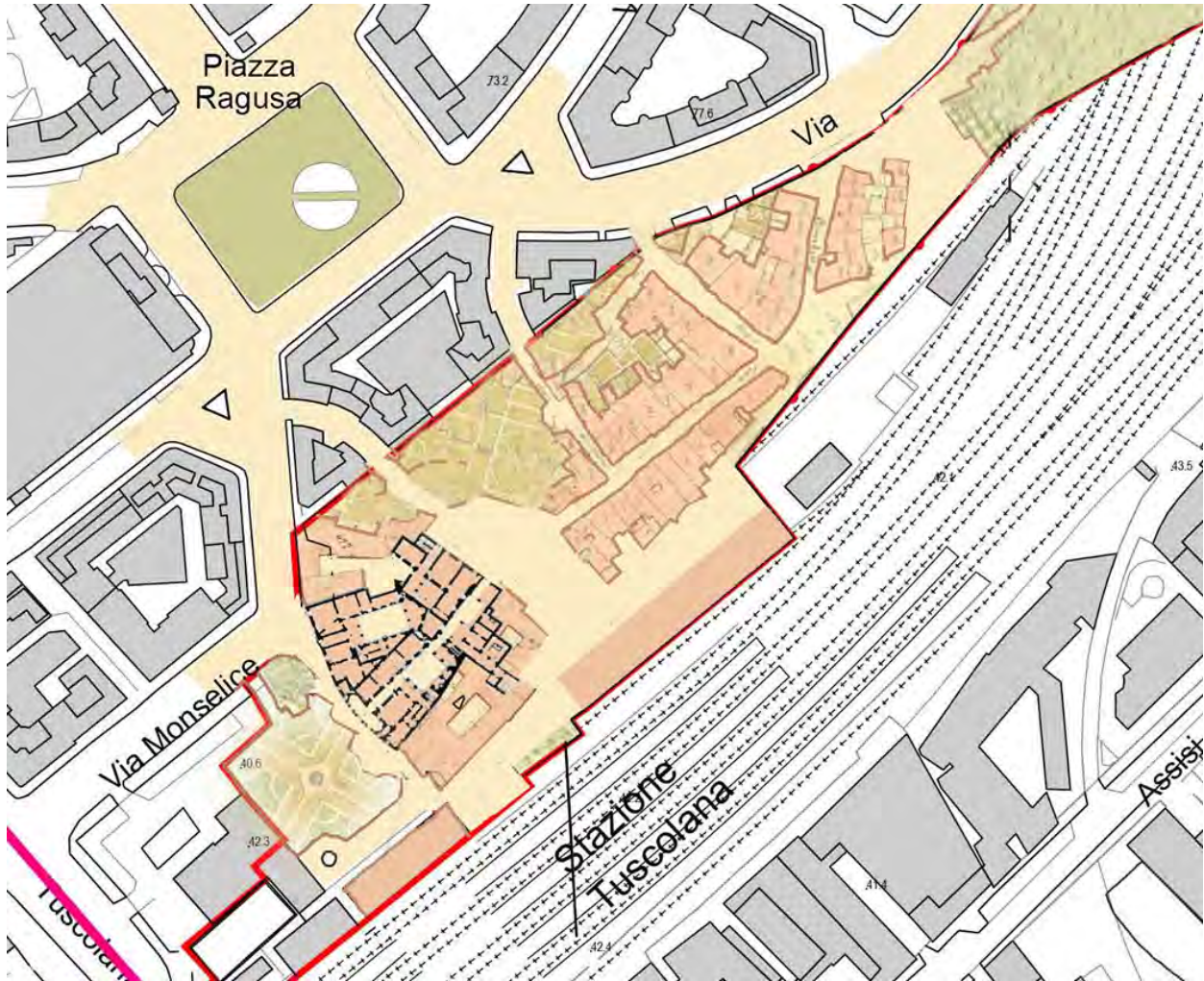
Fig. 9: Masterplan of Archabout proposal for Tuscolana competition. (Source: personal archive, 2022).

From a construction perspective, the proposed building typology relies on materials and technologies rooted in the Roman tradition. Bio-eco-compatible materials and technologies that were successfully adopted in Rome over a century ago in the construction of public housing complexes, still demonstrate their durability, cost-effectiveness, and environmental and social sustainability. These are materials and techniques that, once again today, in significant examples like the new residential complex in *Le Plessis Robinson* in Île-de-France (Paris), showcase the feasibility, cost-effectiveness, and environmental sustainability of such projects.
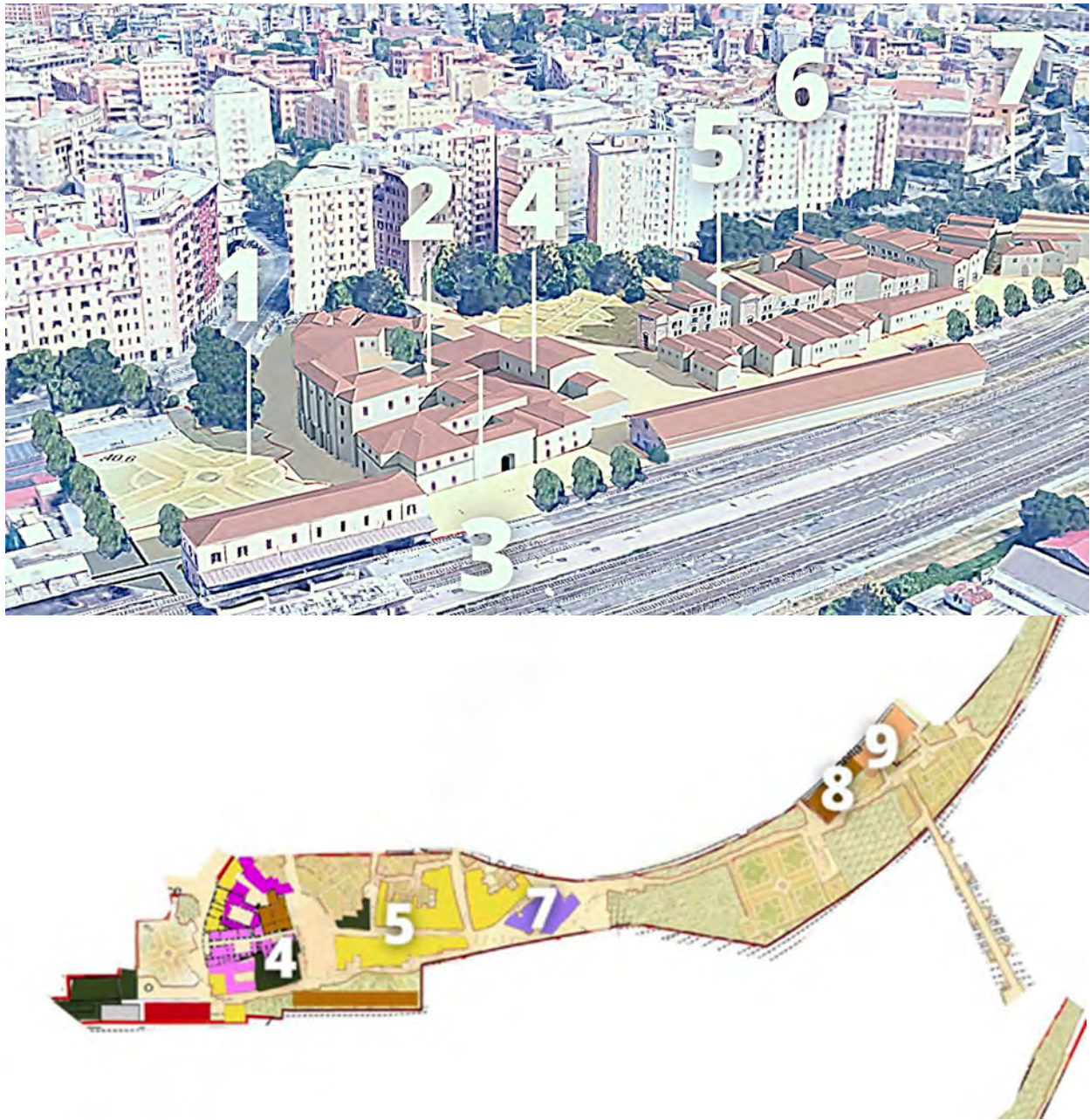
Fig. 10: Archabout's project proposal. Legend: 1. Train Station square with Italian Garden. 2. Innovation Hub: co-working and Fab lab spaces.[16] 3. Fab lab co-working for social use. 4. Recreational-cultural spaces 5. Shops and artisan workshops, Housing for Seniors/Senior Living.[17] 6. Shops and artisan workshops, Youth hostel.[18] 7. Local health district (ASL). 8. Cultural services: rehearsal rooms for artistic production spaces; public theater; amphitheater. 9. Headquarters of the cultural associations (Source: authors' elaboration)

5. CONCLUSION

The two-thousand-year nature of Rome in the form of a *Star,* which interact with its *double hyperbole* urban structure, presents a challenging methodological dilemma for urban and architectural design, if not known or considered. The *Star* of Rome is still pretty much unknown to urban planners and architects, even for those that are involved in longstanding urban morphology studies; this situation partly explains Rome's chaotic urban development since the 50s, a metropolis that is locked in the hands of building companies' interests.[19] Rather than attempting to unravel the complexities directly from Rome's current urban landscape, our ADI morphological analysis has undertaken a different approach by tracing the historical evolution of the city's layout revealing and acknowledging the interconnections with the Altera Forma Urbis in the design process. This approach allowed us a clearer understanding of how Rome's urban plan has evolved over time with a multitude of functional influences within the overarching framework of morphological periods. It is essential to note that this accumulation of changes in the city plan is not a simple case of layering one element on top of another. Instead, the morphological frames have been observed to have varying degrees of continuity from one period to another and in different geographical areas, leading to their persistence in contemporary Rome structure.

On one hand, straightforward, additions to the urban structure, such as most of the recent and less recent residential developments, can be easily identified and categorized as *self-referential* urban design, detached from the historical and morphological context. On the other hand, ADI method allowed a deeper understanding of the historical-morphological processes as a valuable tool to discern the multifaceted features of the competition's place as an integral part of the *design process*. This research underscored the importance of comprehending the historical context and morphological evolution of Rome's urban environment to inform future urban and architectural design decisions. By recognizing the city's intricate and dynamic history, we can better navigate the complexities of urban planning and ensure the sustainable and harmonious growth of our cities in the future.

The case study of Tuscolana was the perfect occasion to demonstrate ADI methodology as a valid sustainable alternative to traditional urban and architectural design, avoiding the narrow-minded *trends* and self-referentiality of mainstream contemporary urban and architectural design. Archabout project proposal for Tuscolana competition is different from all other competition's submissions because of its approach to history, and to site and inhabitants' needs. ADI methodology allowed Archabout designers to read the character of a place through a diachronic and synchronic analysis; to interpret and design Tuscolana history and urban space through its connection with the *star* of Rome. Through a participatory process, Archabout

designers strived to translate the identities and desires of Tuscolana district's inhabitants in architectural spaces to foster placemaking, social cohesion, and wellbeing.

NOTES AND REFERENCES

[1] D. Koller, J. Trimble, T. Najbjerg, N. Gelfand, M. Levoy, "Fragments of the City: Stanford′s Digital Forma Urbis Romae Project." in *Proceedings of the Third Williams Symposium on Classical Architecture* (Journal of Roman Archaeology suppl., 2005).

[2] M. Koortbojian, *Crossing the Pomerium: The Boundaries of Political, Religious, and Military Institutions from Caesar to Constantine* (Princeton: Princeton University Press, 2020).

[3] One roman passus is about 1.48 meters or 4.86 feet.

[4] For more information about the star of Rome see Archabout's YouTube Channel: https://www.youtube.com/@romeuncovered

[5] The Milliarium Aureum ('Golden Milestone') was erected in the Roman Forum (Forum Romanum) by Augustus when he was superintendent of the road system (cura viarum) in 20 BC. It was a gilded bronze milestone conceived as a point where all the roads converging on Rome. See L. Richardson, Jr., *A New Topographical Dictionary of Ancient Rome* (London: The Johns Hopkins University Press, 1992).

[6] P. M. Lugli, *Urbanistica di Roma. Trenta planimetrie per trenta secoli.* (Rome: Bardi Editore, 1998).

[7] P. M. Lugli, *L'agro romano e l'Altera Forma di Roma antica.* (Rome: Gangemi Editore, 2006), p. 8-15.

[8] N. Marzot, "Studies for an anthropology of the territory: New achievements from Saverio Muratori's archive." in G. Strappa, A. R. D. Amato, & A. Camporeale (Eds.), *City as Organism: New visions for urban life,* (U+D, 2016), p. 43-53.

[9] See: G. Caniggia, G. L. Maffei, *Architectural composition and building typology: interpreting basic building.* (Florence: Alinea, 2001). M.R.G. Conzen, *Alnwick, Northumberland: a study in town-plan analysis.* (London, Institute of British Geographers, 1969).

[10] Archabout website. Retrieved on 14-10-2023 from: https://www.archabout.it.

[11] Details of the project "Reinventing Cities". Retrieved on 10-10-2023 from: https://www.c40reinventingcities.org/en/sites/sites-in-competition/roma-tuscolana-1379.html

[12] See: G. Cataldi, *Per una Scienza del Territorio.* (Firenze: Studi e Note, 1976)

[13] R.T.T. Forman and M. Godron, *Landscape Ecology.* (New York: John Wiley & Sons, 1986).

[14] See: S. Muratori, R. Bollati, S. Bollati, G. Marinucci, *Studi per una operante storia urbana di Roma.* (Rome: CNR Roma, 1963).

[15] G. Moneta, "Roma: la struttura e la forma." In G. Moneta, *Lineamenti del corso di composizione III,* (Dispensa n.6 DAAC Università La Sapienza, Rome, 1985), pp 20-24.

[16] 2-3-4. A Gross Leasable Area (GLA) of 15% will be allocated to co-working spaces and innovative fab labs, following the innovation hub concept, which promotes dialogue and collaboration among the involved stakeholders, in addition to approximately 5% of GLA for related services. The presence of co-working spaces will ensure the involvement of young people to maintain the right generational mix in the project area. The remaining GLA of 10% will be dedicated to other services, including sports facilities (including a gym with a pool), recreational, and cultural activities, with a preference for revenue-generating activities that could offer special discounts and benefits to residents in the neighborhood.

[17] Senior Living offers its residents the opportunity to remain independent in the comfort of their own homes for as long as possible, without giving up access to services that may become necessary as they age, ranging from simple daily assistance to personalized care services.

[18] These budget accommodations that combine aspects of socialization and meeting among young people. It represents an economical solution, without sacrificing the creativity of the spaces and modern comforts, for youth visiting the city of Rome.

[19] For a review of Rome's residential development see: A. Moneta, *Ponte di Nona: una Centralità Metropolitana nel mercato edilizio romano* (Rome: Nuova Cultura, 2012).

CITIES IN TRANSFORMATION

Yousef Awaad Hussein
Independent Scholar
USA
yousef.awaad@gmail.com

Manar Zaki
American University in Cairo
Egypt
manar@aucegypt.edu

Maurizio Crocco [1], Andrea Moneta [2]
[1] Archabout.org, Italy
[2] Nottingham Trent University, UK
amoneta@smartjokes.it

Manalee Nanavati
Indian Institute of Technology (IIT)-Bombay
India
nanavati.manalee@gmail.com