



# LAYERED

# GROUNDS

Investigation of reviving infrastructure groundscapes

## TABLE OF CONTENT

INTRODUCTION & PROBLEM STATEMENT	4
THEORETIC FRAMEWORK	8
METHODOLOGY	12
RESEARCH DIAGRAM	16
ARGUMENT & RELEVANCE	18
ANNOTATED BIBLIOGRAPHY	20

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## INTRODUCTION & PROBLEM STATEMENT

The research started with the fascination of residual spaces and the lack of space in London. In the search of lost space in London, it is discovered that there are plenty of residual spaces in-between layered infrastructure. With those structures, new vertical groundscapes were born, ground, above, under and the in-between. These spaces are rarely translated into productive and meaningful spaces, even in the context of London where every square metre counts. The result of new groundspaces created by layering infrastructure would be the main topic where the research would deviate around.

In the limited ground space of London, ways like elevating, layering and digging are constantly used to create new groundscapes. However, there is a cost to

create these grounds in the filled urban fabric of London. The new infrastructure grounds run through the urban grains demolishing everything in its way, creating borders and separate neighbourhoods. Which ironically does the opposite of what the infrastructure is supposed to do; to create good linkages. The infrastructure instead intersects and divides various demographics, experiences and memories of the city. The spaces in-between the infrastructures are often wasted lands and residual spaces. The spaces above and under become prominent to various informal uses, including criminal and local communal uses. There is a challenging segregation of socio-spatial that produces complexity in the urban fabric, due to the incisions of these layered infrastructure also known as groundscapes. The continuation, experience and memories of the spaces is disturbed. The layered infrastructure is a border both horizontally and vertically. It is speculated what the potentials are and how to generate meaning within these groundscapes for the users nearby through reclaiming and reviving these residual spaces. Instead of being a border, unite the spaces, people and urban fabric through experimenting with new groundscapes and their potentials.

**Image 1**

Residual space created by layered infrastructures (highway, road, railway)

By: Rupert to Hardy, *The London Westway*, 2015, 1/5s, 18.3mm, ISO200, f/5 <https://www.r2h.co.uk/london-westway/>.



**Image 2**

Informal use of space created by the new grounds.

By: Vice, *The Travellers Who Live Under One of London's Busiest Roads*, 2017. <https://www.vice.com/en/article/8xayn3/the-travellers-who-live-under-one-of-london-s-busiest-roads>



Thus the research would be led by the main question:

**How to generate meaning within the new groundscapes for the users nearby through re-claiming and reviving residual spaces produced by the layered infrastructure.**

The thematic sub-questions below are to help to guide through the theoretic framework, methodology and design research. They are divided into three smaller topics; tackling the ground conditions, potential adaptations, and the social-spatial relationships and tensions.

*What is the groundscape? What are the effects of reviving residual ground spaces created by layered infrastructure on the continuity of the horizontal and vertical space? What is the meaning of the material and intangible qualities of the groundscape (transition zone)?*

*What potential interventions could be suitable? What alternative spaces are the 'groundscapes' capable of adapting into? What are the effects of the readaptation in the context of the city, ecology and environment? What are the consequences of reviving the groundscapes?*

*How does reviving residual ground spaces created by layered infrastructure influence the socio-spatial relationship? How is the relationship between the social and spatial impacted by the transformation of the residual space?*

## THEORETIC FRAMEWORK

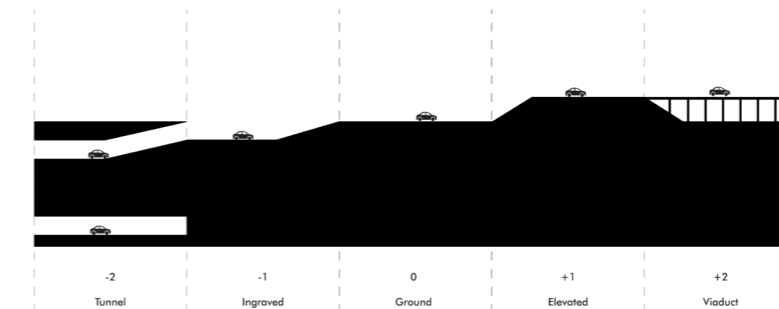
In this chapter, theoretical frameworks will be discussed. The concepts that are relevant to the topic are: Groundscapes, Reviving Infrastructural Space, Infrastructure and Public Space. These topics would be discussed in a way of literature review. The discussion of these topics should formulate a deeper understanding on the topic and help answer the research question.

The ground is defined as a continuous plane and stable reference points.<sup>1</sup> In the context of the metropolitan city of London, the 'ground' is often a result of layering infrastructure. This can be seen on many degrees such as; railways, motorways, cycle lanes, buildings, pedestrians, etc. The intense layering of various infrastructures creates different in-between 'grounds' also known as groundscapes. The in-between grounds are found both on the vertical and horizontal axis of the city. The true ground becomes a point of reference to the level the person or object is on. In the book "The making of Hong Kong", is mainly discussing the matter of movement throughout multiple horizontal and vertical layers of the city. The book redefines the ground, the movement on and between the ground and layering of functions on the ground. The definition of multiple ground would be suitable, where the users can traverse as if they were on the ground plane. However, when there is too much layering and levelling it becomes a 'city without ground' this concept comes from the book "Cities without ground: a Hong Kong Guidebook". No ground means no figure. The matters of axis, edge, centre and even fabric which

Shelton Barrie, Karakiewicz Justyna and Kvan Thomas, *The making of Hong Kong*, In McGrath, Brian, ed. *Urban Design Ecologies: AD Reader*, West Sussex: Jon Wiley & Sons, 2013

<sup>1</sup> Frampton, Adam, Clara Wong, and Jonathan D. Solomon. 2012. *Cities Without Ground: A Hong Kong Guidebook*. N.p.: Oro editions.

shape the urban space, is also missing. In that case the third-dimensional becomes essential; it overlooks the traditional plain, in some sense the fourth dimension of time could also be added which Gausa and Kim suggested. They see the opportunity to revive layering infrastructure.



**Image 3**

Various 'ground' conditions (groundscapes).

*"The concept of multi-ground responds to the-  
sis criteria: it does not intend to "continue" or  
"recreate" the traditional city. Nor impose or  
positionate, transform it, build machines or  
objects but superimpose a new dense floor that  
becomes a new topo on, inside, in, where and  
through which to develop new/old programs,  
uses and activities of life and relationship."*<sup>2</sup>

Transportation infrastructures are mainly made to create the purpose to commute, and thus the mission to revive them becomes very challenging. This is because infrastructure is static itself but serves the function of movement.<sup>3</sup> Recycling, reclaiming and revitalising could be ways to rethink infrastructure. The ability of architecture to transform within the realm of infrastructure becomes an opportunity to rethink the invisible.<sup>4</sup> Reclaimed infrastructure has to prioritise integrating new programs and interconnecting systems.<sup>5</sup> The new program and systems create a new super-organism and ecosystem. The transition ought not to be static in any means, but dynamic. They should interact with one another and adapt themselves in the

<sup>2</sup> Frampton, Adam, Clara Wong, and Jonathan D. Solomon. 2012. *Cities Without Ground: A Hong Kong Guidebook*. N.p.: Oro editions.

<sup>3</sup> Allen, Stan, "Landscape Infrastructure", *Infrastructure as Architecture: Designing Composite Networks*. N.p.: Jovis. ed. Stoll, Katrina, and Scott Lloyd, eds. 2010, p. 36-45.

<sup>4</sup> K. Stoll, S. Lloyd, "performance as form", *Infrastructure as Architecture: Designing Composite Networks*. N.p.: Jovis. ed. Stoll, Katrina, and Scott Lloyd, eds. 2010, p.4-7.

<sup>5</sup> Angelil M\_Klingmann A. (1999) *Hybrid Morphologies- Infrastructure, Architecture, Landscape*.

complex and intertwined time structuring network.<sup>6</sup> Allen suggests that the site of these intertwined infrastructures should be seen as a continuous matrix. This matrix consists of the horizontal axis (infrastructure and landscape) and vertical axis (building). The two axes are woven together and both could be understood as architectural material. The spaces could be identified as movement, building, infrastructure and open space. How could these spaces be revived and serve the public?

The purpose of infrastructure is to create linkages between countries, cities, communities, and individuals. However, in some cases, the infrastructure itself becomes a barrier and border. At this point the system does not serve the public anymore, the system has failed. There is a tendency for these leftover spaces created by the overlaying infrastructures to attract informal activities like, drinking, skating, street art, camping, homelessness, etc. Wall continues to talk about the tension between the informal and formal, public and private, city and infrastructure, the planned and not planned. He suggests that the socio-spatial relationships of these informal activities reveals a new typology of urban space. Cuff talks about those failed public systems and how to give back to the public. It is suggested that the next generation of public sphere is infrastructure, they were designed for the public, and thus should give back to the neighbourhood. She continues to talk about the WPA 2.0 competition, five lessons can be drawn from it; infrastructure must give back to the communities it serves, infrastructure should be made visible, infrastructure should be productive and be service-orientated, public works should be the end result of recycled, reclaimed and revitalised infrastructure, and the process of transformation ought to be completed in phases.

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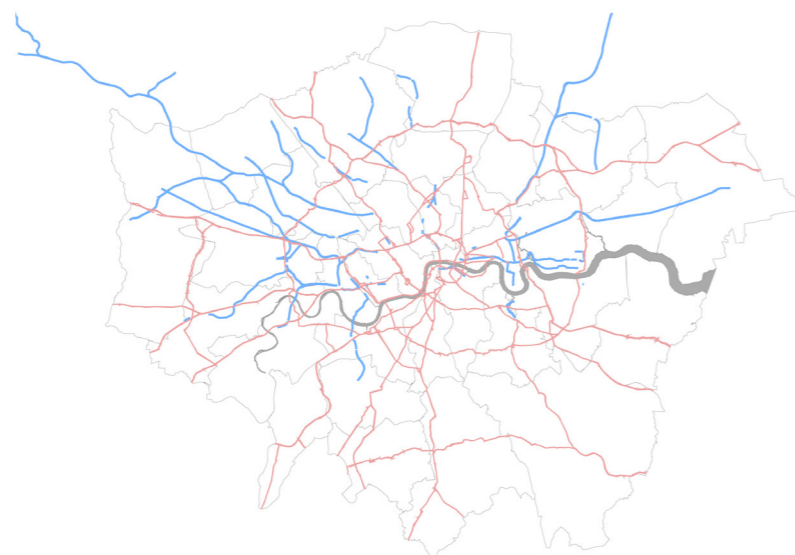
<sup>6</sup> Bhatia, Neeraj, Maya Przybylski, Lola Shepard, and Mason White. Pamphlet Architecture 30: Coupling: Strategies for Infrastructural Opportunism. New York: Princeton Architectural Press, 2011.

Wall, Ed. "Infrastructural Form, Interstitial Spaces and Informal Acts," In *Infrastructural Urbanism-Addressing the in-Between*, edited by Thomas Hauck, Regine Keller, and Kleinekort, Volker, 145–58. Berlin: DOM Publishers, 2011.

Cuff, Dana, "Architecture As Public Works", *Infrastructure as Architecture: Designing Composite Networks*. N.p.: Jovis. ed. Stoll, Katrina, and Scott Lloyd, eds. 2010, p.18-25.

## METHODOLOGY

This research aims to discover the potentials of reviving residual spaces produced by the horizontal and vertical spatial thresholds, created by transportation infrastructures in London. In the methodologies these potentials would be discovered through analysis of case based studies that would be tackled on a macro and micro scale. Typological and morphological mapping, and praxeology would be used. In this chapter, the argument would be made why the methodology is relevant to the research, what are the methods and tools that would be used, what data would be collected, and what are possible outcomes or findings. The images that are used are to make clear how the research should proceed, Westway is used as an exam-



**Figure 1**

The image shows the geographical relation of the railways (blue) and the highways (red). When the two intersect the levels of the ground are layered creating an interesting cluster. From this map, the intention is to discover potential areas of interest on a macro scale.



**Figure 2**

In the historical mapping the intention is to deal with the conflict of the infrastructure and the urban fabric. How did the layers formulate, who was first, the infrastructure of urban fabric, were neighbourhood demolished?

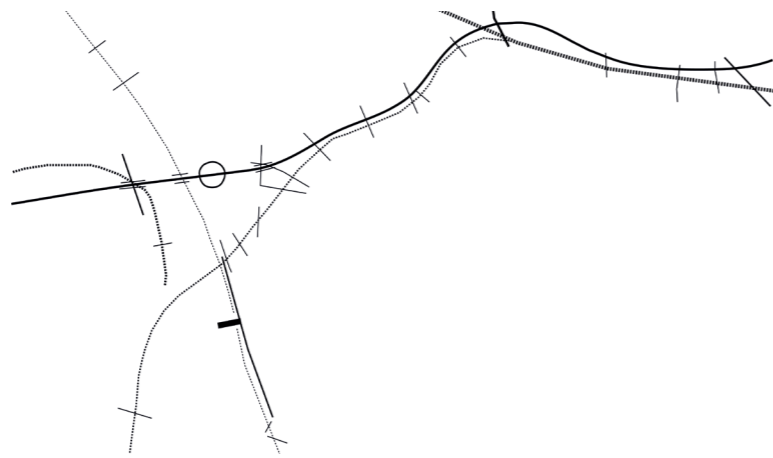
ple. These methods would also be applied to other sites in future research.

Typological and morphological studies will be used to investigate and understand London on a macro scale. This method would be mainly used to find places of interest. The interest of the project lies in the layering of infrastructure. Therefore, morphological mapping would be used on the current and past context (historical mapping) of the space to find possible correlation of the horizontal and vertical axis, most likely to investigate the segregation and bordering of space caused by infrastructure. Mapping should also be done on the function of space, what is nearby the layered infrastructure and what correlation does it have to the space.

Typological mapping will be used to find different types of densely overlaying. Through investigation this is happening where there are mainly highways and railways intersecting on the ground. Two dimensional mapping would be used and afterwards three dimensional methods like Axonometry would continue to clarify the relation of various groundscapes. From this the macro scale should reduce to micro where the nodes become interesting.

**Figure 3**

This is an abstraction of the Westway roundabout. The roads (solid line) and railways (dotted line) intersect with each other through abstraction several points of conflict can be found. That could be further investigated on a smaller scale.



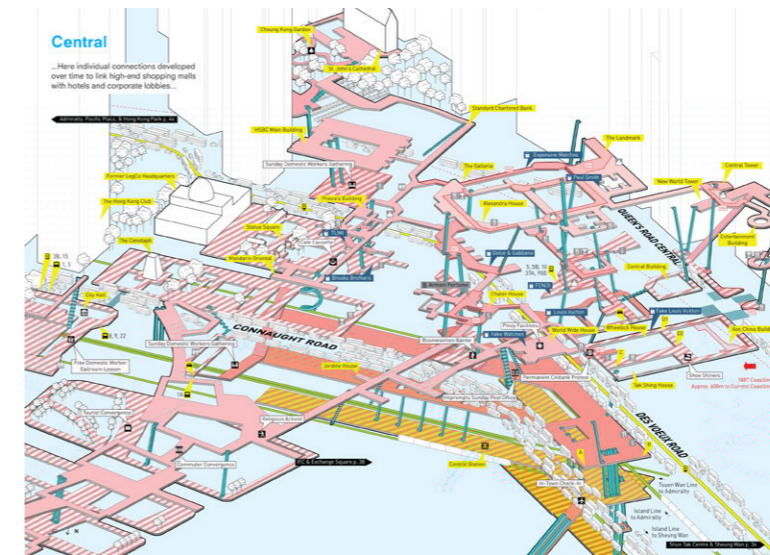
Praxeology is preferred as it gives insight into the social and behavioural patterns of people. This method is used to discover potential needs and groups of interest and their needs which could translate to possible design programs. This should be done through axonometric drawings and relate the space with the behaviour and use of the space. Perspective drawings and material studies should be done to reflect the experience of space and the behaviour of the people that respond towards this.

Interviews are another technique that would be used. The intention would be to find the opinions, memories, experiences, hidden needs, etc. of the people that are in the surrounding community. These results should translate into behaviour, memory, diagrams/mapping. That could transform into potential programs, connecting systems, sites, etc.

Counting and recording techniques are also methods that should be used. The intention of these methods is to find certain patterns or correlations. The data that might be useful are the number of parked cars, informal use, informal housing, etc. along the layer infrastructure. From this potential insight might be drawn, possible fourth dimension mapping, which would include the invisible perspective.

Case studies would be used to understand the potentials and challenges of reclaiming residual space from

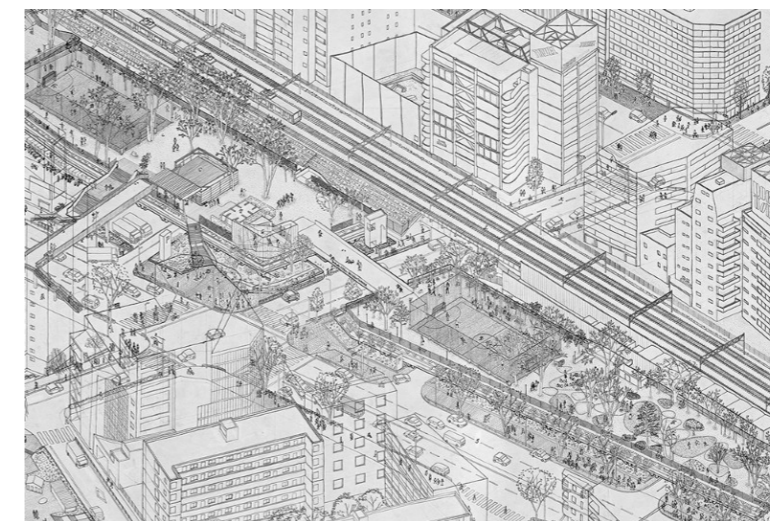
layered infrastructures. The examples that would be used are from the books "Superground Underground" and "The Underground City".



**Figure 4**

Example of the 3D relationships of various infrastructures and their relation to one another.

Image: Frampton, Adam, Clara Wong, and Jonathan D. Solomon. 2012. *Cities Without Ground: A Hong Kong Guidebook*. N.p.: Oro editions.



**Figure 5**

Example of 3D relationship of the layered groundscapes and their relation to the neighbourhood/community. Or other possible fourth dimensions that are going to be discovered in the research.

Image: Atelier Bow-Wow, Miyashita Park, Tokyo, 2011



**Research question:** What are the effects of reviving residual ground spaces created by layered infrastructure on the continuity of the horizontal and vertical space?

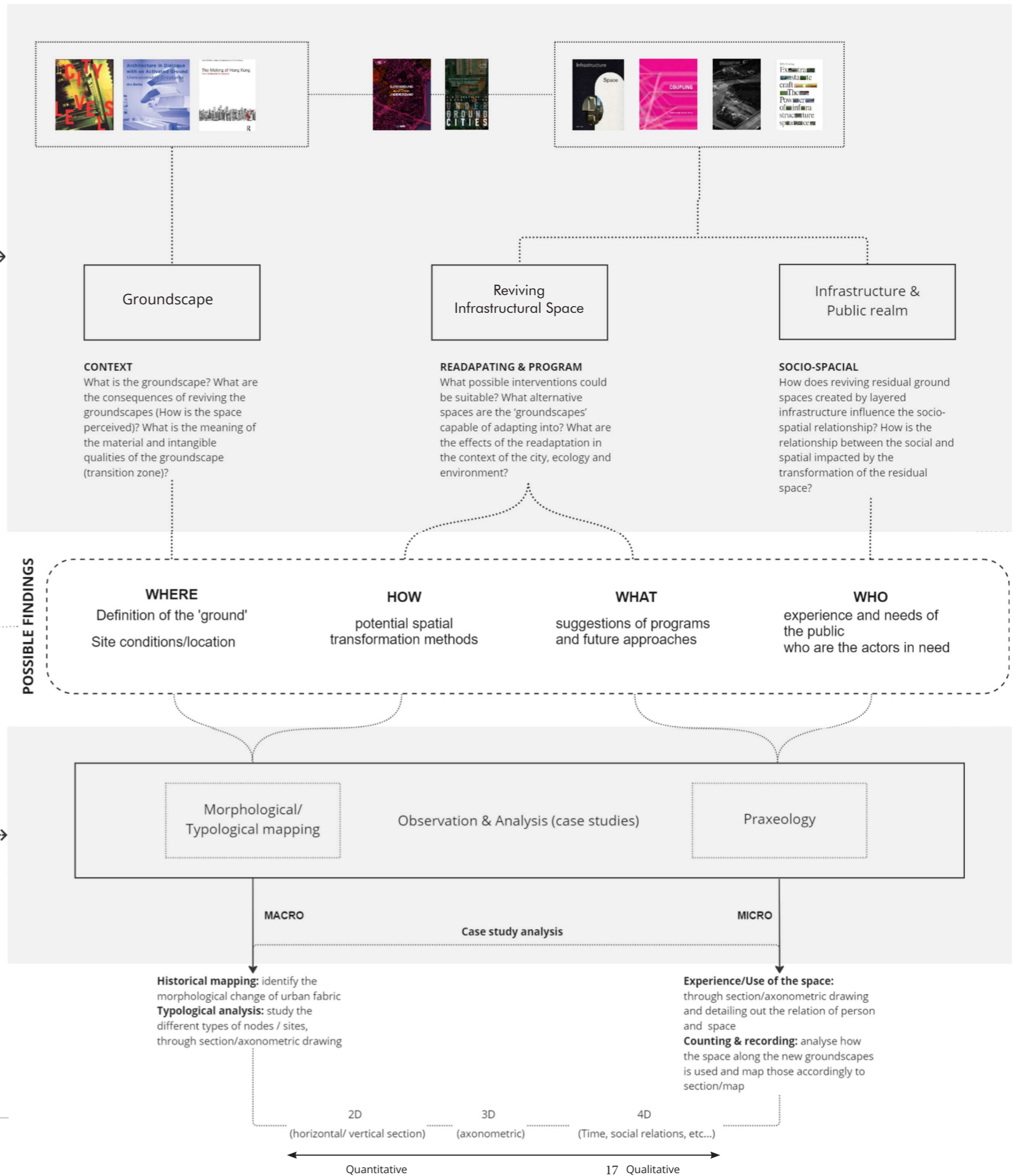
WHAT TO RESEARCH

Theoretic Framework

WHAT TO DO

Methodology

WHY



# RESEARCH DIAGRAM

## ARGUMENT & RELEVANCE

At the moment metropolitan cities are packed with stuff. The land of cities like London is very precious, land is scarce, every inch counts. Therefore, the decision of what to do with space is crucial, the highest bidder often gets the land. However, how to deal with space that is wasted, like residual space as a result of layered infrastructure?

As the city gets more and more crowded, other alternatives have been implemented to create 'ground', this is often done by layering and levelling of spaces. Especially when it comes to movement and efficiency of infrastructures. These are often layered over each other to create good connections throughout the city. Nevertheless, these infrastructures are designed to serve efficiency and neglect the neighbourhoods they cut through, dividing them socially and spatially. These borders are the result of the layered infrastructure. The residual space produced is often poorly used, most of the time as parking spaces, drinking, street art, etc. However, there is potential and opportunity to use those spaces. These landscapes are to be explored to find new common grounds, as well as, perspectives on these spaces. The addition of the elevated grounds also generate opportunities to explore new grounds; the in-between vertical and horizontal grounds of these systems. However, transforming the grounds is challenging (segregation, pollution, and difficult adoption). How could these grounds be given meaning in these harsh conditions?

One could argue that the topic is already explored in the context of other metropolitan cities like Shanghai, HongKong, Tokyo, Seoul, etc. which have created systems and networks that are based on layering. These cities are designed to live in buildings and the vertical world by connection, and create public spaces on the layers. Similar spaces could be found everywhere in London but different. In the context of London, the layers are often not designed for public use. The layering of grounds should be an experimental playground where the purpose is to create a suggestion on how to use these new landscapes, and what opportunities and potentials they can create for transforming metropolitan cities like London in the future. Moreover, the meaning of reviving and transforming these spaces should also be experimental. The research is to find possible ways to make architectural interventions on new landscapes which could potentially benefit the city as a whole.

## ANNOTATED BIBLIOGRAPHY

Allen, Stan, "Landscape Infrastructure", *Infrastructure as Architecture: Designing Composite Networks*. N.p.: Jovis. ed. Stoll, Katrina, and Scott Lloyd, eds. 2010, p. 36-45.

Allen suggests that the site of these intertwined infrastructures should be seen as a continuous matrix. This matrix consists of the horizontal axis (infrastructure and landscape) and vertical axis (building). The two axes are woven together and both could be understood as architectural material. The spaces could be identified as movement, building, infrastructure and open space.

Angelil M\_Klingmann A. *Hybrid Morphologies-Infrastructure, Architecture, Landscape, 1999*.

"A wasted territory within the city is reclaimed through the introduction of new programs and through the interconnection of systems, commonly kept apart, such as those for infrastructure, architecture, and landscape. The project avoids any type of compositional order which might prioritise architecture; it instead alludes to potential strategies promoting a hybridization of components within a space of topological extension."

Bhatia, Neeraj, Maya Przybylski, Lola Sheppard, and Mason White. *Pamphlet Architecture 30: Coupling: Strategies for Infrastructural Opportunism*. New York: Princeton Architectural Press, 2011.

The essence of the reading is to create opportunities for infrastructures to reintegrate with architecture so that it creates a system based organization- a superorganism. By reintroducing architecture as a superorganism, it has the ability to be dynamic rather than static. The system becomes an open system that adapts and interacts with its environment.

Cuff, Dana, "Architecture As Public Works", *Infrastructure as Architecture: Designing Composite Networks*. N.p.: Jovis. ed. Stoll, Katrina, and Scott Lloyd, eds. 2010, p.18-25.

Cuff talks about those failed public systems and how to give back to the public. It is suggested that the next generation of public sphere is infrastructure, they were designed for the public, and thus should give back to the neighbourhood. She continues to talk about the WPA 2.0 competition, five lessons can be drawn from it; infrastructure must give back to the communities it serves, infrastructure should be made visible, infrastructure should be productive and be service-oriented, public works should be the end result of recycled, reclaimed and revitalised infrastructure, and the process of transformation ought to be completed in phases.

Frampton, Adam, Clara Wong, and Jonathan D. Solomon. 2012. *Cities Without Ground: A Hong Kong Guidebook*. N.p.: Oro editions.

In the book *Cities Without Ground: A Hong Kong Guidebook*, the ground is defined as a continuous plane and stable reference points. However, playing intensively with levelling and layering can create a condition of 'city without ground'. No ground means no figure.

Gausa, Manuel, and Young Joon Kim. 2020. *Superground / Underground*. New York: Seoul Metropolitan Government.

The book talks about the potentials of urban infrastructure how it can be transformed and the challenges. The focus is on the new groundscapes, what they mean to the metropolitan city of Seoul.

Ireson, Ally, and Nick Barley, eds. 2000. *City Levels*. N.p.: Princeton Architectural Press.

The book focuses on the different levels of the city: The highest point, Elevated territories, the street and the beneath ground, reading the book the hope is to clarify the definitions of the different levels. And how they are blurred and essential to the metropolitan city of London.

Shelton Barrie, Karakiewicz Justyna and Kvan Thomas, *The making of Hong Kong*, In McGrath, Brian, ed. *Urban Design Ecologies: AD Reader*, West Sussex: Jon Wiley & Sons, 2013

In "The making of Hong Kong", is mainly discussing the matter of movement throughout multiple horizontal and vertical layers of the city. The book redefines the ground, the movement on and between the ground and layering of functions on the ground. The definition of multiple ground would be suitable, where the users can traverse as if they are on the ground plane.

K. Stoll, S. Lloyd, "performance as form", *Infrastructure as Architecture: Designing Composite Networks*. N.p.: Jovis. ed. Stoll, Katrina, and Scott Lloyd, eds. 2010, p.4-7.

This book is a selection of chapters, the main essence of the book is to identify infrastructure systems and the invisible. It looks at infrastructure in the forms of Infrastructure Economy, Infrastructure Ecology, Infrastructure Culture, Infrastructure Politics, and Infrastructure Space and Networks. Recycling, reclaiming and revitalising could be ways to rethink infrastructure. The ability of architecture to transform within the realm of infrastructure becomes an opportunity to rethink the invisible.

Wall, Ed. "Infrastructural Form, Interstitial Spaces and Informal Acts," In *Infrastructural Urbanism-Addressing the in-Between*, edited by Thomas Hauck, Regine Keller, and Kleinekort, Volker, 145–58. Berlin: DOM Publishers, 2011.

This article gives insight to the informal and formal uses of residual spaces created by infrastructure. There is a tendency for these leftover spaces created by the overlaying infrastructures to attract informal activities like, drinking, skating, street art, camping, homelessness, etc. Wall continues to talk about the tension between the informal and formal, public and private, city and infrastructure, the planned and not planned. He suggests that the socio-spatial relationships of these informal activities reveals a new typology of urban space.

### To read:

Anuar, M. I. N. M., and Raziah Ahmad. "Elevated highways and its lost spaces: A review of Kuala Lumpur? s seldom seen." *Environment-Behaviour Proceedings Journal 2*, no. 6, 2017, p. 279-291.

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Khaleghi, Marjan, and Jahanshah Pakzad. "Elevated highways in residential layouts: The imposed negative impacts (case study: Sadr Elevated Highway)." *International Journal of Architecture and Urban Development 7*, no. 2, 2017, p. 5-18.

