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# PREFACE

This research booklet marks the first phase of my graduation project at the TU Delft, where I study architecture within the Design for Health and Care studio. The focus of this phase is a topic that has become deeply personal to me over the years: *designing to stimulate physical activity*. This research lays the foundation for the design project that will follow, reflecting my concerns about rising health issues in Dutch society and globally, and my belief that architecture has the potential to contribute meaningfully to combating sedentary lifestyles.
The inspiration for this research stems from a pivotal course I took during the first year of my master's studies, titled *Entrepreneurship in Architecture*. In that course, I developed a roadmap for creating an architecture firm aligned with my values and personality. With a military background and a passion for sports, nutrition, and health, I have become fascinated by how our built environments shape our physical and mental well-being. This course solidified my conviction that architecture is able to actively promote healthier lifestyles.
This research explores the intersection of architecture, behavior, and health. It examines theories of affordances and behavior alongside practical and conceptual innovations in architectural design that encourage movement and physical activity. While this study is largely theoretical, it sets the groundwork for further exploration and practical application, advocating for innovation in how architecture engages with and stimulates physical activity.
With this research, I aim to reach companies interested in creating office spaces that promote the physical health of their employees, as well as anyone intrigued by the idea of architecture that positively impacts lives and communities. Additionally, I hope this work inspires, raises awareness, and sparks curiosity about the transformative role architecture can play in fostering a healthier society. In a world where we spend the majority of our time within buildings, it is within these spaces that change can occur. With this mindset, every architect can choose to advocate for design principles that promote health, contributing to a built environment that is sustainable not only for our planet but also for ourselves.

# CONTENT

# ABSTRACT

The increasing prevalence of sedentary lifestyles has given rise to a "pandemic of inactivity," significantly contributing to widespread health issues. These health challenges place considerable strain on hospital systems and impose substantial financial burdens on healthcare infrastructures.

This research explores how architecture can take a proactive role in addressing this crisis by designing spaces that encourage movement, and social interaction. Focusing on Rotterdam's Tarwewijk, a neighborhood with notable socioeconomic challenges, this study investigates how thoughtful and intentional design interventions can foster more active and healthier living. By integrating behavioral theories such as Gibson's affordances and Thaler's nudge theory with practical frameworks like the Active Design Guidelines and WELL Building Standard, the research bridges the gap between abstract theoretical insights and actionable real-world applications. Using site analysis, fieldwork, and literature review, the study identifies design strategies that subtly promote physical activity while strengthening social connections. Key findings highlight the value of playful and engaging design solutions, including prominently visible and aesthetically appealing staircases, multifunctional public spaces, and culturally inclusive elements that reflect the identity and diversity of the local community. Furthermore, the research highlights how the expansion of available affordances to move through a building can be an effective strategy to stimualte different kinds of movement.

These interventions underscore the potential for architecture to directly contribute to physical and mental well-being while addressing the dual issues of inactivity and social isolation.

The research culminates in an innovative design proposal for an office building in Tarwewijk, emphasizing realistic and financially viable solutions tailored to the community's needs. The proposal is accompanied by a set of practical design guidelines and a comprehensive toolkit to inform and support the design process. By combining creativity, theory, and practical application, this research demonstrates how architecture can serve as a catalyst for healthier, more active, and socially connected communities.

**KEYWORDS**

Active design, affordances, nudge theory, physical activity, architecture, choice architecture

# INTRODUCTION

# 1.1 THE PANDEMIC OF INACTIVITY

This research report focuses on the preventative aspects within the domain of health and care. Rather than focusing on improving the quality of care, much progress can still be made by reducing the need for care through the prevention of health issues. Over the past few decades, health issues have been on the rise worldwide as our lifestyles have become increasingly sedentary. According to Erik Scherder (Ministerie van Sociale Zaken en Werkgelegenheid, 2024), professor of neuropsychology and movement science, we are in the middle of a new pandemic: the pandemic of physical inactivity. In the Netherlands, the average person spends around 8.9 hours a day sitting, which is linked to approximately 21,000 deaths per year (Renaud et al., 2024). Worldwide, 5.3 million people have died in 2012 from diseases related to sedentary behaviour (Ministerie van Sociale Zaken en Werkgelegenheid, 2024).

In the Netherlands, 39.2% of the hospital disease burden is attributed to poor lifestyle choices, of which 20.9% is related to sedentary behavior (Van Der Zande, 2018). This data illustrates the scale of the issue and how the cumulative effect of small, unhealthy choices made by individuals directly impacts hospital capacity and, by extension, society as a whole. Furthermore, the healthcare costs associated with treating these health issues amount to 1.2 billion euros annually in the Netherlands (Renaud et al., 2024), adding another layer of societal and economic complexity to the problem. By making short-term unhealthy choices, we not only harm our own well-being and longevity but also contribute to a growing financial and healthcare capacity burden on society. This highlights the urgent need for effective interventions to combat physical inactivity and enhance public health outcomes.

This research is focused on the Tarwewijk, located in the south of Rotterdam. The Tarwewijk has faced significant issues with criminality and drug problems in the past, which has created a stigma around the neighborhood and its surrounding areas (CultuurWerkplaats Tarwewijk, n.d.). As a result, the Tarwewijk has become known as a neighborhood associated with socio-economic challenges, particularly for people with low incomes. People with low incomes often have limited access to sports facilities and face far greater challenges than focusing on their health, it is usually not a priority for them (Bloomberg et al., 2010). Consequently, physical and mental health issues are more prevalent in this area (Gemeente Rotterdam, 2024). This makes the Tarwewijk an excellent location to study how architecture can contribute to encouraging physical activity and reducing health issues.

An international study conducted in twelve countries demonstrates that spatial conditions play a significant role in the level of human physical activity (De Bourdeaudhuij et al., 2015). Architects and urban planners are therefore in a unique position to encourage physical activity among the people who use their designs. By incorporating elements that promote movement and social interaction, design can help address the negative effects of sedentary behavior. A practical design toolkit for such an approach was commisioned by the City of New York, who developed an *Active Design Guidelines* toolkit (Bloomberg et al., 2010). Furthermore, another toolkit is the *Well Building standard* (Delos Living LLC, 2016). Which is similar to LEED AP and BREEAM, but covering human health instead of sustainability. The architecture office BETA (2016), has developed their own toolkit based on these 2 foundational studies, further broadening the practical toolkit of architects to achieve the purpose of stimualting physical activity.

This research will build on these three foundational design toolkits to explore how their principles can be leveraged to stimulate physical activity in the Tarwewijk and positively influence the well-being of its residents. The research will first analyze the aspect of sedentary behavior throughout human evolution to define the root causes of the problem. This will be followed by establishing a theoretical foundation for the design of affordances and study practical insights into stimulating physical and social activity through architecture. Finally, defining practical design guidelines for architectural projects.



*Figure 1: Instinctive tendency toward inactivity*

# 1.2 THEORETICAL FRAMEWORK

The theoretical framework of this research integrates 3 distinct perspectives: behavioral theory, architectural practice, and critical reflection, to provide a comprehensive understanding of the problem and potential solutions. The initial chapters (H2.1-3.2) emphasize theoretical and behavioral aspects, while the later chapters (H3.3-4.2) focus on practical architectural considerations. Throughout, the research critically reflects on emerging conclusions, comparing them with critical perspectives on promoting physical activity. This approach avoids framing architecture as a solver of all problems, and focus on creating realistic guidelines instead.

*Behavioral Theory*
This section outlines 3 foundational theories for behavioral theory. The first is the *Theory of Affordances* by James J. Gibson (1979), an American psychologist known for his ecological approach to perception. Gibson introduced affordances, which refer to action possibilities the environment offers relative to an organism's capabilities. This concept emphasizes the dynamic relationship between the environment and the organism, emphasizing the relation between the environment and behavior.

The second is Erik Rietveld's theory, which builds on Gibson's affordances. Rietveld, a Dutch philosopher, highlights how affordances are shaped by sociocultural contexts and the abilities of the perceiver (Rietveld et al., 2014). He argues that we are surrounded by a landscape of affordances which emerge from the interaction between individuals and their environments. The design of this landscape therefore inlfuences how an organism will interact with it.

The final theory is *Nudge Theory* by Richard Thaler and Cass Sunstein (2008). Thaler, a Nobel laureate in behavioral economics, and Sunstein, a legal scholar, propose that behavior can be subtly influenced without restricting freedom of choice. By modifying choice architecture, nudges make specific decisions more appealing, encouraging desired behavior.

*Architectural Practice*
The architectural practice component of this framework draws on 3 design guideline toolkits, forming a robust set of proven strategies to promote physical activity.

The *Active Design Guidelines* (Bloomberg et al., 2010) offer strategies for designing buildings, streets, and neighborhoods that encourage activity and improve health.

The WELL Building Standard (Delos Living LLC, 2016) is a globally recognized framework prioritizing human health and well-being. It includes strategies across ten areas, such as air, water, fitness, and mental health, to enhance occupant wellness.

The Active Design in Buildings toolkit (BETA, 2016) builds on the previous two, incorporating expert insights and additional guidelines to further support activity promoting principles.

*Critical Reflection*
This component of the theoretical framework incorporates sources that critique aspects of the previously mentioned behavioral theories. Key references include *The Social Life of Small Urban Spaces* by William H. Whyte, an urbanist and sociologist known for studying public spaces and human behavior. In his 1980 book, Whyte critiqued architecture's tendency to neglect how people actually use spaces.
Additionally, smaller-scale studies are included that critique theories like Nudge Theory, as well as projects and architects referenced in the research, such as Herman Hertzberger.

# 1.3 METHODOLOGY

The research methodology combines site analysis, fieldwork, and desk research, as shown in Figure 2.
The first phase involved analyzing the site and its demographics, followed by fieldwork with observations and interviews to understand local dynamics and user needs. Additional qualitative data was collected through online research, reviewing studies and reports on the site and neighborhood.
The second phase focused on desk research, examining theories, design guidelines toolkits, and case studies, which were integrated into the theoretical study to provide practical insights.
Theoretical research ran parallel to further site investigation and program analysis, ensuring the theory remained aligned with the project's context and needs.

*Hypothesis*
The current affordances within a building that facilitate movement are typically limited to stairs, elevators, ramps, and escalators. Expanding the range of affordances with more physically engaging alternatives can encourage more active movement throughout the building and therefore increase physical activity.

This results in the following research question:

*How can active design principles be leveraged to enhance the physical and mental well-being in the Tarwewijk?*

*Ethics and Data Collection*
This research is based on principles that are designed to influence behavior. This raises ethical questions about freedom of choice. However, since freedom of choice is not limited through the application of nudges, and the nudges are designed to contribute to a greater purpose that benefits the inidivudal aswell as the whole society, I believe the nudges are in this case justified to be integrated for the purpose of increasing well-being.
Ethics are also crucial in the methodology, as the study involves observing and interacting with people. Participants will be informed about the study's purpose, and their right to withdraw at any time. Given the sensitive topics of health and well-being, confidentiality will be prioritized by anonymizing all interview and observation data.

*Impact on Broader Architectural Practice*
This research builds on a strong foundation of existing theoretical frameworks and practical guidelines. The aim is to raise further awareness about the possibilities of architecture through an "out-of-the-box" approach to building design, challenging traditional ways of moving through a building. With this, I hope to encourage the expansion of innovative strategies to stimulate physical activity through architecture, going beyond the existing guidelines provided by current toolkits.

*In some chapters and parts of the appendix, certain texts will reference a letter-number combination. These refer to the location analysis or conclusions from the conducted fieldwork. These references are located in the fieldwork appendix.*

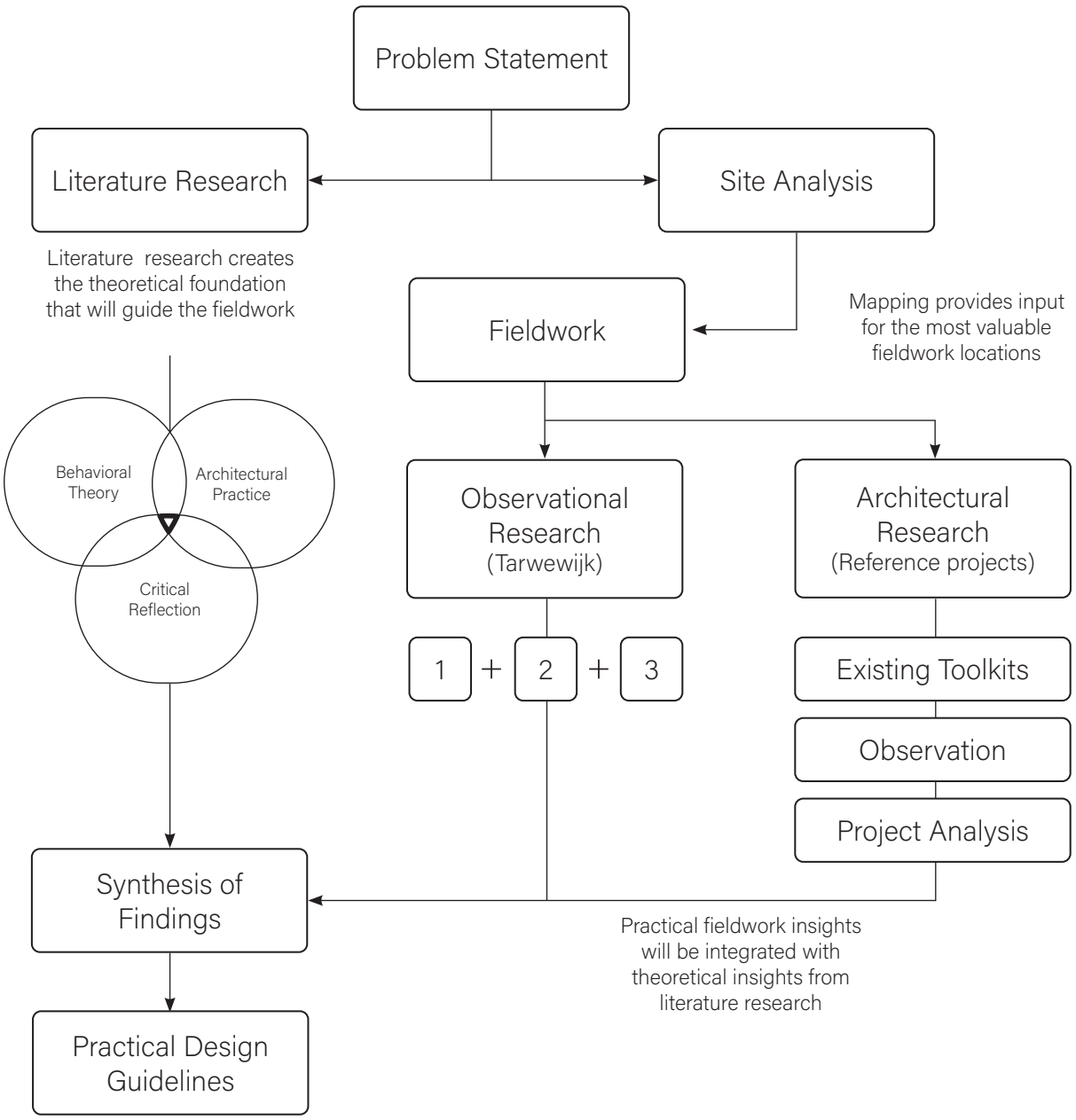


*Figure 2: Research methodology*

# A BRIEF HISTORY OF MOVEMENT

# 2.1 INNOVATION TOWARD SEDENTARITY

Historically, humans had no technological means of facilitating their own movement, relying on walking as their primary mode of transportation. However, humanity has made significant technological advancements which have played a crucial role in the evolution of the human species (Grübler & Nakicenovic, 1991). What began as a survival instinct—developing techniques to increase accessibility to resources—eventually led to a more economically driven development. Through these advancements, mankind has been able to enhance the abilities of its species and to sustain a growing population at higher levels of economic well-being.

The human drive for technological advancement and innovation, has now shifted toward minimizing effort. Recent technological developments, such as electric bicycles and scooters, are no longer driven by a survival imperative but rather by a desire to minimize the physical effort of daily mundane activities. This transition underscores a fundamental complexity of human nature: the very instincts that once ensured the survival and success of our ancestors have now become the pitfall to our own health.

According to Gibbons (2016), humans have the highest energy consumption of all apes. Our brains are over three times larger, and we reproduce more frequently with shorter intervals between births—both of which demand significantly more energy—leading to a 27% higher metabolic rate compared to other apes. This high metabolic rate has caused the need for a significantly higher storage of body fat in humans. Gibbons says natural selection would have favored not only fatter individuals, but also smaller guts and other energy-saving adaptations, such as cooking and efficient walking. In the course of its evolution, the human body has developed many energy-saving measures. Zelik (2012) argues that humans subconsciously value the economy of locomotion, often moving in ways that reduce the energetic demands of the human body. This can be seen as obvious in the case of sports activities, such as running a marathon or skiing, in order to maximize performance. However, in relatively undemanding activities like walking, Zelik argues that minimizing effort, particularly energy expenditure, plays a significant role in determining how individuals move. This demonstrates how humans have evolved to subconsciously seek ways to minimize energy expenditure, a mechanism that has been vital for survival and the progression of the human species. However, this same trait has now become detrimental to our health. Since the Industrial Revolution, technological and economic advancements have significantly reduced the need for physical effort. While these developments have enhanced our comfort, they have often diminished the necessity for physical activity.

One of the most influential developments was the invention of the safe passenger elevator by Elisha Otis in 1854, which enabled the construction of increasingly tall buildings and therefore transformed the urban landscape of cities. This breakthrough revolutionized real estate by introducing new revenue models focused on maximizing density and returns. (Koolhaas, 2001). The escalator, which was invented by George Wheeler half a century later in the 1900s, is among the most influential innovations in retail marketing. Whereas an elevator provides a means for a limited number of people to travel between floors, and stairways demand physical effort from users. The escalator transforms accessibility by making all floors equally accesible. Upper floors become as easily reachable as the ground floor, enabling retail traffic to flow effortlessly between levels (Carpenter, 2019). While such developments are economically justified in contexts like shopping malls, these innovations have been widely adopted globally to accommodate society's increasing need for minimizing physical effort and maximizing comfort. Elevators and escalators have been widespread implemented in the modern urban landscape to reduce physical effort in situations where it is not neccessary for the average human being. Even in cases where architects deliberately discourage elevator usage (N1), many people will often still choose the elevator (or escalator) over stairs.


*Figure 3: Human tendency to minimize effort*

Another crucial tranformation in the evolution of modern society is the shift from physically demanding labor to predominantly sedentary work. Sedentary office work as we know it today is only about 100 years old (RAAAF, 2014). This transition was accelerated by the advent of computers, which revolutionized industries and led to the widespread establishment of office-based work environments (Chevez & Huppatz, 2017). The concept of the workspace with a desk, chair and computer was born. Designed to minimze physical energy expenditure to maximize computer work productivity.

In 2017, in the European Union 39% of people spent most of their working hours sitting, in the Netherlands the rate is even higher with 55% (Eurostat, 2019).

The growing importance of office-based work has driven significant efforts to optimize workplace environments. Much like the evolution of the shopping mall, offices were increasingly shaped by economic motivations, with designs progressively aimed at enhancing productivity through reduced distractions and improved privacy. This focus on efficiency led to the introduction of the "cubicle" workspace in the 1960s (Hansen & Saini, 2020). Cubicles proved to be a major financial success, gaining widespread adoption in office settings. Their modular design not only promoted a sense of individual focus but also allowed companies to maximize the number of employees within a given office space. However, the cubicle quickly faced significant criticism according to Hansen & Saini (2020). Critics argue that cubicles can stifle collaboration and socially isolate employees. The repetitive and monotonous nature of cubicle workspaces may lead to decreased motivation and job satisfaction. Additionally, poorly designed cubicles can result in ergonomic issues, causing discomfort and health problems for workers.

Since COVID-19, which globally forced most office-based work to shift to working from home, perspectives on the necessity of traditional office spaces have shifted significantly (Gavett, 2020). Many employees expressed a pref-erence for the comfort and flexibility of remote work, while companies recognized potential financial advantages from reduced workplace-related costs. New trends in the workplace include adopting hybrid working models and flexibility of working spaces. In Europe, 77% of multinational companies have considered transitioning to a hybrid working model, while most smaller companies have reported a return to fully working from the office (CBRE, 2021). While this shift may have created a potentially better work-life balance between employers and employees, it has not addressed the sedentary nature of office work. In fact, according to RIVM (2023), individuals who transitioned to working from home during COVID-19 were reported to engage in less physical activity and spend more time sitting compared to those who continued commuting to the office daily. A study by Kantar & European Union (2022) further highlighted that during COVID-19, half of people engaged in sports activities less frequently, and only 7% planned to be more physically active post-pandemic. While this decline is not proven to be directly related to the working from home aspect, it is alarming to observe how physical activity levels dropped during this time and have continued to remain lower than before.

This highlights the importance of a healthy and stimulating working environment. Over the last years companies have become more aware of the impact of the working evironment on the health of their employees. Influential companies like Facebook, Google and Apple have all built new large headquarters, with a focus on health and social interaction. These headquarters all have large open plans with open desks, communal tables, and modular furniture to encourage collaboration. Furhtermore, these offices feature extensive greenery, such as rooftop gardens, and often include playful activities such as ping-pong tables.

This shift in office design highlights the growing awareness of the potential impact office buildings can have on the health of their users. In the case of an office building, this can influence employee performance, making it beneficial for companies to prioritize such designs. But how could companies or organizations with less financial resources

*Figure 4: The cubicle workspace*


EXIT
STOP

achieve such a health enhancing environment? Despite the recent shift in awareness, our society remains predominantly economically driven. The elevator and escalator were widely implemented because they provided much more than simply bringing someone to another floor; they created significant financial opportunities. In order to create health-promoting interventions in buildings, it is likely that such efforts will only succeed if they are similarly financially beneficial or are beneficial in any other way that people care about.

*Figure 5: Facebook headquarters rooftop*

# 2.2 EVOLUTION OF AFFORDANCES

In the classic ecological approach to perception, James J. Gibson introduced the concept of affordances to explain how organisms perceive and interact with their environment. Affordances refer to the actionable possibilities that the environment offers to an organism, relative to the organism's physical and perceptual capabilities (Gibson, 1979). For instance, a chair affords sitting for a human due to its shape, height, and stability relative to human anatomy, but the same chair may not afford sitting to a smaller organism, such as a bird. Furthermore, an object's affordances are not fixed; they depend on both the environment and the state of the perceiver. For example, a surface may afford walking when dry but not when slippery.

Rietveld and Kiverstein (2014) expand Gibson's concept of affordances by proposing a broader and more dynamic framework that integrates human skills, sociocultural practices, and the material environment. While Gibson defined affordances as the possibilities for action that the environment offers to an organism, Rietveld argues that these possibilities are much richer and deeply embedded in the specific sociocultural and material contexts in which humans live. Rietveld's perspective emphasizes that affordances are not limited to basic motor actions like sitting or walking. Instead, they extend to more complex engagements, including higher cognitive activities such as problem-solving, making judgments, or participating in creative practices like art and architecture. He underscores the relational nature of affordances, stating that they are dependent on the abilities and skills of the individuals or groups interacting with them. These abilities, in turn, are shaped by the specific environment and culture in which individuals operate.

A central idea in Rietveld's work is the concept of sociocultural embedding. Human affordances are inherently tied to the shared practices, norms, and customs of their communities. Rietveld calls this *situated normativity*, which recognizes that the appropriateness of engaging with an affordance is evaluated based on the specific sociocultural and material context. For example, a chair might afford sitting universally, but the ways it is used or even the contexts in which sitting is deemed appropriate are shaped by cultural knowledge and expectations. This normative aspect of affordances is particularly relevant in human contexts, where actions are often judged as correct, optimal, or inadequate based on shared standards and practices.

The richness of human engagement with the environment is captured in what Rietveld calls the *rich landscape of affordances*. This landscape includes not only existing possibilities but also the potential for discovering and creating new affordances through innovation and creativity. By understanding the relational and sociocultural dimensions of affordances, architects are in the unique position to design environments that encourage new forms of interaction and engagement. Affordances are therefore not static but evolve through the interplay of skills, cultural practices, and material conditions. In the case of this research, the understanding of this framework of affordances allows to architect to redefine the landscape of a sedentary environment, such as an office building or a school, and explore the integration of more physically active affordances.

Based on the insights of the rich landscape of affordances, RAAAF developed the project *the end of sitting* (figure 6) which challenges the typical sedentary office setup of desks and chairs. By re-thinking the environment of the office as a whole, RAAAF explored possibilities for a radical change in the way people work in offices (2014). It expands the affordances of the office landscape and allows visitors to stand, lean, hang or lay down while interacting, reading or working.

While this innovative approach redefines the traditional office environment, it is unlikely to have a substantial impact on users' health. Multiple studies (Ahmadi et al., 2024; Pulsford et al., 2015) have demonstrated that merely replacing sitting with standing does not significantly affect health outcomes. The researchers concluded that there is insufficient evidence to support notable health differences between sitting and standing. Instead, they

*Figure 6: The end of sitting by RAAAF*

emphasize that regular physical activity is far more critical. In fact, Ahmadi et al. concluded that standing too much increases the risk of orthostatic circulatory disease (postural blood flow issues). Simply standing more often does not provide substantial health benefits if overall daily movement remains minimal. Research by Metcalfe et al. (2011) supports this claim. The study concluded that short high-intensity training, such as 2 all-out sprints lasting 20 seconds each, 3 times per week, significantly improved participants' metabolic health. However, this intensity could be challenging to achieve in an office environment, especially if people are not interested in such physical activities. But, while less impactful, frequent low-intensity activities, such as short walks, have been shown to increase energy expenditure, thereby positively impacting metabolic health (Vanherle et al., 2024). This suggests that an environment that stimulates frequent short breaks is more effective than one that simply replaces sitting with standing.

This demonstrates that, to meaningfully influence people's physical activity levels, the landscape of affordances must go beyond simply reducing sitting time. It must also increase the time spent moving or increase the intensity of movement. An effective landscape of affordances in an office building would therefore not only include alternatives to sitting, like standing and leaning, but also include more active alternatives for moving throughout a building. Davids et al., (2016) who studied the design of new affordances for physical activity, advocate for incorporating non-standard elements that challenge individuals and encourage skill development. Affordances should balance risk and safety, providing manageable challenges that promote resilience and adaptability without causing harm.

However, introducing a new type of affordance in an environment can be challenging. According to Rietveld and Kiverstein (2014), people are unlikely to engage with new affordances if they believe these are not socially accepted within their community. Therefore, introducing an alternative to stairs does not necessarily mean it will be used. If individuals feel uncomfortable, they are likely to avoid it. A possible bridge to integrating new, more physically active affordances is the aspect of playfulness. Play often involves exploratory behavior, where individuals—particularly children—test the affordances of objects and environments. Through playful interactions, they learn about the properties and possibilities of their environment. Aldo van Eyck's playground designs provide an excellent example of how play can be used to engage users with their surroundings. His minimalist playground equipment, such as climbing frames and sandpits, encouraged open-ended exploration and interaction, turning neglected urban spaces into vibrant hubs for physical and social activity. Van Eyck understood that play was not just for children but an essential aspect of human engagement with the world, emphasizing interaction between people and their environment (Ligtelijn, 2019). According to Herman Hertzberger (2021), Aldo van Eyck said: "A city that is good for children, is also good for adults". Hertzberger further emphasized the importance of play. According to Hertzberger, a good city transforms itself into a playground. As people grow older, they often stop engaging with the world through playful interactions. However, people seem to remain inherently attracted to them. A study by Sturm et al. (2013) demonstrated that people are more likely to participate in physical activity in public spaces if it is a playful experience. The study transformed traditional public activities into more game-like or competitive experiences. This highlights the potential of playfulness as an effective tool for increasing interest and participation in new affordances. By incorporating playful, interactive elements into designs it becomes possible to encourage exploration, movement, and interaction for new affordances.

A contemporary example of integrating playfulness to stimulate engagement with new affordances is Superkilen, an urban park in Copenhagen designed by BIG. This project transformed a multicultural neighborhood by incorporating elements from over 60 different countries into its design, creating a vibrant

*Figure 7: Aldo van Eyck: The city as playground*

and interactive public space that reflects the diversity of its residents. Superkilen features playful, exploratory elements like swings, bike tracks, and climbing structures, which invite users to engage with the environment in dynamic and creative ways (BIG, 2012). The design encourages social interaction and physical activity through its playful affordances, much like Aldo van Eyck's approach to urban playgrounds. However, Superkilen takes the concept further by embedding gamified and culturally symbolic elements that resonate with the community. This approach aligns with the principle that playful interactions can increase interest and engagement with new affordances, as noted by Sturm et al. (2013).

This chapter lays the foundation for a new concept challenging traditional movement methods in sedentary buildings, based on the theory of affordances. It explains that new affordances encourage users to explore and engage in movement, shifting the focus from simply sitting less to moving more. While reducing sitting is beneficial, moving more or at higher intensity has a greater health impact. Integrating these affordances playfully can increase user interaction. Based on these findings, the following guidelines have been developed:

*DESIGN GUIDELINES*

The workplace design includes alternatives to sitting, such as standing or leaning. The environment should stimulate the user to switch position throughout the day.

The design includes more physically active alternatives to move up and down floors, such as a climbing wall or climbing frame.

The design stimulates playful interaction with (new) affordances, such as elements of gamification, dynamic forms or vibrant colors.

New affordances should be designed to be easily recognizable for their intended purpose. For example, an alternative to stairs should be identifiable as such.

*Figure 8: Superkilen, Copenhagen*

# THE ARCHITECT'S SUPERPOWER

# 3.1 DESIGN TO INFLUENCE BEHAVIOR

As architects, we design spaces that to a certain extent influence behavior, offering a unique opportunity to encourage healthy habits. Rather than dictating behavior or removing choice, architects can subtly stimulate actions on a subconscious level, benefiting users' health. This ability to shape behavior through design adds an additional layer on top of existing aspects such as aesthetics, functionality, or social impact. I therefore see this as the *superpower of the architect*. This chapter focuses on behavioral theory, exploring principles that could stimulate the use of new or existing physically active affordances through architectural design.

A proven and widely praised method to influence behavior is called Nudge Theory (Thaler & Sunstein, 2008). This theory is rooted in behavioral economics, which emphasizes the power of subtle interventions to influence decision-making in a predictable way without restricting individual freedom. The design of the available choices in a certain situation or environment is called *choice architecture*. The interventions that subtly stimulate the preffered behavior are called *nudges*. Nudges are designed to work within the cognitive biases that shape human behavior. The human mind is inherently biased towards certain behaviors and interpretations. Shepard's 1990 test demonstrated how easily the mind can be completely fooled under certain circumstances (Thaler & Sunstein, 2008, p. 18). This underscores the importance of understanding cognitive systems when designing nudges. The human mind operates through two distinct cognitive systems: an automatic system and a reflective system. The automatic system is rapid and intuitive, while the reflective system is deliberate and self-conscious (Thaler & Sunstein, 2008, p. 20). Nudges primarily target the automatic system, guiding behavior seamlessly. But, there are also possibilities to engage the reflective system to encourage more deliberate decision-making. One particularly effective context for nudges is in "benefits now - costs later" scenarios, such as health-related decisions, where immediate rewards often overshadow the long-term consequences (Thaler & Sunstein, 2008, p. 73). A successful example of activating the reflective system is the use of graphic warnings on cigarette packaging and marketing. As Glantz (2016) noted, these warnings have proven effective in increasing individuals' intentions to quit smoking, illustrating how concretizing long-term consequences can significantly influence decision-making.

A powerful feature of nudges lies in their reliance on default options. When a default option exists—an outcome that applies if no action is taken—most people will choose it, whether or not it is optimal for them. Defaults are widely present and profoundly influential, often exploiting the tendency to take the path of least resistance (Thaler & Sunstein, 2008, p. 83). For example, when only stairs are available within the immediate environment of stepping out of the train, nearly everyone takes the stairs without issue (figure 8). However, when an escalator is in sight when exiting the train, the vast majority will opt for the escalator instead. This shows that when people are not choosing consciously, they are more likely to choose a physically demanding option if it is the most obvious choice.

A practical and widely implemented choice architecture-based strategy in marketing is *the decoy effect*. While nudges are designed to subtly guide individuals toward beneficial behaviors, the decoy effect can manipulate preferences by the strategic presentation of options (figure 9). This effect leverages the principles of behavioral economics by making another option appear more attractive by comparison. In this case, the decoy effect is used to influence consumer decisions for commercial gain. However, it showcases the potential of such powerful behavioral principles. What if this principle is leveraged in the design of buildings in favor of the health of the user? As argued in the previous chapter, the introduction of new, more physically active affordances could re-think the way people move through buildings. The decoy effect might have potential to increase the use new types of affordances. Figure 9 illustrates how introducing a more


*Figure 9: Delft train station*

physically active alternative—such as a climbing wall—alongside stairs or an elevator can make the stairs appear like a more attractive option. By combining this strategy with the subtle hiding of the elevator—thereby making stairs the default option—we create a conceptual model where the stairs become the default and attractive choice for moving between floors. Meanwhile, the climbing wall serves as an occasional, more energetic, and enjoyable alternative, further promoting physical activity.

To critically evaluate the effectiveness and feasibility of implementing such behavior based principles, it is essential to consider the known barriers to their design and application. Bandsma et al. (2021) conducted extensive research into the effectiveness of nudges implemented by urban planners, highlighting key barriers to success. They argue that nudges require a place-specific approach that is carefully aligned with the behavior of the target group to be effective. This presents a significant challenge, as a thorough understanding of the target group can be difficult to obtain. Individuals often lack awareness of why they act in a particular manner or what might influence their decisions. For this reason, interviews are not always reliable for predicting target group behavior. Bandsma et al. recommend combining interviews with observations and generalised data collection of the target group to get a better understanding of the target group's behavior. Also, this highlights the importance of incorporating well-established principles of general human behavior, such as the decoy effect. Despite this challenge, nudges have proven its ability to be successful when designed appropriately.
The architecture office BETA has developed their own approach during the development of their active design toolkit (BETA, 2016). Their approach is based on two principles:

*1. Discouraging passive behaviour by making the passive choice unattractive or unfavourable.*


*Figure 10: The decoy effect*

*2. Encouraging active behaviour by making the active choice attractive or favourable.*

This approach combines two aspects, complementing each other to encourage physical activity. By making the passive choice impractical, many people are likely to opt for the more active option, particularly when decisions are made by the automatic cognitive system. While discouraging passive behavior can effectively promote physical activity, it risks being perceived as patronizing or even intrusive. Encouraging active behavior, on the other hand is more appealing for architecture. Interventions designed to promote physical activity often provide additional (spatial) value, enhancing the overall experience of the built environment. When both these aspects are integrated into a design—discouraging passive behavior and encouraging active behavior—it maximizes the chances of someone choosing the active option.

According to BETA, humans make decisions based on a combination of sensory perceptions, often leading to subconscious yet competent actions. Architecture, with its ability to engage multiple senses simultaneously, can subtly influence human behavior if carefully designed. Research in neuromarketing, which has long studied these mechanisms, shows that specific sensory stimuli, such as rhythmic music or bright lighting, can prompt actions like faster walking or increased activity. However, the coherence of sensory inputs is crucial; mismatched stimuli, like the smell of chocolate in a flower shop, can lead to confusion despite their individual appeal. This is was also emphasized by Thaler and Sunstein in their Nudge Theory, which highlights that nudges can be more effective when they incorporate sensory stimuli—provided these stimuli align with the context and the intent of the nudge. The impact of subconscious perception on the success of public spaces is well illustrated in *The Social Life of Small Urban Spaces*, by William

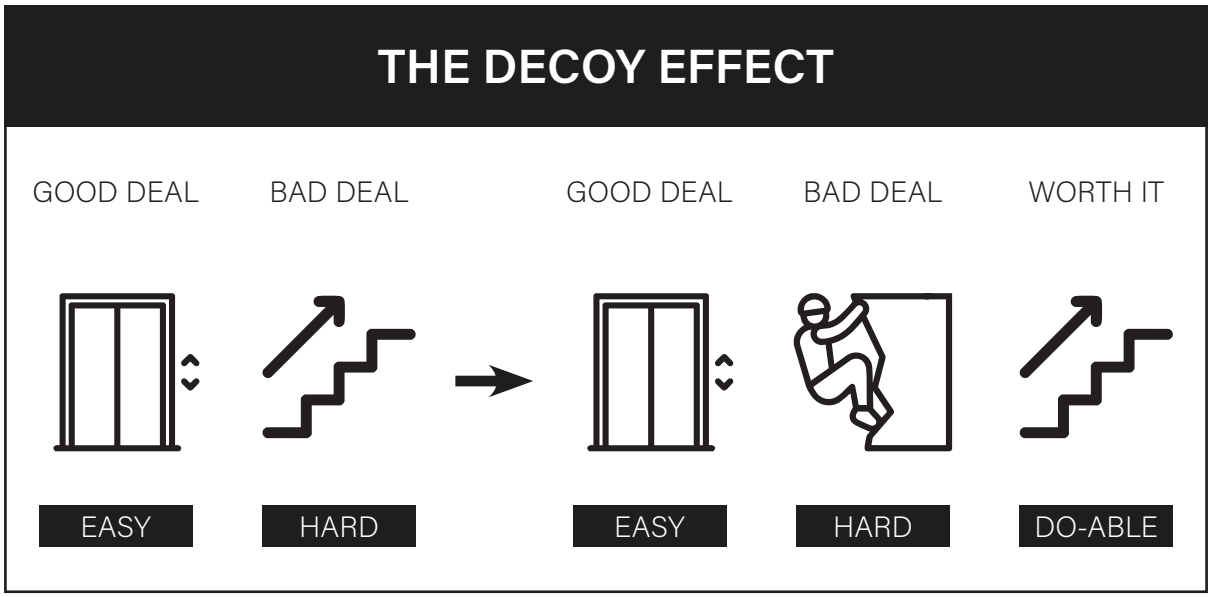


*Figure 11: Architecture based decoy effect*

Whyte (1980, p. 43-45). It features experiments that show, among others, that humans have a collective sense of the maximum number of people a space can comfortably hold. Such principles highlight the potential to influence subconscious decision-making through deliberate and thoughtful design choices.
Meanwhile, Whyte (1980, p. 16-18) was also critical of the assumption that architecture alone can reliably dictate human actions. Whyte argued that the effectiveness of a space depends not only on its design but also on how it is managed and used by its occupants. He observed that while design can provide opportunities for interaction, movement, and other desired behaviors, these opportunities must align with the natural tendencies and preferences of users to succeed. Whyte also emphasized the unpredictability of human behavior in public spaces, often noting that people use spaces in ways designers did not anticipate. For instance, features meant to encourage interaction or activity might be ignored if they do not resonate with the needs or desires of the users. On the other hand, spaces with flexible, adaptable features—like movable seating or shaded areas—tend to foster greater engagement because they align with people's instinctive preferences. Herman Hertzberger (2021) instinctively understood this principle, as he always tried to leave space for interpretation by the user in his designs. By not explicitly dictating how a space or feature should be used, the user can decide for themselves how they would like to use it, thereby increasing the likelihood of it being used.
Furthermore, Whyte stressed that design interventions must account for broader social and cultural factors. A well-designed space can fail to achieve its goals if it does not consider the community's values, habits, and social norms. For example, a public space designed to encourage activity might fail in a community where sedentary behavior is deeply ingrained or where the presence of certain features feels out of place. This perspective is aligned with Rietveld's theory on affordances, where he similarly highlights the importance of considering social and cultural context in design.
Whyte's critiques highlight the limitations of architecture as a tool for influencing behavior. While thoughtful design can create the conditions for desired behaviors, its effectiveness depends on the understanding of the social and cultural context in which the space exists.

This chapter explored human (sub)conscious decision-making and how architecture can influence behavior through theory-based principles. Nudges are effective when tailored to the target group, with a combination of discouraging passive and encouraging active behavior being the most effective. However, designs must account for the unpredictability of human behavior, allowing flexibility and user interpretation. Based on these findings, the following design guidelines have been developed:

*DESIGN GUIDELINES*

The design discourages passive behavior, such as taking elevators or escalators.

The design encourages active behavior, such as taking the stairs.

The design has integrated nudges that stimulate physical activity, tailored to the specific social norms of the location and program target groups.


*Figure 12: Old Camel advertisement, leveraging nudge principles*

# 3.2 SOCIAL AND PHYSICAL ACTIVITY SYNERGY

The relationship between social interaction and physical activity offers potential for architectural design to address public health challenges (figure 12). In the Tarwewijk, mental health issues like stress, loneliness, and anxiety significantly impact well-being of residents (Bijster, 2021). Research by Kim et al. (2012) highlights the link between physical inactivity and mental health problems, with those facing mental challenges being less likely to engage in physical activity, a concern particularly relevant to lower-income groups. This chapter explores how architectural design can utilize the connection between social and physical activity to effectively promote well-being.

In recent years, attention in the Netherlands to creating spaces for social interaction has gradually declined (CRa & RVS, 2022). However, the social value of neighborhoods is slowly increasing again. In 15 selected municipalities, the *new Leefbaarheid en Veiligheid* (Livability and Safety) program is being implemented to foster environments that encourage interaction and physical activity (de Jonge, 2022). The College van Rijksadviseurs (CRa), in collaboration with the Raad voor Volksgezondheid en Samenleving (RVS), have issued recommendations on creating spaces for interaction in public areas (2022). According to them, social contact is inherently intertwined with our health and well-being, serving as a way to prevent loneliness and to feel seen and heard. Despite personal differences in the need for social contact, it is a fundamental human requirement, as was broadly experienced during the COVID-19 pandemic. However, realizing this in public spaces poses significant challenges. The mere existence of spaces for interaction does not guarantee their use. A space that appeals to one person may repel another (Duyvendak & Wekker, 2015, p. 9). Nonetheless, much can be achieved through design, according to the CRa and RVS (2022). The potential lies primarily in creating opportunities for people to encounter one another. This involves integrating flexibility and multifunctionality into the design. As a result, spaces are created that facilitate interaction but leave the specifics of what happens there to the users. For example, designing spaces where the activities, routines, or paths of different age groups naturally cross can help bring people together. If these spaces are then designed to feel welcoming and encourage people to pause and chat, they can become places for meaningful connections.
This is exactly why the connection between creating spaces for interaction and spaces for physical activity holds great potential. Not everyone is interested in participating in sports, but a social space or event can provide a reason to visit the location, thereby encouraging movement. Also, when a social space is surrounded by sports activities, it increases the visibility of the sports activity, which increases the chance of participation (BETA, 2016). Furthermore, not everyone is drawn to social events, but sports activities are, to some extent, inherently social. Engaging in any kind of sport often increases the likelihood of encountering or interacting with others. Additionally, creating a space that attracts people for both reasons—sports aswell as social events, or casual conversations—increases the chances of different kinds of people encountering one another.

The study by CRa and RVS shows that spaces with a secondary social function are places that stimulate social interaction. Examples include a football club in Enschede that has been transformed into a sports park open from morning until evening as a community meeting space. And a library in Vathorst, which next to its primary function also houses a restaurant, bakery, small shops, and healthcare facilities. Similarly, several successful projects combine multiple functions, bringing many people together. Examples include Forum Groningen, which features a cinema, library, media labs, exhibition spaces, and computer labs, and the LocHal in Tilburg, a library with many integrated social functions. LocHal offers workspaces for students and freelancers, areas for children, exhibitions, performances, lounge spaces, presentations, and events. Its flexibility accommodates a wide range of functions and social activities, which are highly

appreciated by users and local residents. These projects demonstrate how flexibility and multifunctionality can succesfully bring people together and encourage interactions in public buildings.

To succesfully stimulate spontaneous social encounters, it is essential to leave room for user interpretation and experimentation. This principle is evident in the designs of Herman Hertzberger. In his work, Hertzberger brought people together by combining multiple functions, but primarily by leaving the use of spaces open to interpretation rather than dictating their use entirely (Brinkgreve, 2021, p. 94). For instance, in his design for the Centraal Beheer office building in Apeldoorn, Hertzberger created a fixed grid structure that allowed for change and personal interpretation within its framework. The in-between spaces encouraged spontaneous interactions, serving as spots where people could gather for a chat or a coffee, stepping away from their desks. The grid structure provided transformability, enabling the building to adapt over time to meet the changing needs of its users (Brinkgreve, 2021, p. 94–99). These intermediary spaces for spontaneous interactions also offer opportunities to encourage movement. In sedentary, monotonous environments like offices, people occasionally need a short break. Research by BETA (2016) highlights how the visibility of sports facilities stimulates participation. When routes taken during short breaks are surrounded by engaging and playful small-scale sports opportunities, it increases the likelihood of interaction. Moreover, the presence of such facilities can encourage brief social moments among colleagues, such as a

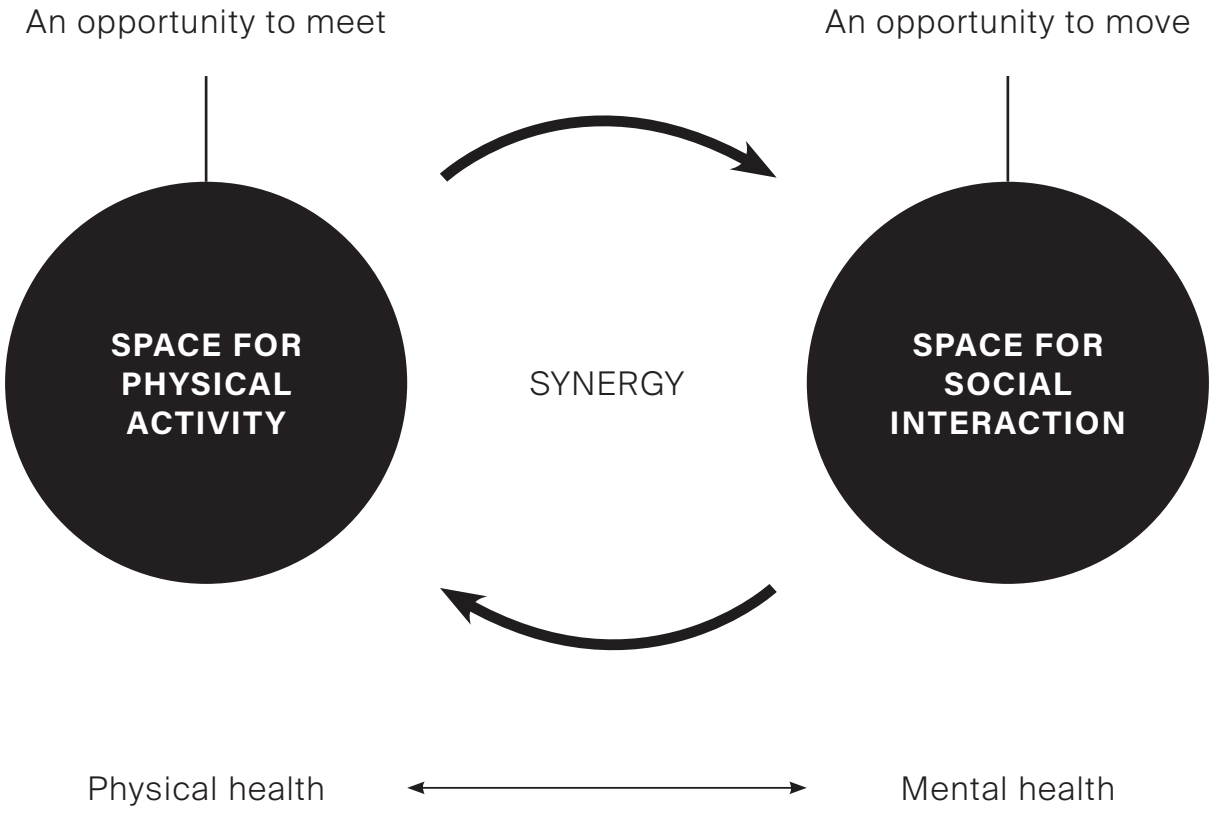


*Figure 13: Physical and social activity synergy*

quick game of ping-pong during a break. In their design for De Draaier, BETA connected a more physically active route of taking the stairs with communal living rooms. This approach affords that those seeking conversation may choose the more active option for the chance of encountering someone. At the same time, it makes the healthier choice more visible to everyone in the communal spaces, increasing the likelihood of participation. This is a practical and direct application of how the synergy between physical activity and social interaction can be leveraged within architectural design.

Both projects demonstrate that design interventions must align with the target group and function to be effective. Observations at De Draaier (N5) revealed that communal spaces were often unoccupied, suggesting they held less value for residents than anticipated by the architects. Similarly, Hertzberger's Centraal Beheer Office faced challenges due to its complex spatial layout, which caused confusion and hindered navigation, potentially limiting spontaneous social interactions (Ting, 2020). The open communal spaces and lack of clear boundaries, intended to foster collaboration, sometimes conflicted with the need for privacy and focus in a corporate setting. Additionally, poor acoustic insulation made the spaces noisy and disruptive (Ting, 2020). These examples underscore the importance of aligning design interventions with the program's purpose and the needs of the target group.

This chapter examined the synergy between social interaction and physical activity, highlighting their strong interconnection and greater potential when combined rather than designed separately. Social interaction thrives in multifunctional, flexible spaces adaptable to various users and purposes over time. This approach works best when structures are future-proof and spaces remain open to interpretation. Based on these findings, the following guidelines have been developed:

*DESIGN GUIDELINES*

The design is adaptable to withstand the changing needs of users in the future.

The design incorporates in-between spaces that are open to interpretation by the users.

The design combines spaces for social interaction, such as coffee corners, kitchenettes, or toilets, with areas for (small-scale) physical activity.

The design includes spaces that are multifunctional at different times of the week or day, serving purposes related to social or sports activities.

*Figure 14: Centraal Beheer Office*

# 3.3 ARCHITECTURAL MEANS TO MOVE

This chapter will explore the practical architectural strategies available to architects for achieving the goal of stimulating movement. It will be organized into four categories, based on the design toolkit developed by BETA (2016): routes, destinations, activity programs, and building surroundings. Followed by crucial safety regulations from the building code.

*Routes*

Routes are the pathways along which people move, collectively forming the access system of a building. Programmed spaces are connected by this system of entrances, corridors, staircases, and elevators. Since people already navigate these routes, principles in this area focus primarily on increasing physical activity and the intensity of use.

In general, the aim should be to stimulate the use of more physically active modes of movement, such as stairs, and to discourage sedentary alternatives, such as elevators. Elevators that are less visible tend to be used less frequently. By positioning elevators out of immediate sight upon entering a building, people are less likely to choose them (Bloomberg et al., 2010; Delos Living LLC, 2016).

Active modes of movement, such as stairs and other affordances, can be encouraged by making them more attractive. This can be achieved in several ways. Humans are instinctively drawn to daylight, so stairs placed near natural light sources are used more often (BETA, 2016). Similarly, environments with natural ventilation and a pleasant interior climate are more appealing and encourage use (Delos Living LLC, 2016). Visibility is another critical factor—stairs that are more prominent or aesthetically striking are used more frequently (Bloomberg et al., 2010). Location also plays a significant role; stairs placed near elevators tend to be used more often, as some people choose to take the stairs while waiting for the elevator. Additionally, stairs located along main routes that connect commonly used areas of a building are more likely to be utilized (Bloomberg et al., 2010). Interior and exterior views are also rewarding. Stairs connected to interesting viewpoints provide a sense of reward and encourage usage (BETA, 2016). Signage can further promote stair use by highlighting its benefits and encouraging users to set personal goals or integrate physical activity into their daily routines with distance markers (BETA, 2016). Sensory stimuli such as color, pleasant materials, art, music, and plants can also make stairs more attractive and increase their usage (Bloomberg et al., 2010; BETA, 2016).

The aforementioned principles can be applied to any affordances designed to facilitate movement within a building. However, stairs—being the most commonly used affordance—can also be designed specifically to enhance their appeal. Stairs are used more frequently when they are wider than 120 cm or have a lower inclination, ideally around 30 degrees (Bloomberg et al., 2010; Delos Living LLC, 2016). These features create a more pleasant experience, ultimately increasing their frequency of use.

The horizontal organization of movement, such as corridors, also plays an influential role in how people move through a building. Straight, unbroken corridors tend to discourage activity, whereas routes that include spatial diversity between sections are more likely to encourage movement. Incorporating variety along horizontal pathways is therefore promoting activity (Gadet et al., 2010). In addition, curiosity plays a key role in stimulating movement. In addition, curiosity can evoke movement. Humans are naturally curious and are drawn toward elements that spark their interest. According to BETA (2016), this can be achieved by strategically showing or concealing elements from view and ensuring spatial variation.

*Destinations*

Destinations are a tool for architects to guide people through a building and define the routes they take between these points. People are naturally drawn to certain destinations because they are either appealing or functional. These destinations can include essential spaces or optional amenities. In an office building, for instance, they might be restrooms,

workstations, meeting rooms, coffee machines, smoking areas, restaurants or lunchrooms, printers, and other office-specific functions.

To effectively leverage destinations as a means to stimulate movement, the destinations themselves need to be designed to attract people and placed in strategic locations. As mentioned in the previous chapter, social spaces naturally draw people. Humans are inherently social beings and are therefore attracted to spaces that offer opportunities for social interaction. Designing spaces to better facilitate social interaction, such as by placing benches in strategic spots, can enhance their appeal (Bloomberg et al., 2010). Similarly, collective spaces are highly attractive due to their increased potential for social interaction. Functions like a gym or a shared kitchen in an office can serve as valuable additions and effective destinations (Bloomberg et al., 2010).
Grouping destinations can also be advantageous. Frequently used functions can be grouped to increase the likelihood of informal encounters with colleagues, such as centralizing printers in a single room instead of placing them on every floor (BETA, 2016). Conversely, deliberately dispersing functions can also be effective. When frequently used functions are spread throughout the building, they create regular opportunities for brief walks, encouraging movement (Bloomberg et al., 2010).
The combination of well-designed destinations and pleasant routes yields complementary benefits. Placing appealing destinations along an enjoyable route increases both the likelihood of the route being taken and the destinations being used. Together, they enhance the spatial experience of the building while promoting physical and social interaction (BETA, 2016). Communal spaces, which are typically attractive destinations, are particularly effective when located along the main routes of a building. Rooftops and courtyards, which are often isolated from the rest of the structure, can become more frequently visited if they are integrated into the main route. This integration can significantly enhance social and physical interaction (BETA, 2016).

*Activity Programme*
The activity programme refers to the program that an architect can incorporate into a building to directly promote physical activity, such as gyms, swimming pools, football fields, or multifunctional spaces. Practical amenities, such as showers and bicycle parking, also fall into this category. Additionally, active furnishings, such as height-adjustable desks, are included.

The presence of activity spaces in the immediate surroundings influences the likelihood of interaction. Activity spaces that are highly visible tend to be used more frequently (Bloomberg et al., 2010; Delos Living LLC, 2016). For instance, incorporating a highly visible gym within an office building not only serves as a constant reminder to employees that they can use the facility but also provides a practical and time-saving option for engaging in sports. Additionally, when an activity space is visible from the outside, it informs passersby about the presence of the facility. If the gym itself is attractive—offering features such as a scenic view or a unique location—it tends to be used more frequently (Bloomberg, 2010).
Furthermore, the inclusion of multifunctional communal activity spaces (e.g. designed for both exercise, play and recreation) increases the likelihood of participation in physical activities. This is particularly impactful for lower-income groups, who often lack access to private activity spaces and are therefore have higher rates of inactivity and obesity (Bloomberg, 2010).
Designing activity spaces for multiple target groups also enhances their appeal and utility. For example, combining a gym with a playground allows parents to exercise while keeping an eye on their children (Bloomberg, 2010).
Practical additions such as showers, storage facilities, and changing rooms further encourage participation in activity spaces. A secure bicycle parking area can promote commuting by bike, and the availability of showers after physical activities can increase user engagement

(Bloomberg et al., 2010; Delos Living LLC, 2016). The inclusion of climbing frames or exercise equipment in communal spaces also stimulates physical activity. Such equipment invites individuals of all ages to participate in exercise, fostering greater engagement. Incorporating these elements into the design of communal spaces can therefore boost participation rates (Bloomberg et al., 2010; Delos Living LLC, 2016). Finally, it is beneficial to include alternatives to traditional sitting desks, such as height-adjustable standing desks. In a conventional office environment with only chairs, individuals lack the option to alternate between sitting and standing. While—as mentioned in the previous chapter—replacing sitting all day with standing all day is not ideal, the inclusion of diverse furniture options allows individuals to switch positions periodically, promoting movement (Bloomberg et al., 2010; Delos Living LLC, 2016).

*Building surroundings*

Buildings have a direct impact on their immediate surroundings. The massing, materiality, transparency, entrances, and functions influence how the building is perceived and used, as well as its impact on surrounding buildings.

The bottom two floors are crucial for creating a pleasant building experience at street level. Variety in detailing, continuity, and incorporating more "eyes on the street" contribute to a welcoming environment and a sense of security (Bloomberg, 2010).
Public spaces are perceived as more inviting when they are activated. The inclusion of multiple entrances increases ground-level activity and accessibility. In lower-density areas, social functions such as cafés or wider pavements can encourage social interaction and foster a sense of safety (Bloomberg, 2010).
A well-integrated building entrance enhances its connection to the urban fabric, encouraging seamless movement between indoor and outdoor spaces (Whyte, 1980).
Providing protection from (bad) weather conditions, such as with canopies or awnings to shield against rain or sun, increases comfort and subsequently promotes greater usage (Bloomberg, 2010).

*Safety regulations*

In the Netherlands, the Bouwbesluit (the Dutch Building Code), mainly determines the restrictions in terms of building configuration. In the design toolkit of BETA (2016) they have included potential issues with building regulations when designing for physical activity. For the development of their toolkit they have interviewed an expert on the subject, Erik Platvoet, prevention advisor and spokesman for the Amsterdam-Amstelland Fire Department.

The Building Code establishes minimum fire safety standards for buildings, focusing on two key principles: neighboring areas must not be affected by a fire, and safe egress must be possible from any fire compartment.
Escape routes must enable movement to a safe area free of smoke and fire, with multiple routes improving safety. Fire compartments can also serve as temporary assembly points. Outdoor escape routes are especially beneficial as they minimize exposure to smoke and can double as recreational spaces if kept unobstructed.
Stairs which are part of an emergency escape route must comply with the dimensions and steepness determined by the building code. Also, these stairs must be visible, for example by extra illumination during emergencies.

BETA (2016) further argues that the building code assumes a certain amount of self-reliance during emergency scenarios. Modern conveniences, such as mobility scooters, can indirectly undermine self-reliance, particularly among the elderly. Efforts to promote physical fitness, and thereby enhance self-reliance, inherently contribute to improved safety.

*ROUTES*

- Properly illuminated by (day)light
- Located in pleasant indoor climate
- Located along commonly used areas
- Visible and/or aesthetically pleasing design
- Located near elevators
- Connected to rewarding views
- Instructing and/or motivating signage
- Sensory stimulating
- Horizontal and vertical spatial variation
- Spark curiosity by revealing/concealing

*ACTIVITY PROGRAMME*

- Include highly visible activity spaces
- Leverage scenic views for activity spaces
- Include multifunctional communal spaces
- Facilitate multiple target groups
- Include showers and changing rooms
- Include storage for bicycles and equipment
- Provide more active furniture alternatives
- Include visible exercise equipment in communal spaces

*SURROUNDINGS*

- Integrate multiple entrances with a strong connection to the surrounding urban fabric
- Vary in facade detailing and continuity
- Facilitate social exchange in the plinth
- Provide protection against (bad) weather

*DESTINATIONS*

- Facilitate spaces for social interaction
- Include valuable communal spaces
- Group frequently used functions
- Disperse frequently used functions
- Combine destinations with routes
- Place communal outdoor space along route

*BUILDING CODE*

- Integrate sufficient unobstructed emergency escape routes and fire departments
- Prioritize outdoor escape routes which can also be used for recreational purposes
- Stairs part of escape routes must comply with the dimensions of the building code

# DESIGN GUIDELINES

*AFFORDANCES*

The movement affordances should be separable during office closing hours, enabling the municipality to offer them as free neighborhood sports facilities.

The workplace design includes alternatives to sitting, such as standing or leaning. The environment should stimulate the user to switch position throughout the day.

The design includes more physically active alternatives to move up and down floors, such as a climbing wall or climbing frame.

The design stimulates playful interaction with affordances, such as elements of gamification, dynamic forms or vibrant colors.

The design integrates aspects of the many cultures present in the Tarwewijk, stimulating the multicultural identity of the neighborhood.

The design is adaptable to withstand the changing needs of users in the future.

*SOCIAL INTERACTION*

The design incorporates in-between spaces that are open to interpretation by the users.

The design combines spaces for social interaction, such as coffee corners, kitchenettes, or toilets, with areas for (small-scale) physical activity.

The design includes spaces that are multifunctional at different times of the week or day, serving purposes related to social or sports activities.

*NUDGES*

The design discourages passive behavior, such as taking elevators or escalators.

The design encourages active behavior, such as taking the stairs.

The design leverages the decoy effect, by providing physically challenging alternatives to stairs.

The design has integrated nudges that stimulate physical activity, tailored to the specific social norms of the location and program target groups.

# PRACTICAL TOOLKIT

*ROUTES*

- Properly illuminated by (day)light
- Located in pleasant indoor climate
- Located along commonly used areas
- Visible and/or aesthetically pleasing design
- Located near elevators
- Connected to rewarding views
- Instructing and/or motivating signage
- Sensory stimulating
- Horizontal and vertical spatial variation
- Spark curiosity by revealing/concealing

*ACTIVITY PROGRAMME*

- Include highly visible activity spaces
- Leverage scenic views for activity spaces
- Include multifunctional communal spaces
- Facilitate multiple target groups
- Include showers and changing rooms
- Include storage for bicycles and equipment
- Provide more active furniture alternatives
- Include visible exercise equipment in communal spaces

*SURROUNDINGS*

- Integrate multiple entrances with a strong connection to the surrounding urban fabric
- Vary in facade detailing and continuity
- Facilitate social exchange in the plinth
- Provide protection against (bad) weather

*BUILDING CODE*

- Integrate sufficient unobstructed emergency escape routes and fire departments
- Prioritize outdoor escape routes which can also be used for recreational purposes
- Stairs part of escape routes must comply with the dimensions of the building code

*DESTINATIONS*

- Facilitate spaces for social interaction
- Include valuable communal spaces
- Group frequently used functions
- Disperse frequently used functions
- Combine destinations with routes
- Place communal outdoor space along route

# THE NON-SEDENTARY WORKPLACE

# 4.1 FINAL DESIGN GUIDELINES

Throughout the course of this research, a broad and comprehensive set of design guidelines was developed to stimulate physical activity through architecture. To ensure their practical applicability in the design process, these guidelines have been synthesized into a refined set of key principles organized under two distinct categories: daily movement and sports participation.

This categorization reflects the dual nature of physical activity as it occurs in everyday life. Daily movement focuses on the small, often subconscious instances of physical activity that occur throughout the day—walking between destinations, taking stairs, our pausing for short breaks. These behaviors are primarily influenced by architectural form, spatial layout, and environmental stimuli. Design interventions here aim to subtly integrate movement into the routines of daily life, leveraging behavioral design principles such as nudging and affordances.

In contrast, sports participation centers on the more deliberate and motivational aspects of physical activity—joining a sports team, visiting a gym, or engaging in recreational play. These actions are highly dependent on individual motivation and are often facilitated through dedicated facilities and programs. Architectural design in this domain focuses more on providing spaces that are inviting, visible, and accessible, offering opportunities and incentives for users to voluntarily engage in higher-intensity physical activity.

The distinction between these two categories serves not only to structure the guidelines but also to make them more actionable during the design process. It allows designers to approach physical activity promotion as two complementary yet independent aspects, each operating at a different scale and in different phases of design. While daily movement is integrated through small-scale interventions in routes, spatial layouts, and subtle cues, sports participation typically requires programmatic and infrastructural considerations which have a larger impact on the overall design and the urban environment.

Within the two categories, sports participation stands out as the one with the greatest potential for innovation. Unlike daily movement, which often depends on subtle modifications to existing routines and spaces, the design for sports participation allows architects to creatively reimagine how and where sports can take place within the built environment. This opens up opportunities to integrate physical activity into underutilized or unconventional spaces—such as transforming rooftops into sports courts, embedding climbing walls along circulation routes, or designing multifunctional spaces that operate as sports facilities during specific times and serve other functions during the rest of the day. This flexibility not only maximizes spatial efficiency but also democratizes access to physical activity by embedding it within everyday settings. Furthermore, from a health perspective, sports participation typically involves higher-intensity physical activity, which has been shown to produce the most significant improvements in metabolic health, mental well-being, and disease prevention (as mentioned in chapter 2.2). Therefore, while both categories are essential, fostering sports participation represents the most impactful avenue for architecture to actively improve public health at a meaningful scale

## DAILY MOVEMENT

The small instances of movement throughout the day, influenced by the affordances of an environment.

**Encourage active behavior**

- Increase length or intensity of routes
- Increase attractiveness of routes
- Include social spots along routes
- Disperse frequently used functions
- Provide more active furniture alternatives
- Active furniture as “default option”

**Discourage passive behavior**

- Place elevators out of plain sight
- Avoid escalators if not necessary

## SPORTS PARTICIPATION

The participation of an individual in sports activities, highly dependent on personal motivation.

**Increase attractiveness of sports facilities**

- Utilize attractive views for sports
- Pleasant indoor climate and lighting
- Aesthetically attractive design
- Include showers and changing rooms
- Facilitate social interaction

**Increase proximity of sports facilities**

- Utilize multifunctional spaces for sports
- Integrate sports facilities in or on buildings
- Allow sports facilitties to be separated

**Increase visibility of sports facilities**

- Make sports facilities highly visible
- Include visible exercise equipment in multifunctional activity spaces

# 4.2 THE WORKPLACE AS SPORTS FACILITY

In the context of growing urban density and the ongoing housing crisis, sports facilities are increasingly being pressured by the expansion of the city (Appendix: XL). This spatial pressure makes it ever more difficult for cities to maintain sufficient areas dedicated to physical activity. Yet, physical inactivity remains a pressing public health concern, and design strategies to reverse this trend are urgently needed.
One of the most promising opportunities lies in the reimagining of office buildings as multifunctional spaces that include sports facilities. Office buildings represent a vast and underutilized category of real estate, particularly during evenings and weekends—precisely the times when most people are free to engage in sports activities. This temporal mismatch between use and potential opens up a powerful design opportunity: to transform office spaces into sports facilities outside of working hours.

This research has mentioned that multi-functional spaces utilized for sports can stimulate sports participation. In the case of an office that doubles as a sports facility, the boundary for employees to participate in sports acitivity after work becomes as low as possible. Employees are offered seamless access to physical activity, integrated directly into their daily environment, removing both logistical and psychological barriers. Moreover, this transformation is not a superficial amenity or costly add-on like the simple integration of a regular sports facility. It provides economic value. By monetizing the building during its current "dead" hours, the office becomes more financially viable. It increases its utility, offering the possibility for secondary income streams through rental or public use, similar to how escalators unlocked new revenue models for multi-level retail in shopping malls. In this way, the integration of sports is not a gimmick, but a strategic design innovation—one that enhances both human health and real estate value.

Beyond the internal benefits, such a building model also enables the office to give back to the surrounding community. Rather than occupying land exclusively for private commercial gain, the multifunctional office provides an amenity to the neighborhood during off-hours, becoming a public asset. Especially in socioeconomically challenged areas, like the Tarwewijk, this ability to merge private development with public value is vital. Architecture, then, becomes a bridge—connecting the professional lives of workers with the needs and well-being of the broader community.
This concept directly aligns with insights gathered from the site analysis (appendix: L) and on-site observations. During the research phase, it became evident that the municipality of Rotterdam is aiming to stimulate the development of small-scale office spaces and support local entrepreneurship. Simultaneously, residents expressed a desire for more free accessible sports facilities and increased greenery in the neighborhood. These parallel ambitions—economic development and health-promoting environments—are an opportunity to re-think the traditional office building with a more multifunctional concept which is able to facilitate both.

The proposal is therefore to develop a new typology of office building: one that adheres to the municipality's spatial vision for increased small-scale office spaces, while simultaneously offering a flexible infrastructure that promotes sports participation and physical activity. It will house working spaces during the day, and transform into a neighborhood sports hub during evenings and weekends. The architectural design will support this dual functionality through adaptable layouts, and visible and inviting activity spaces.
In doing so, the office becomes more than a workplace. It becomes a platform for health, social interaction, and community development—an innovative model for how we might rethink the use of urban space in a more inclusive and resilient way.

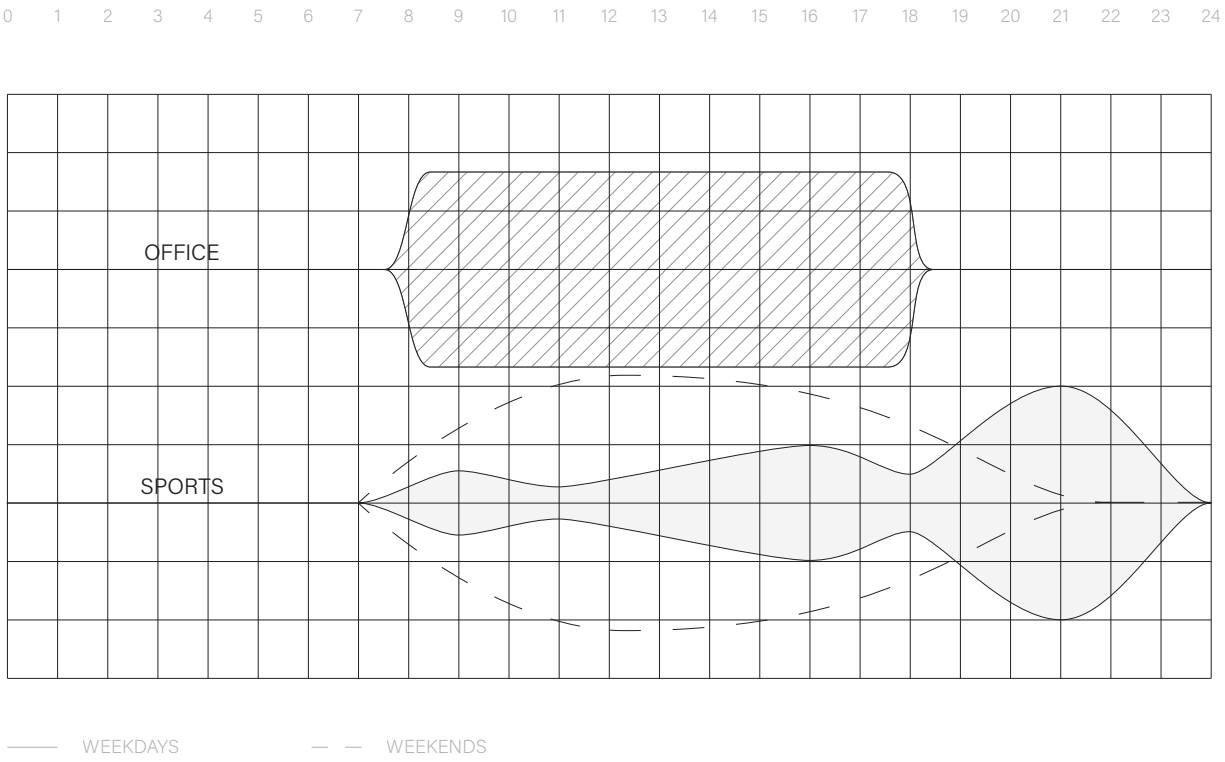


*Figure 15: Program timelines*

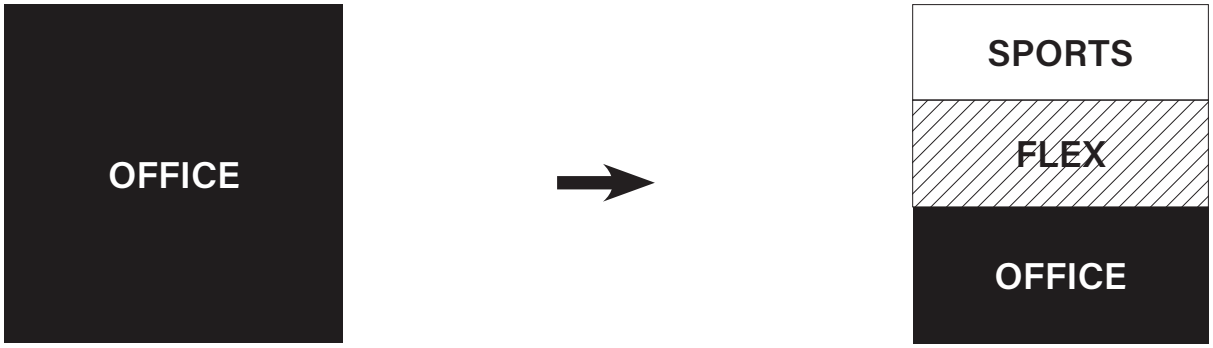


*Figure 16: New office concept*

# 4.3 DISCUSSION

This research set out to explore how architectural design, particularly through active design principles, can contribute to the physical and mental well-being of users. It culminated in the development of a comprehensive set of design guidelines and a conceptual proposal for a multifunctional office building that transforms into a sports facility outside of working hours. While the theoretical and contextual foundation of the research is strong, several significant challenges and uncertainties remain, particularly regarding the practical applicability and effectiveness of these proposals.

One of the central challenges is the difficulty in determining whether the proposed design guidelines will genuinely influence the health of building users. Health outcomes are influenced by a multitude of factors, ranging from genetics and lifestyle to economic conditions and social environments, that extend well beyond the reach of architecture. Although active design principles are grounded in behavioral theory and supported by empirical case studies, their impact in a specific context such as the Tarwewijk is difficult to predict. Even with thoughtfully designed affordances and nudges, human behavior is inherently complex and often resistant to change. As such, the translation from spatial intervention to improved health outcomes remains uncertain.
Equally uncertain is the practical viability of implementing multifunctional office spaces that serve as sports facilities after hours. The idea presents an innovative response to the growing scarcity of urban space and the increasing demand for accessible sports infrastructure, but its real-world execution raises several logistical questions. Converting an office into a sports environment daily requires a highly adaptable infrastructure, one that can transition quickly and efficiently without compromising the function or atmosphere of either use. While this concept is compelling in theory, it has yet to be widely tested, and there is no conclusive evidence to support that such transformations would operate smoothly in practice.

Moreover, it remains unclear whether employees would actually participate more in sports activities simply because they are available in the same physical environment in which they work. While proximity and ease of access may lower logistical barriers, psychological and social barriers might remain. The overlap of professional and recreational spaces could also blur boundaries that some users may prefer to keep distinct. An environment designed for productivity during the day may not automatically translate into a motivating or comfortable space for physical activity in the evening. The question arises whether people are willing to exercise in a room that, just hours earlier, functioned as their meeting room or workspace.
Closely tied to this is the broader issue of desirability: do people even want this in their office building? While some might welcome the added convenience, others may see it as intrusive or feel that it blurs work-life boundaries. The success of such a concept depends not only on the architectural and technical feasibility but also on cultural attitudes, organizational dynamics, and user preferences, factors that vary greatly between different communities and workplaces. Without robust user research or pilot studies, it is difficult to assess whether the intended users would embrace or reject such a hybrid space.
Finally, a key consideration is whether this model is economically viable. While the integration of a secondary function aims to increase the value and utility of office space, the initial costs of implementing flexible infrastructure, such as systems that allow rapid and secure removal of office furniture, could be significant. It is not yet clear whether the long-term financial benefits, such as rental income or improved employee health and productivity, would outweigh these upfront investments. As such, the economic argument for this concept, although promising, remains speculative until tested in practice.

These challenges do not undermine the relevance or urgency of the research but rather highlight the need for further investigation and

experimentation. The ideas proposed here are intended to push the boundaries of traditional office typologies and inspire new thinking about how architecture can contribute to public health.

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Figure 24: Devlaux, M. (2018). Reversible Student Housing Saclay [Photograph]. https://maximedelvaux.com/bruther-baukunst-palaiseau

# LOCATION ANALYSIS

XL - *ROTTERDAM*

# THE CITY OF CHANGE

Rotterdam reflects many of the national and global trends regarding declining health rates in society. In the city, only 65% of individuals aged 18-64 consider their own health to be "good" or "very good," a decline from 79% in 2020 (Gezondheidinkaart, 2022). Beyond self-perceived health, more objective indicators, such as overweight prevalence, show a similar trend. Currently, 52% of Rotterdam's population is classified as overweight (AlleCijfers, 2024). According to RIVM (2024), this trend is projected to continue, with 64% of residents in the Netherlands expected to be overweight by 2050.

In response to these challenges, the municipality of Rotterdam has developed a forward-thinking vision for the city's growth and development, encapsulated in the plan *De Veranderstad* (Gemeente Rotterdam, 2021). This vision addresses the city's rapid expansion and outlines strategies for enhancing residents' well-being while fostering sustainability and economic progress. The plan emphasizes growth that is inclusive, compact, sustainable, and productive, with a commitment to participatory planning that actively involves Rotterdammers in shaping their city. Urban densification within existing boundaries is central to this strategy, ensuring that land is used efficiently while preserving green spaces and integrating robust public transport networks.

Sustainability lies at the heart of the vision, with efforts to increase biodiversity, mitigate heat stress, and enhance public spaces through initiatives such as green boulevards and new parks. The city also plans to expand its public transport system and develop multimodal connections to encourage active modes of mobility, such as walking and cycling. Significant investments in housing, public spaces, and transport hubs are intended to meet the needs of a growing population while addressing disparities in health, education, and economic opportunities across neighborhoods. These efforts aim to balance housing demands, economic activities, and green spaces in a densely populated urban environment.

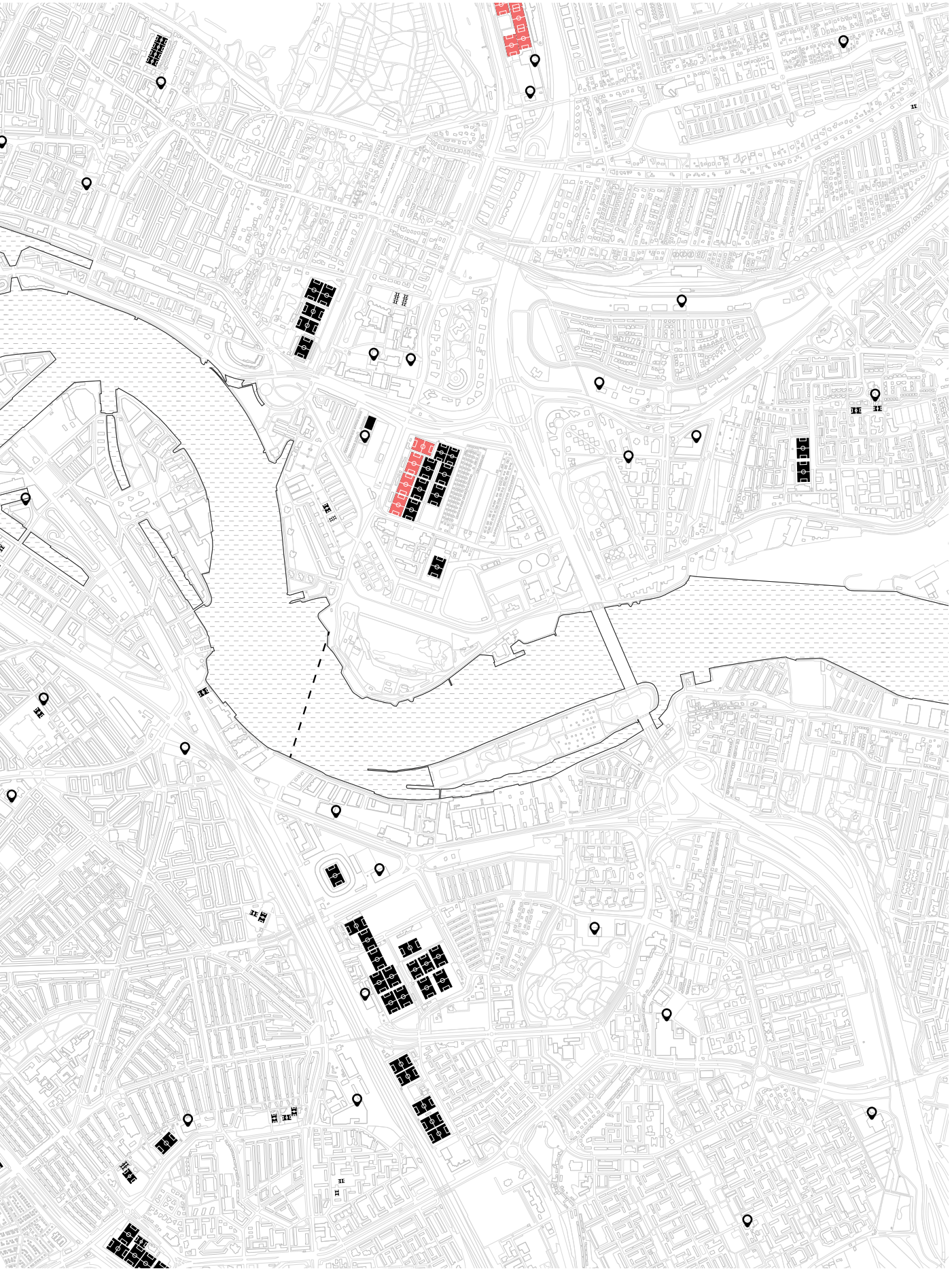
The vision places health at the forefront of Rotterdam's urban planning. Recognizing the relationship between urban environments, lifestyles, and public health outcomes, the city is committed to reducing health disparities across neighborhoods. Parks, riverfronts, and green streets are essential for promoting well-being, offering recreation, reducing heat stress, and improving air quality. Public spaces and community centers are designed to foster social interaction, reducing loneliness among vulnerable groups such as the elderly and immigrants. In neighborhoods with poor health outcomes, targeted interventions aim to improve infrastructure, services, and access to resources. Programs to provide affordable healthy food, reduce housing costs, and create opportunities for low-cost sports and exercise are integral to this strategy.

Furthermore, encouraging physical activity is an important part of the vision. Infrastructure upgrades prioritize walking and cycling, particularly in the city center and along green corridors. Parks and urban squares are designed to promote movement, incorporating walking trails, sports facilities, and outdoor gyms. The city also embraces informal exercise opportunities, such as open-air fitness zones and urban sports parks, to make physical activity more accessible. The rise of informal sports during the COVID-19 pandemic has underscored the importance of flexible, community-driven approaches

to exercise, and Rotterdam aims to support and expand these initiatives. Rotterdam's vision presents a comprehensive approach to urban development, weaving together sustain-ability, health, and inclusivity to create a city that prioritizes the well-being of its residents. By addressing current challenges and planning for future growth, the city seeks to ensure a healthier, more equitable, and vibrant urban environment for all.

However, the growing pressure on space caused by increased housing demand is putting significant strain on public space, including sports facilities. Across Rotterdam, sports fields are increasingly being removed to make way for new buildings. In response, the city is attempting to compensate by making existing sports facilities more multifunctional. Nevertheless, the overall reduction in available space for sports is concerning, especially at a time when physical activity levels are already too low. This trend raises important questions about the city's ability to support a healthy lifestyle for its residents. As urban density increases, it may be essential to proactively seek new opportunities for integrating sports into the existing built environment—within buildings, on rooftops, and in the spaces between structures—to ensure that sufficient room for physical activity remains available in an expanding city. The figure on the next page highlights the sports fields that are scheduled for removal in red, illustrating the spatial impact of this trend across the city.

*Figure 17: Rotterdam sport facilities*



# L - *ROTTERDAM SOUTH*

# VISION FOR SOUTERHN ROTTERDAM

Continuing from the vision for the entire city, the municipality has developed a more detailed plan specifically for the southern side of Rotterdam. *Koers op Zuid 2040* (Gemeente Rotterdam, 2023) aims to transform Rotterdam South into a resilient, inclusive, and vibrant urban environment while preserving its unique identity. It focuses on "good growth," emphasizing affordable and diverse housing, sustainable infrastructure, and climate resilience. Key priorities include improving connectivity, creating green and livable public spaces, fostering economic opportunities, and enhancing social cohesion. By 2040, South Rotterdam aspires to be a well-connected, healthy, and inclusive area that benefits all residents while embracing its dynamic history and cultural diversity.

The city envisions significant expansion in the south, with Stadionpark planned to add 8,000 residences and 8,000 jobs, and Zuidplein set to include 2,300 additional residences and 800 jobs (Gemeente Rotterdam, 2023). The eastern flank of Rotterdam as a whole is expected to accommodate a total of 30,000 new residences and jobs, placing substantial pressure on the connections between southern and northern Rotterdam. To address this, the municipality plans to develop a robust high-quality public transport (HOV) network, anchored by mobility hubs. These hubs aim to enhance the appeal of public transport while reducing dependence on cars. The municipality has classified the Tarwewijk as a "city neighborhood," with planned developments aimed at transforming it into a neighborhood focused on "working in the neighborhood." With this classification, the municipality seeks to maintain space for home-based work, neighborhood hubs, small-scale office functions, retail, and business spaces.

The development of Zuidplein positions the Tarwewijk as a crucial connector. The Mijnsherenlaan, which divides the Tarwewijk in half, will become the shortest and most direct route between Zuidplein and the two newly planned parks along the Maas. This route will also extend toward the Erasmusbrug and the city center. Currently consisting of large unused open space, filled with car parking beneath the metroline viaduct, Mijnsherenlaan has immense potential to be transformed into an inviting public space. The increased volume of people traveling between the parks, Erasmusbrug, and Zuidplein presents a significant opportunity for the small-scale businesses and shops envisioned by the municipality. This transformation could turn the Tarwewijk from a mere transit corridor into a vibrant destination, benefiting both the neighborhood and the new businesses and shops that will establish themselves in the area.

An architecture office located near the Tarwewijk, el Kantoor (2022), has proposed transforming the Mijnsherenlaan into a green park. Their design was developed in collaboration with local residents, confirming the community's support for the creation of this park. Furthermore, it aligns with the municipality's vision of increasing greenery and biodiversity in the city.

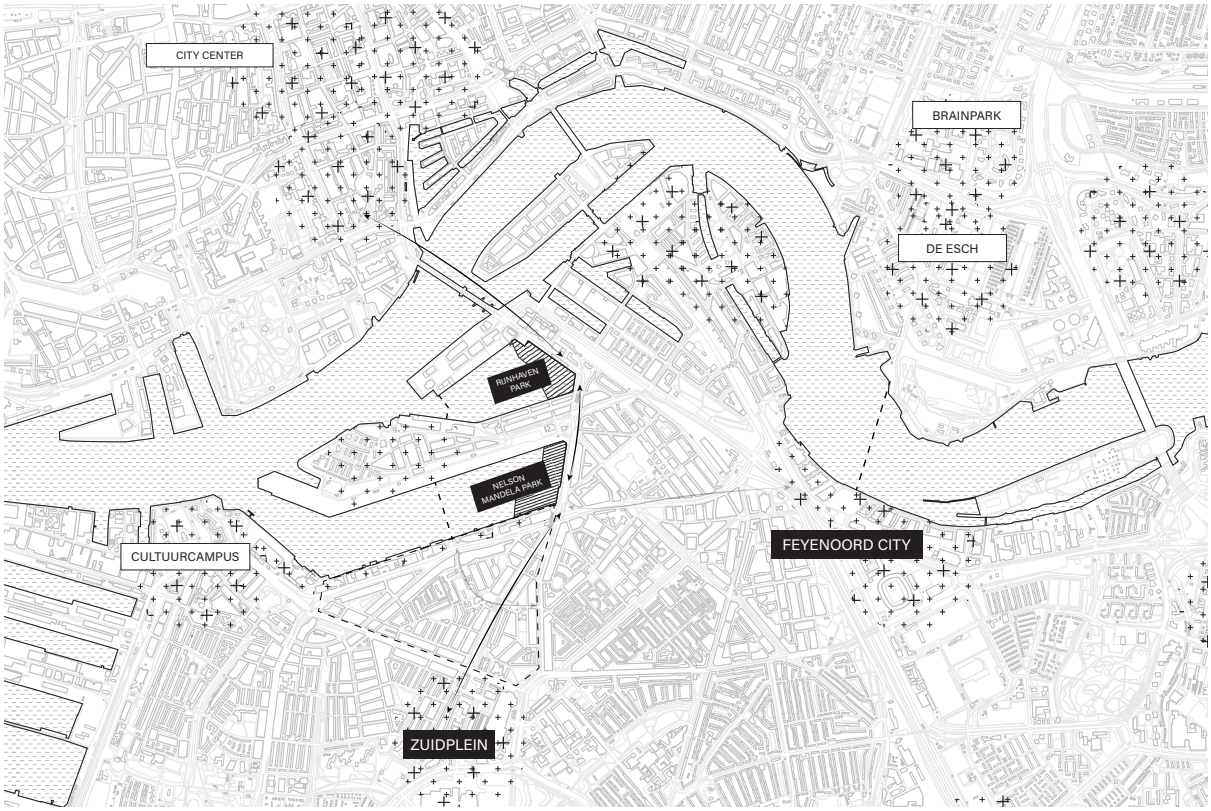



*Figure 18: Rotterdam South Vision Related to Tarwewijk*

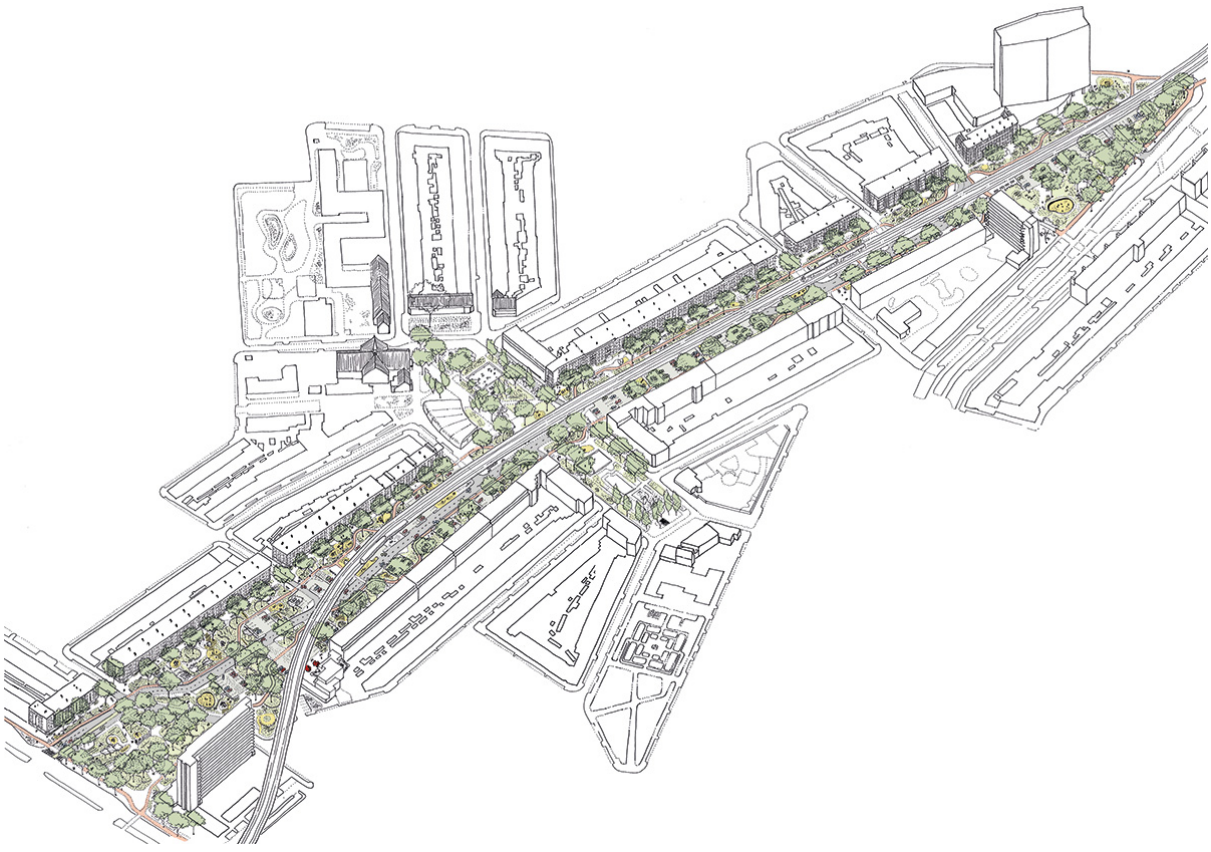
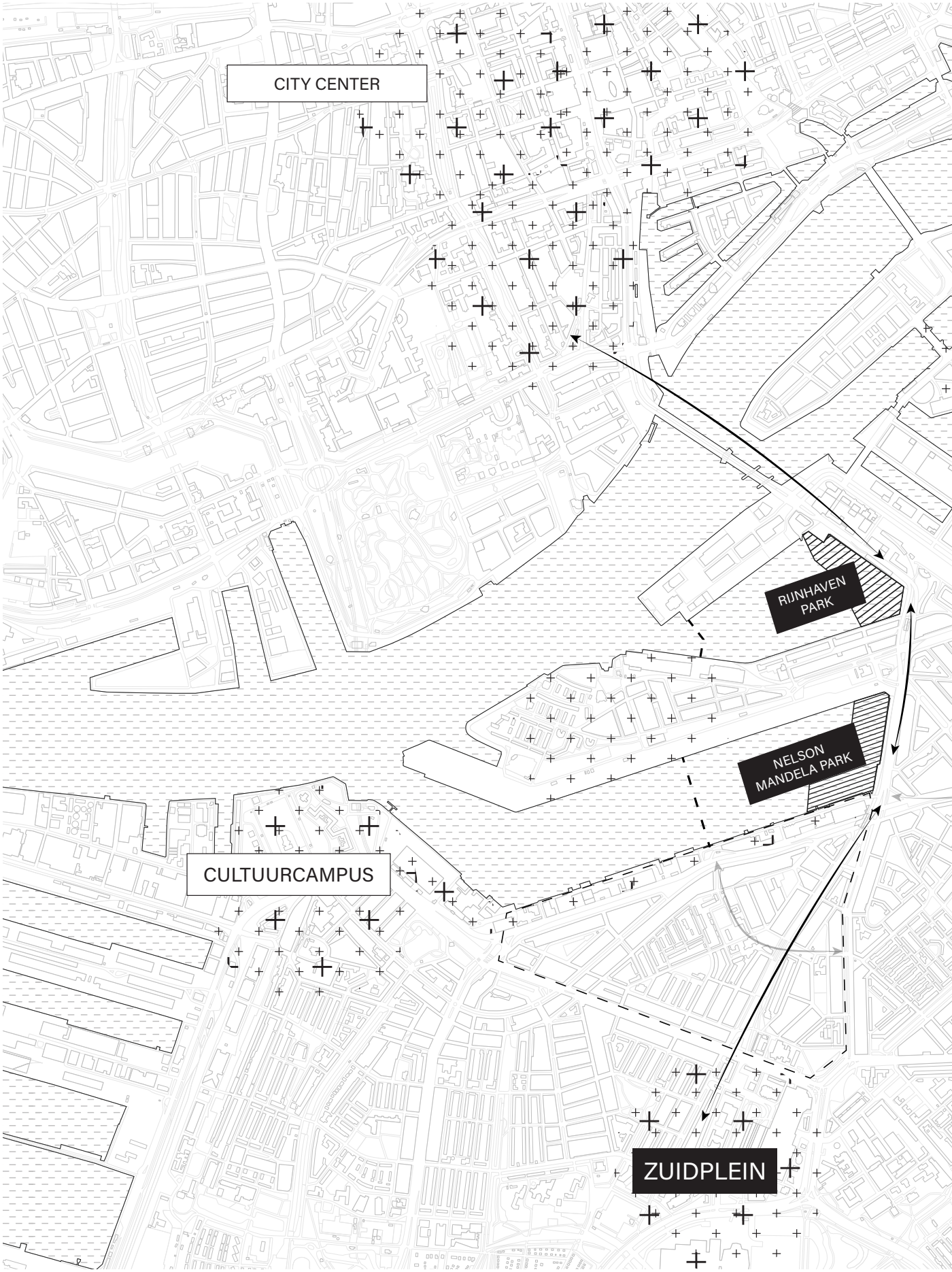
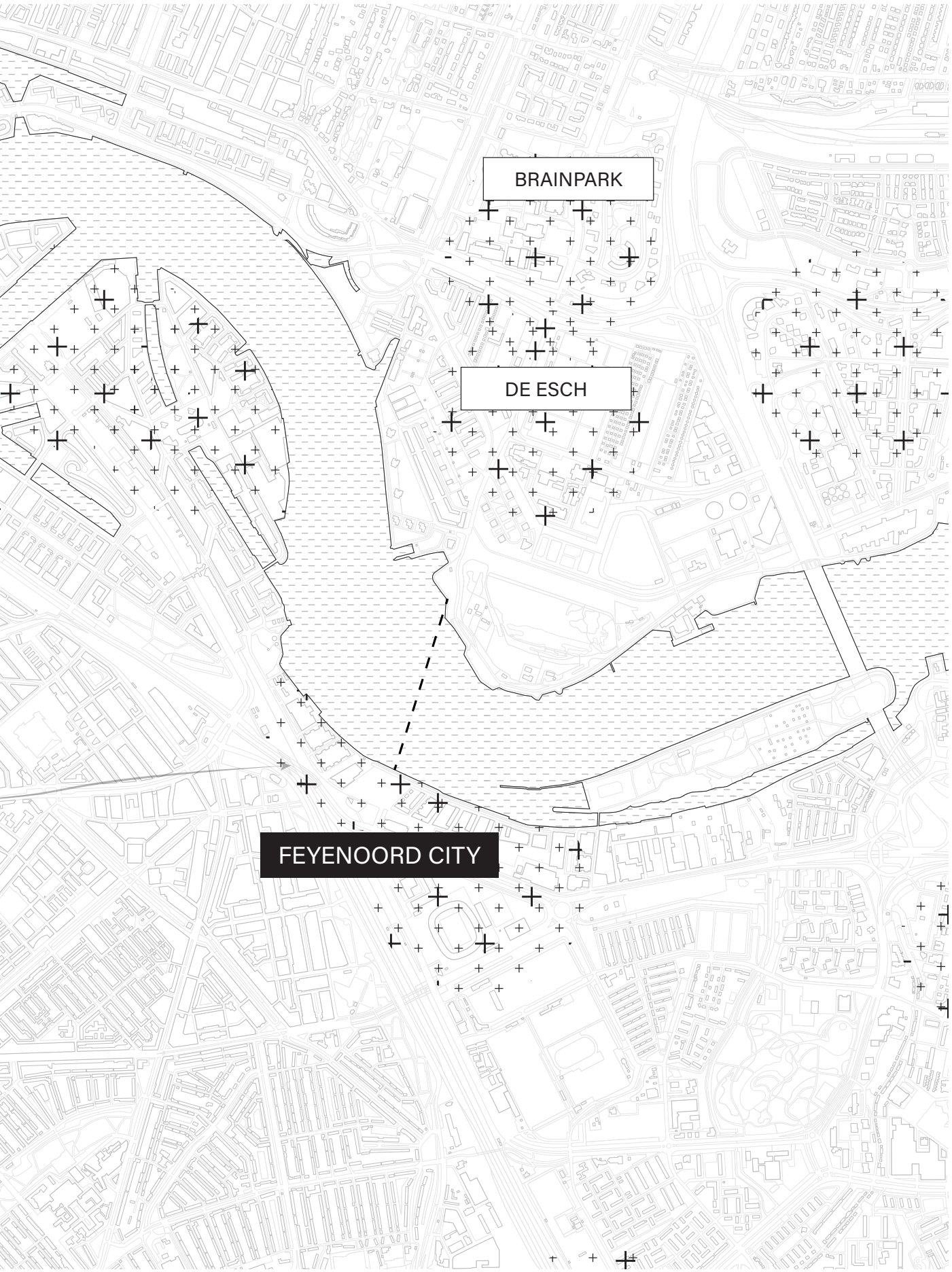


*Figure 19: Mijnsherenlaan Proposal by El Kantoor*


CITY CENTER
RIJNHAVEN PARK
NELSON MANDELA PARK
CULTUURCAMPUS
ZUIDPLEIN


BRAINPARK
DE ESCH
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# M - *TARWEWIJK*

# EVOLUTION OF THE TARWEWIJK

The Tarwewijk was built between 1900 and 1930 to house workers in the rapidly growing port. The neighborhood owes its name to its location next to the Maashaven, where grain ships were once unloaded. Along the Brielselaan, several former grain companies still remain, including the monumental Graansilo. This iconic building is well-known as the event venue Maassilo, but it also houses young, creative entrepreneurs under the name Creative Factory (Gemeente Rotterdam & OBI, 2024).

The neighborhood's development reflects the socioeconomic patterns of early 20th-century Rotterdam. The northern sections, constructed between 1909 and 1930, included multi-story housing blocks that combined residential and commercial spaces. In contrast, the Tarwebuurt and Geervlietbuurt areas were dominated by small family homes, with the Millinxbuurt featuring denser housing constructed during the 1930s (Bavelaar, 2021). This layout was designed to accommodate the city's rapidly growing urban workforce, ensuring proximity to industrial hubs while fostering a sense of community. Significant changes began in the 1950s when middle-class families moved to suburban areas, making way for a wave of guest workers from countries such as Italy, Spain, Turkey, and Morocco. While this diversification brought cultural enrichment, it also introduced challenges tied to socioeconomic disparities. Concurrently, Rotterdam faced deindustrialization pressures, including harbor mechanization and intensified international competition, which contributed to rising unemployment. Many buildings fell into disrepair as lower-income residents replaced middle-class families, and slumlords capitalized on declining property values by overcrowding units (Bavelaar, 2021). By the 1980s, urban decay in Tarwewijk became increasingly visible. The construction of a metro line through Mijnsherenlaan disrupted the area's cohesion, introducing noise pollution and reducing the attractiveness of the neighborhood for higher-income residents. Efforts to counter these challenges were hindered by fragmented property ownership, which made large-scale urban renewal efforts particularly complex (Bavelaar, 2021). Efforts to revitalize Tarwewijk began in earnest in the early 1980s, with initiatives focused on improving housing conditions and urban infrastructure. Initial progress was slow due to limited municipal resources and resistance from private property owners. By the late 1980s, however, a more holistic approach to regeneration emerged, blending physical renovations with social and economic programs designed to uplift residents and attract new populations (Bavelaar, 2021). The Millinxbuurt, originally excluded from significant renewal efforts due to its relatively stable housing conditions, became a priority in the 1990s as its situation worsened. Interventions included demolishing decayed housing blocks to create green spaces and launching initiatives like "Maak Millinx Mooier," which sought to improve the neighborhood's safety, livability, and social cohesion. (CultuurWerkplaats Tarwewijk, z.d.). By the early 2000s, the impact of decades of regeneration efforts became more evident. Physical improvements, such as renovated housing and expanded green spaces, have made parts of Tarwewijk more attractive to diverse demographics. Programs addressing community involvement and safety, like those involving resident-led initiatives, helped foster a stronger sense of collective responsibility. However, the neighborhood still faces challenges related to socioeconomic inequalities, population turnover, and public perception (Bavelaar, 2021).

Today, Tarwewijk is a vibrant multicultural neighborhood. A significant proportion of its population is under 25, reflecting a youthful demographic composition. Despite ongoing improvements, the area is marked by a high percentage of low-income households, with a majority falling into the lower 40% of the national income distribution. Initiatives to enhance urban livability, such as the proposed Nelson Mandelapark project, aim to bolster the quality of life for residents while addressing environmental stressors like noise pollution and air quality concerns (Gemeente Rotterdam & OBI, 2024).

*Figure 20: (Top) Mijnsherenlaan before the metroline*

*Figure 21: (Bottom) Mijnsherenlaan during construction of the metroline*

# DEMOGRAPHICS

The Tarwewijk is one of Rotterdam's most vibrant and diverse neighborhoods, home to around 12,500 residents. Known for its colorful mix of cultures, it reflects the city's multicultural identity (Kuiper et al., 2024). The area has a youthful population, with many families and children. About 18% of its residents are under the age of 15, while only 8% are over 65, making it one of Rotterdam's younger neighborhoods. This creates a dynamic atmosphere but also brings challenges in meeting the needs of children and young families. Despite these challenges, the Tarwewijk is home to many engaged residents who actively contribute to improving the neighborhood. These individuals feel connected to their community and are instrumental in fostering a more pleasant living environment (Gemeente Rotterdam & OBI, 2024).

The majority of Tarwewijk's population, about 79%, has a migration background. This diversity stems from its long history of welcoming new residents, starting with guest workers from Southern Europe, Turkey, and Morocco in the mid-20th century, and more recently from Eastern Europe, including Poland, Romania, and Bulgaria. This blend of cultures brings vibrancy and opportunity, but it also presents challenges, including language barriers and social integration.

Economically, Tarwewijk faces significant difficulties. Nearly 69% of households live on low incomes, placing the majority in the bottom 40% of national income brackets. Employment rates are similarly low, with 12% of residents in unemployment. Many available jobs are in low-wage sectors like construction, cleaning, and retail. These economic struggles are compounded by the transient nature of the neighborhood, with 16% of residents moving in or out each year, which can make it harder to build long-lasting community ties (CultuurWerkplaats Tarwewijk, n.d.).

The physical environment of Tarwewijk is also a challenge. Much of the housing is aging, with conditions that reflect years of neglect, and overcrowding is common, particularly among newly arrived migrant workers. However, the neighborhood is gradually transforming. Community initiatives and urban renewal projects, such as those focused on improving public spaces and housing conditions, are starting to make a difference. Younger residents, in particular, are beginning to access better educational opportunities, and community programs are helping build connections between residents (CultuurWerkplaats Tarwewijk, n.d.).


*Figure 22: Aanrijding Mijnsherenlaan - Cillerhoekstraat 1956*

# URBAN MORPHOLOGY


The Tarwewijk was established in the space enclosed by three busy roads—Dordtselaan, Brielselaan, and Pleinweg—giving the neighborhood its distinctive triangular shape. The neighborhood primarily consists of typical Dutch "portiekwoningen" housing blocks. This triangular area is further divided into three sections by the tramline and the metroline viaduct, creating three distinct parts of the neighborhood, each with public squares or playgrounds nestled within the housing blocks. Along the Maashaven, the area is dominated by industrial and commercial functions, separated from the residential blocks by a dike running along the Brielselaan. This dike further isolates the housing blocks from their surroundings.

# SPORTS FACILITIES

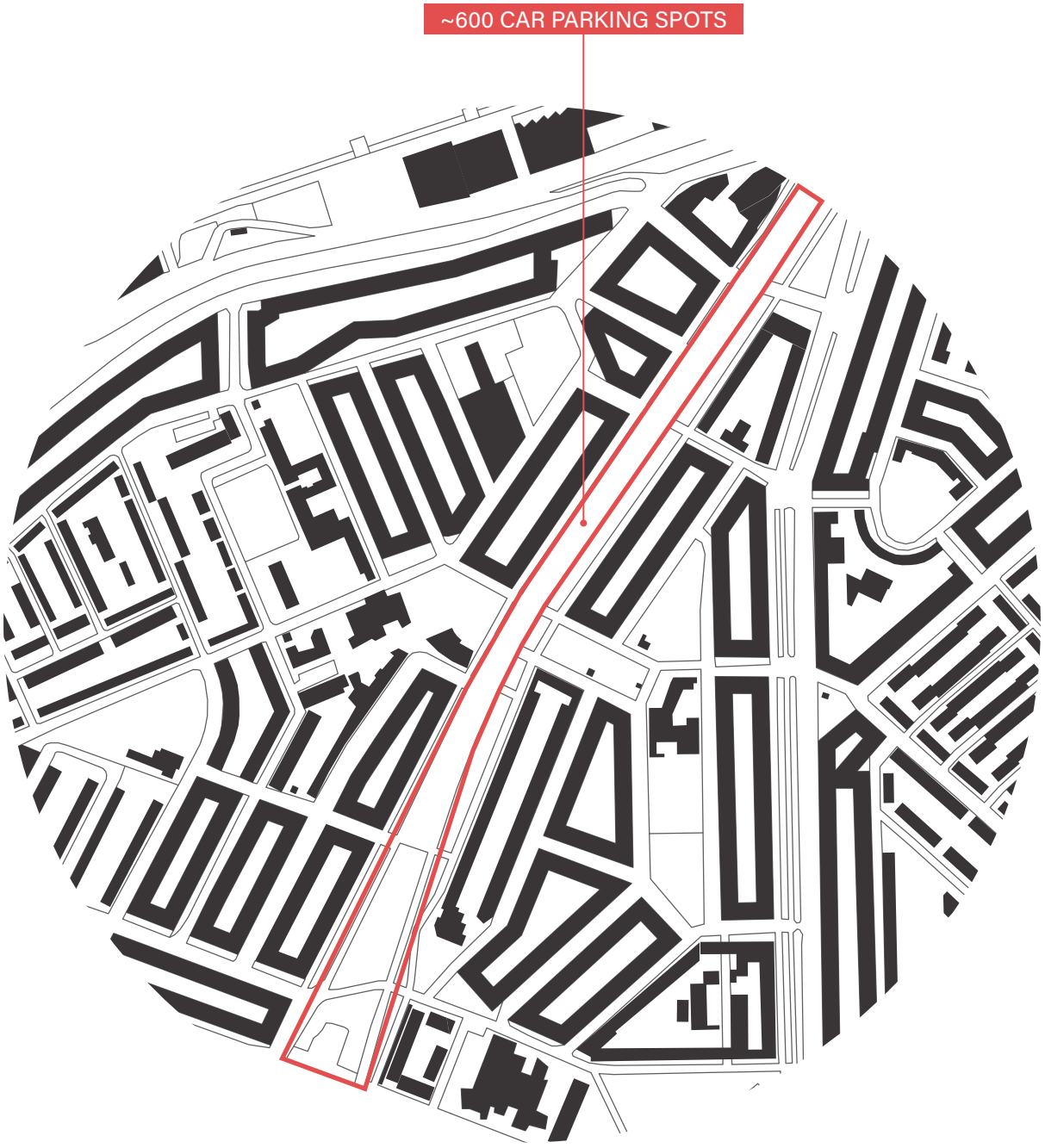

Tarwewijk hosts a relatively high number of sports facilities, including football fields, fitness clubs, a CrossFit box, and calisthenics parks. However, many of these facilities are either outdated or primarily geared toward children. As a result, adults and young adults in the neighborhood often lack adequate motivation and opportunities to engage in regular physical activity.

# S - *MIJNSHERENPLEIN*

# MIJNSHERENPLEIN

The Mijnsherenplein has been selected as the design location. Building on el Kantoor's proposal to transform the Mijnsherenlaan into a green park, this site holds significant potential for stimulating physical activity. It is situated precisely at the intersection of the two most important pedestrian routes in the neighborhood: the Mijnsherenlaan, which connects Zuidplein with the new Nelson Mandela Park, and the Mijnsherenplein, which will form a strong link with Katendrecht following the completion of the new bridge. The design location also serves as a connector between eastern and western Tarwewijk, bridging the divide created by the metroline viaduct and integrating with the new park along the Mijnsherenlaan.

# MIJNSHERENPLEIN




Beneath the metroline viaduct, there are approximately 600 car parking spots, occupying around 6,000 $m^2$ of valuable public space. However, the municipality of Rotterdam plans to reduce car usage and the dominance of cars on the streets. Despite this, these parking spots are heavily utilized, with most being in use throughout the day as well as on weekends. This indicates that the municipality will need to find an appropriate solution to balance their goal of reducing cars on the streets with maintaining accessibility for car owners. Additionally, for el Kantoor to realize their vision of transforming the Mijnsherenlaan into a park, a proper solution must ensure that parking accessibility is not significantly diminished.

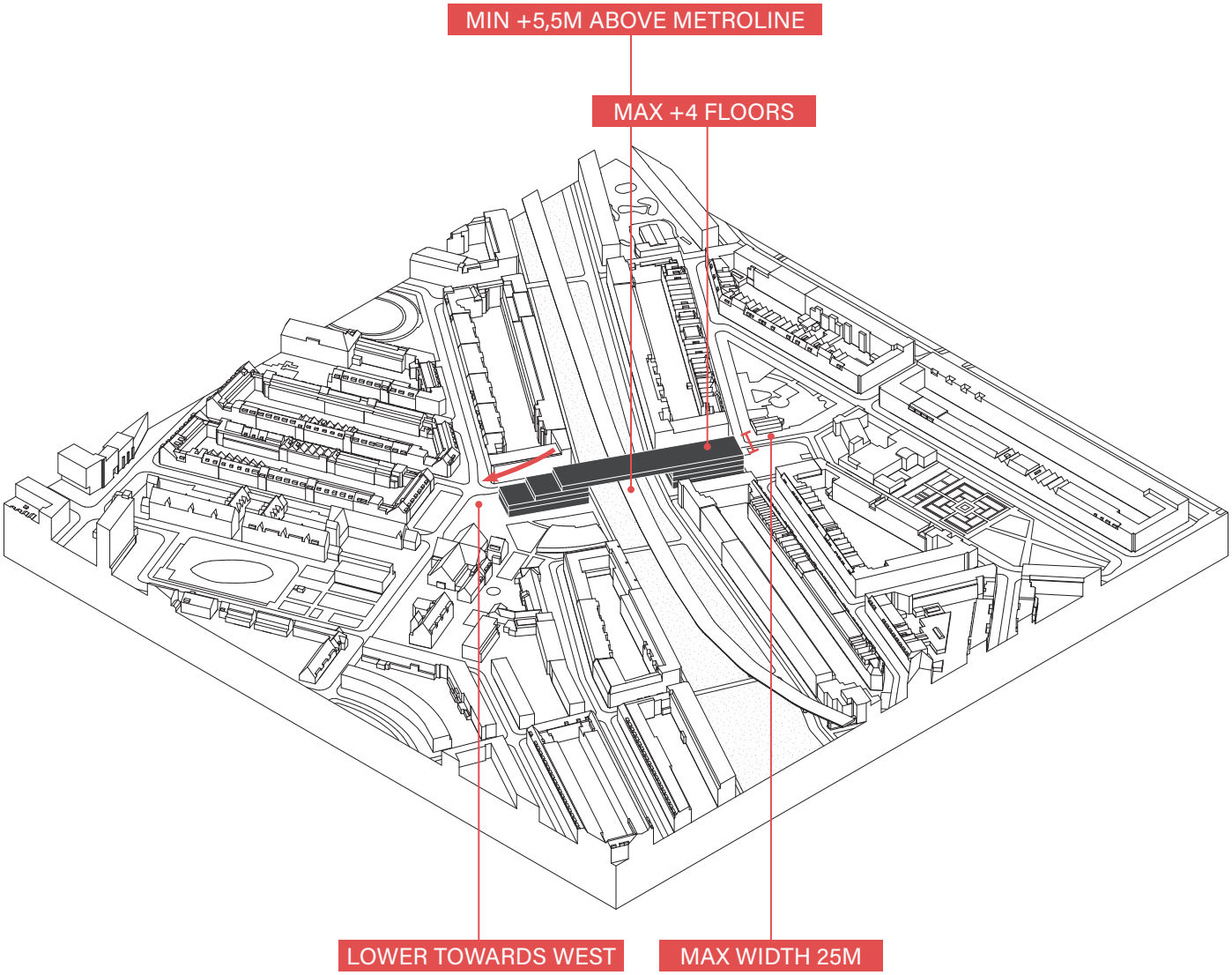



*Figure 23: Site volume boundary*

# LOCATION ANALYSIS CONCLUSIONS

## XL - ROTTERDAM

1A Rotterdam is facing rising health issues, with obesity rates expected to rise with 12%.

2A The municipality has developed a vision "De Veranderstad" which addresses the city's rapid expansion. The municpality plans to actively involve Rotterdam's residents in the developments.

3A The public transport effectiveness will increase with the expansion of the HOV-network and the introduction of mobility hubs. Aiming to reduce car dominance on the long-term.

4A The city will have an increase in public parks and green walking routes, increasing resident well-being.

5A The municipality also aims to stimulate physical activity, by upgrading infrastructure to prioritize walking and cycling, and providing more (free accessible) sports facilities.

## L - ROTTERDAM SOUTH

1B The municipality aims to transform the south into a resilient, inclusive, and vibrant urban environment while preserving its unique identity.

2B Key priorities include improving connectivity, creating green and livable public spaces, fostering economic opportunities, and enhancing social cohesion.

3B With the addition of 30,000 new jobs and 30,000 new residents, Rotterdam South will have a signifcant increase in density.

4B Plans for creating mobility hubs hold potential investment opportunities for suitable locations. Car dominance in the streets and usage is to be reduced.

5B The municipality envisions a higher mix of functions in the neighborhoods, with the Tarwewijk making place for home-based work, neighborhood hubs, small-scale office functions, retail, and business spaces.

6B The developments surrounding the Tarwewijk will significantly influence the importance of the neighborhood. With the Mijnsherenlaan serving as an importnat connection between Zuidplein and the 2 new parks along the Nieuwe Maas.

7B Expand green spaces and biodiversity, integrating nature into urban areas to mitigate heat stress and improve residents' quality of life.

M - TARWEWIJK

1C The Tarwewijk has diverse mix of cultures, with 79% having a migration background. This has caused cultural segregation and barriers for social integration.

2C There are welcoming and accessible spaces, such as CultuurWerkplaats and the pavilion by the water, which encourage self-organized events and inclusivity.

3C The neighborhood fosters a sense of community through many volunteer-led projects and regular events that bring together diverse groups.

4C The Tarwewijk has a high amount of low-income residents, with 69% facing financial difficulties. And 12% being unemployed.

5C The neighborhood has a high transient rate, with 16% moving in or out per year.

6C Community initiatives and urban renewal projects, such as those focused on improving public spaces and housing conditions, are starting to make a difference.

7C Improved conditions, are starting to make a difference. Younger residents, in particular, are beginning to access better educational opportunities, and community programs are helping build connections between residents.

8C The neighborhood benefits from being spacious and relatively low in density, providing room for greenery and open areas.

9C Lack of qualitative public green spaces and biodiversity, and a relatively large amount of unused public space.

S - MIJNSHERENPLEIN

1D The Mijnsherenplein holds potential as an economically interesting location after the realisation of the new bridge and the Nelson Mandela Park, due to increasing pedestrian traffic.

2D The space below the metroline viaduct holds potential for more valuable use. It is now used for 600 car parking spaces along the Mijnsherenlaan, while car use is to be reduced.

3D As a central location the Mijnsherenplein holds potential to create a stronger connection between east and west Tarwewijk, which is currently split by the metroline viaduct.

4D The location holds potential for a scenic view on the skyline of Rotterdam due to all surrounding buildings not being higher than 4-5 floors.

# FIELDWORK

# TARWEWIJK OBSERVATIONS

## Observed areas


1. Cultuurwerkplaats
2. Mijnsherenplein West
3. Mijnsherenplein Fitness
4. Mijnsherenplein East
5. Playground Moerkerkeplein
6. Huis van de Wijk
7. Millinxpark
8. Football field South
9. The Playground
10. Church “De Banier”
11. Café Royal
12. Playground Verschoorstraat
13. Balkon aan de Maashaven
14. Spijkenissestraat
15. Zwartewaalstraat

**Observational walk A** Tuesday 12/11 15:30 - 17:30

2 (15:30) 2 people are sitting at Mijnsherenplein. They are talking to eachother.

A father is playing with a child on the field.

(16:21) 2 people are sitting at the sportsfield.

A delivery driver grabs his bike, placing the saddle first, which he had taken off.

People regularly walk past the sportsfield.

Many cars drive past the sportsfield.

The sportsfield itself is not being used.

3 (15:30) 2 people are exercising at the outdoor fitness.

3 people are sitting and chatting in the fitness area.

(16:21) The fitness area is empty.

5 (15:32) 15 kids are playing in the playground.

Adults are watching on the side; some sit alone, some stand together talking.

(16:14) The number of kids playing has reduced to 7; 3 adults are sitting at a table.

(17:00) The playground is empty; 1 adult is tidying up the area.

7 (15:34) 1 child is playing alone, seeming unhappy, leaves the park 5 minutes after my arrrival.
(15:38) The park is completely empty.

People regularly walk past the roads on both sides of the park. Occasionally cars pass by.
People occasionally pass through the park, but no one stays.

(15:50) Many people are now walking past the park.

During my time at this park, almost all curtains of the surrounding houses have been closed.

(17:04) The park is still empty.

9 (16:29) 10-15 children are playing at the playground. 4 adults are present.

All adults sit close togther under a covered area near the building.

They seem to leave the children mostly undersupervised.

Many cars drive past the playground.

(17:12) The playground is empty.

10 (16:35) About 10 children are playing outside, an unknown number of people are inside.

11 (16:38) 3 small groups of men are hanging on the street.

(17:24) A group of 6-7 men is hanging on the street. This spot gives me an uncomfortable feeling in the dark.

**Observational walk 1** Tuesday 12/11 15:30 - 17:30

12 (16:40) There is a mixed age group of people playing at the football field. About 30 people.

A few of the children are playing at the surrounding playgrounds.

A few adults and teenagers join in on the football game.

Parents come to pick up their children.

(17:02) The surrounding playground is now empty.

In contrary to the other palygrounds, there is no surrounding fence here.

Only the football field is fenced, and the looks quite new, and made of fake grass.

The asphalt football field next to it is empty.
(17:20) 5 children remain, no adults are present.

A group of 4 children and 5 teenagers/ young adults is sitting on 2 benches, chatting.

13 (16:48) 1 person is using the outdoor fitness area.

3 people are sitting on a bench, facing the view.

A handful of people are walking along the water.

The bike path and car road are fairly busy.

Several runners pass along the water.

## Conclusions

1E There are generally not many public places where people gather for a chat or any social activities. The largest gathering of people was at the playground on Verschoorstraat.

2E Until about 16:30 - 17:00, there are many children in the playgrounds, though they are fairly spread out across the neighborhood. Afterwards they remain empty.

3E The calisthenics parks are used by a few people but not frequently. Public parks are generally underused, except for Balcony Park, which attracts more people, possibly due to its scenic location by the water.

**Observational walk B** Thursday 14/11 09:30 - 12:00

1 (09:27) A random cyclist greets me on my way to the cultuurwerkplaats.

The cultuurwerkplaats is empty.

(10:15) Eventhough it is open, there is still no one at the cultuurwerkplaats.

(11:50) Still no one at the cultuurwerkplaats.

2 (09:25) The mijnsherenlaan football field is still empty.

(10:40) A group of 20 children is playing on and around the football field.

3 (10:35) 3 people are sitting idly in the fitness area.

(10:35) On the corner next to the outdoor fitness, there are 7 adults standing next to a supermarkt, chatting.

(11:34) There are still people hanging around this corner.

4 (10:15) About 10 children are playing on the football field.

(10:30) The football field is empty again.

5 (10:15) 12 children are playing at the playground. They are supervised by 2 adults.

A group of 15-20 children run from the school towards the playground.

The teacher is calling group 8 to get back inside.
(10:30) Still many children on the playground.

(11:30) The playground is empty again.

6 (10:15) The school's private playground is empty. All the children are going to the bigger, fenced playground or the football field.

(10:30) 4 people are sitting in het huis van de wijk, drinking a coffee or reading the newspaper.

8 (09:40) 1 child is already playing on the football field. There is not adult present.

9 (09:30) The playground is completely empty.

(11:06) The playground is still empty.

(12:00) The playground is still empty.

12 (11:15) The playground and football field are completely empty.

13 (10:50) 2 people are at the park. 1 person is using the outdoor fitness and the other person is watching the view.

14 (10:46) Many children are playing next to the school, on playground and in open public spaces.

The dog park is empty.

(11:06) The dog park and the surrounding playgrounds are completely empty again.

15 (11:45) A group of chilren is playing on the playground within the tramline.

I have never seen a tram using this tramline, while walking through the neighbourhood.

## Conclusions

1F In the morning there are very little people on the streets. Especially a low amount of adults. Although there was still a high amount of cars parked in the neighbourhood.

2F The schools in the neighbourhood are intensively using the nearby playgrounds. The playgrounds are used with different intervals, for a short amount of time. Most likely related to the break times of the schools.

3F The playgrounds seem to be used in a very isolated way. The children mainly go the nearest playground. Also, there is a division between the school's playgrounds and other playgrounds that are only used as after-school care. There seems to be very little overlap or multi-purpose of these playgrounds.

4F The outdoor fitness areas seem to be used quite regularly, even during working hours. Not everyone is actually exercising in these areas. Some are just hanging out or chatting there.

5F None of the playgrounds in the area seem to be unused.

**Observational walk C** Sunday 17/11 14:00 - 15:00

2 (14:12) 4 teenagers are playing basketball at the sports field.

3 (14:12) 1 person is working out in the outdoor fitness area.

7 adult men are hanging at the corner next to the fitness area.

4 (14:15) About 10 children are playing on the football field.

5 (14:15) The playground is empty and seems to be closed.

The small outdoor fitness next to the playground is not used.

6 (14:16) Het huis van de wijk is closed on weekends.

7 (14:16) The Millinxpark is empty.

8 (14:20) 3 teenagers are playing football at Zuidplein.

9 (14:34) The playground is empty. It is closed on sundays. There seem to be leftovers from an event from the day before.

10 (14:34) The playground is empty. It is closed on sundays. There seem to be leftovers from an event from the day before.

13 (14:38) 3 people are exercising at the outdoor fitness area. No one is sitting near the water.

14 (14:38) 1 person sitting alone at the dog park.

## Conclusions

1G In the weekends the playgrounds and sports facilities are still used frequently. Due to closing of some of the playgrounds, the single-use character of the playgrounds is even stronger now.

2G There is not much to do for (young) adults in the neighbourhood, even in the weekend. The public spaces are therefore dominated by children and teenagers.

3G The outdoor fitness areas are quite popular. Also, the one along the new maas is more popular. Along the water there are also people running quite frequently.

# TARWEWIJK INTERVIEWS

**Huis van de Wijk**

14-11-2024

Interview by Bo Kuiper

**What is the community center, and what is it used for?**
The community center is a place where people come together for various activities. It offers opportunities for social gatherings, like shared breakfasts or dinners. There are also Dutch language lessons, and on Mondays, there's a walking club. In the evenings, activities like Zumba are organized. There's really a bit of everything.

**What kind of people come here, and how many approximately?**
The audience is very diverse and includes all age groups. Around 100 people come every week. There's a core group that attends regularly and a rotating group of people who drop by occasionally.

**Why isn't it open in the evenings and on weekends?**
The community center is entirely run by volunteers, which makes it difficult to stay open during evenings or weekends. However, there are still events organized during those times, like the Sinterklaas celebration.

**Does the current building meet the needs, or is there a need for more space or facilities?**
The building is large enough for the current activities. There's also a strong collaboration with the neighboring school. At this time, there's no need for additional space or facilities.

**Do you think a single central location in the neighborhood for cultural activities would work well?**
I'm not sure if this would work well. The culture workshop offers more creative activities, but currently, there's little connection between the workshop and the community center. Visitors usually choose one or the other. This used to be different—most people went to both places in the past. I'm not sure why this has changed; it might just be a matter of habit or preference.

## Conclusions

1H The Huis van de Wijk is a very popular and appreciated location, run by volunteers that care about the neighbourhood.

2H The residents of the Tarwewijk might not prefer to centralise the community centers into 1 building, since they have slightly different purposes and different visitors.

Nizar (18) mentions having good memories of living in the Tarwewijk. Living there felt village like, with summer barbecues on the streets.

According to Jacqueline (52), the neighbourhood used to have a lot of criminal activity. During the 1990s, many drug dealers operated in the area. This situation, however, brought people closer together, creating stronger bonds as they supported one another. Despite the challenges, it was a very nice neighbourhood where everyone knew each other and helped one another.

Nowadays, things feel different to her. She experiences less connection with her neighbours than she used to. People seem more isolated and divided into cultural groups, such as Bulgarians, Romanians, and Moroccans.

Martin (57) highlights the significant role the Tarwewijk Playground played in his youth, describing it as very important to him. He recalls that there was always something to do, such as football, badminton, or disco events.

He also reflects on a period marked by very high levels of criminal activity, which resulted in many victims and frequent funerals. However, he notes that the arrival of new residents has brought fresh energy into the neighbourhood. Also, crime rates have decreased, though older residents continue to keep the stories of that period alive.

Ans (78) appreciated the community centers that used to be present in the neighbourhood. However, she notes that due to financial cuts by the municipality, all of them have disappeared. She also mentions a similar fate for the school gardens; there used to be 600 educational gardens, but all of them have been removed.

The neighbourhood changed according to Ruud (64). He reflects on the 1990s as a time when everyone was welcome, people knew each other, and neighbours frequently spent time together. However, he believes the system is now falling apart. According to Ruud, the neighbourhood has become polarised, with residents being less welcoming toward one another. He attributes this shift to increasing individualisation and financial cuts to the public sector.

Bep (80) agrees with Ruud's observations about the neighbourhood. She notes that there is little to no contact among neighbours, with most people keeping their curtains closed. According to her, residents often move out of the neighbourhood after just one or two years. She believes that people are focused on surviving rather than building connections with each other.

Herlin (66) longs for liveliness: children playing in the streets, the sound of cars. She also wants to be able to walk to her friends who live nearby. Herlin used to live in the Millinx neighbourhood, where it was cozy and peaceful until drug-related problems arose, turning it into a notorious area. Her fondest memories of the neighborhood are the monthly parties that were organized.

At the time, the residents expressed their desire for a community house where they could come together. As a result, the Millinxpark House was built. This solved many of the neighborhood's problems but also caused the social cohesion to fade. With the need to build things together gone, people started to focus more on themselves again.

Wil (77) also remembers the Tarwewijk as a cozy neighborhood where everyone knew and helped each other. She confirms that this changed due to drug-related issues, but

in recent years, the situation has improved significantly. Wil loves the sense of community in the neighborhood and the spontaneous encounters. She enjoys chatting with people who pass by her window.

## Conclusions

1J The residents of the Tarwewijk cherish the idea of a strong sense of community, where neighbours know and support one another. However, this sense of connection has gradually faded over time. Many residents have expressed their appreciation for community centers and other shared spaces, as well as the opportunity to actively contribute to the neighborhood's development and vibrancy.

2J The high turnover of new residents has a negative impact on social cohesion. Many people live in the neighborhood only temporarily, not because they want to, but because they have no other choice. This suggests that the neighborhood lacks certain essential elements, making it an unattractive place for long-term living. of turnovers

3J There was great appreciation for the village-like and social character the neighborhood once had. Many people feel nostalgic about this and regard it as the Tarwewijk's golden era

4J Most residents have experienced a strong sense of individualization. Where people once knew each other, the neighborhood is now divided into smaller groups, and individuals have become more focused on themselves. The residents view this as a negative development.

**Gedeelde Ruimte op Zuid**

Published in 2022
by Wenda Doff & Erik Snel

In *Gedeelde Ruimte op Zuid*, Wenda Doff and Erik Snel, along with their team, conduct research on how public spaces in Rotterdam Zuid are used and experienced by its residents. The research is based on numerous interviews with residents from various income groups. In this paragraph, I will summarize their findings.

**Shopping**
In Southern Rotterdam shopping behaviour is influenced by convenience and social connections. Higher-income residents tend to shop locally for everyday needs but go to the city center for specialty or luxury items. In contrast, lower-income groups are more reliant on local stores, which they find sufficient for their daily needs. While local markets and small international shops are appreciated for their uniqueness and personal service, many residents note the limited variety, especially for luxury or specialty products.

**Activities and Nightlife**
In Zuid, higher-income residents enjoy local cafes and bars but often seek better dining and nightlife options in the city center or other parts of Zuid. Lower-income groups rarely go out due to financial or physical limitations, with social activities mostly confined to their neighborhood. Middle-income residents also socialize locally but occasionally venture outside Zuid. Many reflect on past venues that are no longer available, and their socializing is less focused on traditional nightlife and more on informal gatherings.

**Parks, playgrounds and squares**
Public spaces like parks, playgrounds, and squares are commonly used by residents across all social groups in Zuid. They serve as important places for social interaction and community connection. For many, these spaces offer opportunities for both bonding (socializing within groups) and bridging (meeting people from different groups). Interviewees from higher social classes often frequent these spaces to meet familiar faces, while also encountering people from diverse backgrounds, fostering connections. However, for some, especially those from lower-income groups or with physical limitations, the use of these spaces is limited, and they often stay at home. Communication barriers can also affect interactions, particularly among people with different migration backgrounds. Despite these challenges, public spaces remain significant for neighborhood interaction and social safety.

**Movement and routes**
The use of public space in Zuid involves various routes and modes of transportation. Most residents, regardless of social group, move through the area on foot due to short distances and, for lower-income groups, limited access to cars or bicycles. Walking and cycling are common not only for practical purposes but also to explore the neighborhood, admire its appeal, or meet others. Upper-class newcomers and the emerging middle class prefer scenic and green routes for leisurely strolling and observation, while middle-class residents often prioritize efficiency and choose the quickest paths. Overall, public spaces are valued for both their utility and social or aesthetic qualities.

**Social Interaction**
Social interactions on Zuid vary by social group. Upper-class residents maintain dispersed networks, often connected to northern Rotterdam, while adjusting to the local community. The middle class forms casual ties with neighbors in shared spaces but prioritizes contacts outside the area. The emerging middle class rarely engages locally, focusing instead on socializing elsewhere. The connected lower class relies on neighborhood connections due to financial limits, while the

precarious group is the most isolated, with social life largely confined to their homes.

The researchers conclude with their key recommendations for shaping the city's vision as outlined by the municipality:

1K Invest in small-scale, diverse amenities such as shops, restaurants, terraces, and courtyards to increase local spending and strengthen neighborhood connections.

2K Enhance the livability of the neighborhood by adding more diverse greenery, seating areas, winding paths, terraces, and public art.

3K Prioritize green and inviting squares to make the area attractive to all social groups.

4K Encourage participation by enabling residents to take ownership of neighborhood spaces, for example, by removing fences around parks and playgrounds and promoting community management of green areas.

5K Expand programming for outdoor spaces and facilities with diverse activities, such as sports or hobbies, to foster casual encounters between different groups.

6K Assess the accessibility and visibility of existing indoor and outdoor sports facilities, and ensure there are enough gathering spaces for youth and less affluent groups.

7K Improve social safety by investing in green, well-maintained walking routes and ensuring there are more "eyes on the street."

8K Include community input in neighborhood planning to create a more inclusive and user-friendly living environment.

**Het Geheim van de Tarwewijk**

Published in 2019
by Grandioos Media, RTV Rijnmond

Episode 24006
(07:00) Events are regularly organized at the Milinxpark playground, fostering community bonds among parents and children, with active involvement from the local police officer.

(11:00) The Tarwewijk is home to diverse cultures, with residents often forming communities around shared identities. For example, many Bulgarian Roma gather at a local Bulgarian supermarket.

Episode 24005
Take_a_way is an inspiring project where approximately 50 residents including volunteers, artists, neighbours, and undocumented individuals gather weekly to craft products, cook, and share meals.

Episode 24004
(03:10) During his analysis of the neighbourhood, Paul noticed a lack of sports participation. He therefore collaborated with the municipality to establish an outdoor sports park in the Balkonpark.

Episode 24003
The Samenhuis Ernaast is a unique Christian-inspired living community of four families sharing a building with a communal living room, rooftop terrace, and staircase while maintaining private apartments.

(09:00) Dennis Bouwen, a resident, advocates for more greenery in urban neighborhoods.

Episode 24002
In this episode, we meet Sander, who serves as a unifying factor for the residents of Tarwewijk. With a passion for community projects, he is ready to support residents in realizing their dreams for the neighborhood.
According to Sander, true connection comes from working together and getting hands-on.

(02:00) People can use the pavilion by the water to organize their own events.

(03:00) Different teams prepare meals each week and bring their own network.

(07:21) When a place isn't too expensive, it is much freer in use and allows for organizing things differently. The freedom everyone seeks in life only comes through taking responsibility.

(09:15) People from Charlois often come to the pavilion by the water to eat and attend performances.

(09:30) About 30-35 people have a key to the pavilion. These people do not necessarily know each other. There is no key manager. Places that are open for people to do things on their own, without financial interests, are disappearing from the city.

Episode 24001
Archell Thompson, a theater maker, raises awareness about poverty through his interactive play Poverty Escape, while Marjorie Malbons, once trapped in debt, now leads a foundation assisting people in financial distress.

Episode 23004
Seval, a longtime resident known as the "mother of the neighbourhood," organizes community activities like summer festivals to strengthen social bonds.

(04:00) The neighborhood council, elected to represent Tarwewijk residents, acts as a bridge between the community and city hall, implementing neighborhood improvements.

(05:30) The Tarwewijk is an accessible neighbourhood where everyone can feel at home. It is a lively area with many different people.

Episode 22006
(05:00) Residents express a need for a water station and a larger place to walk their dogs.

(11:00) The district's strengths lie in its residents and their diversity, as well as its spaciousness and lively atmosphere.

## Conclusions

1L The Tarwewijk fosters strong community bonds through regular events and projects by volunteers that bring together diverse groups of residents.

2L There is low amount of sports activity in the Tarwewijk and a need for more sports facilities, which led to the creation of an outdoor sports park.

3L The neighborhood is welcoming and accessible, with spaces like the pavilion by the water offering opportunities for self-organized events.

4L There is a demand for more green spaces and basic amenities such as water stations and dog-friendly areas.

5L Freely accessible spaces for community activities are disappearing, and there is a growing need for places that allow for self-organization without financial interests.

# DE DRAAIER OBSERVATIONS

De Draaier is a residential building designed by BETA, based on the principles developed in their Active Design in Buildings toolkit (2016). Their main interventions are an elevator, which only stops every 4th floor, causing the user to having to take maximum of 2 additional stairs to reach their appartment. The second is linking this elevator to 3 collective spaces called lobbys, which function as small collective living rooms for the residents. Additionally, the lobby elevator is right at the entrance and the regular elevator is more hidden.

I visited the building and observed and counted how many people took the lobby elevator and how many took the regular elevator. This indicates the effectiveness of such an intervention and evaluates whether people are influenced by it.

**Conclusions**

N1 When coming home, many people will consciously choose the sedentary option, in the case of elevators.

N2 Some elements showed to highly influence the path people take, in this case the mailbox and bicycle storage.

N3 When people are unfamiliar with an environment, they will choose whatever is the obvious choice, in this case the lobby elevator.

N4 When presented both options, some people will consciously choose the “healthy” option, in this case the lobby elevator.

N5 The communal spaces were unused during the timeframe of the observation. This might indicate it is not valued as much by the residents, or that it is only used during certain timeframes, for example weekends.

**Static Observation** Thursday 14/11 17:00 - 18:30

1. Normal elevator count: 10
   Lobby elevator count: 22 of which 4 coming from the bicycle storage.

   This means the lobby elevator was used by 55% of the people.

2. Many people pass by their mailbox, which is slightly closer to the other lift. What if the distance between the mailbox and the normal elevator was increased?

3. People who don't live in the building (and ring the doorbell) always use the lobby lift.

4. 18:40 No one is on the rooftop terrace. There are barely any pieces of furniture. It feels very empty, unappealing, and also quite small.

5. There are two staircases: One is relatively well-designed and connected to the hallways and lobbies. The other is a dark, concrete, enclosed space.

6. The overall interior of the hallways and stairs feels a bit cold. It doesn't feel very inviting.

7. The bicycle storage is placed in the back, this causes people coming from the storage to cross the normal elevator first. This might influence many people coming home by bicycle.

8. 4 people did pass the normal elevator, coming from the bicycle storage and took the lobby elevator.

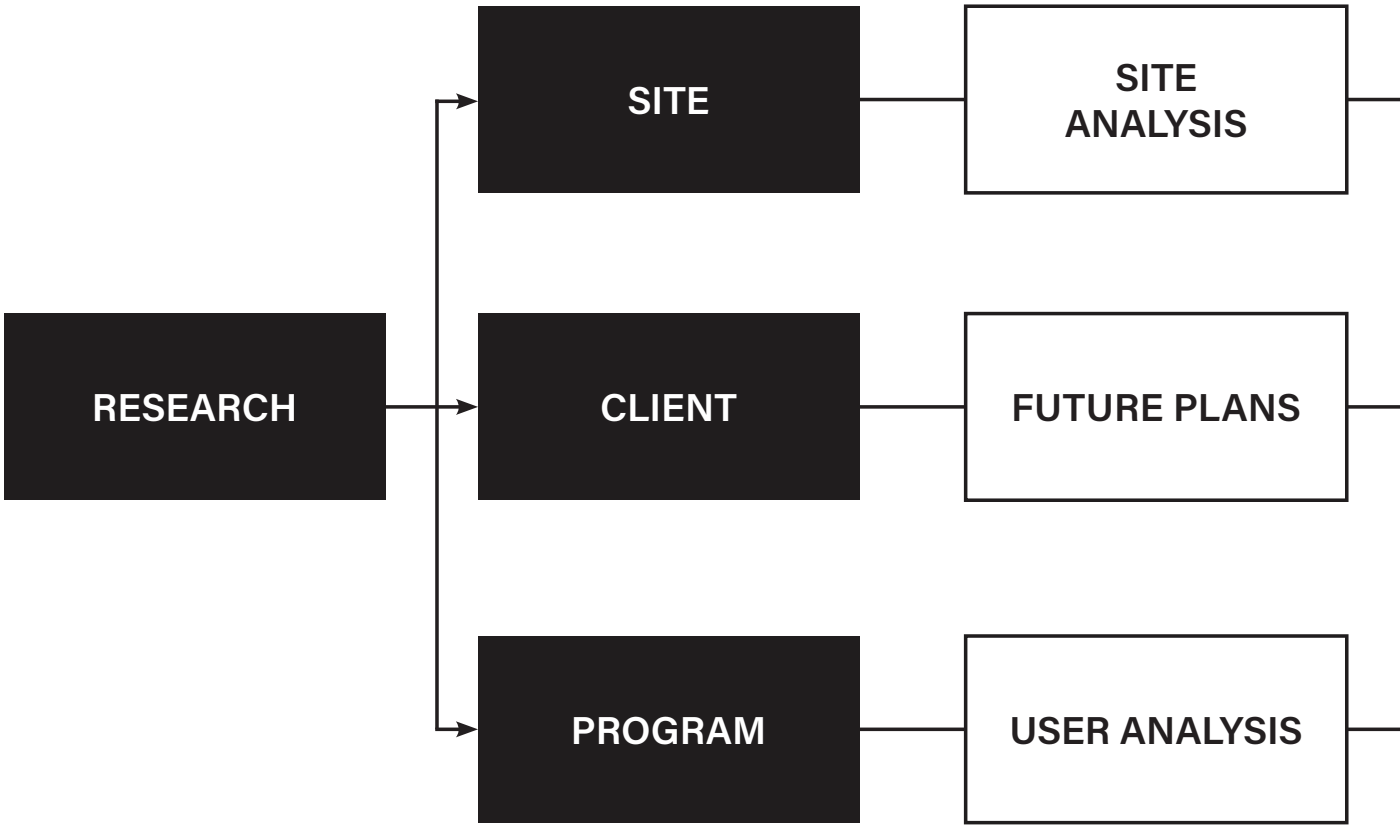
9. It is unknown whether the people who take the lobby elevator, take a stairs afterwards or not. And if they would have to take a stairs up or down.

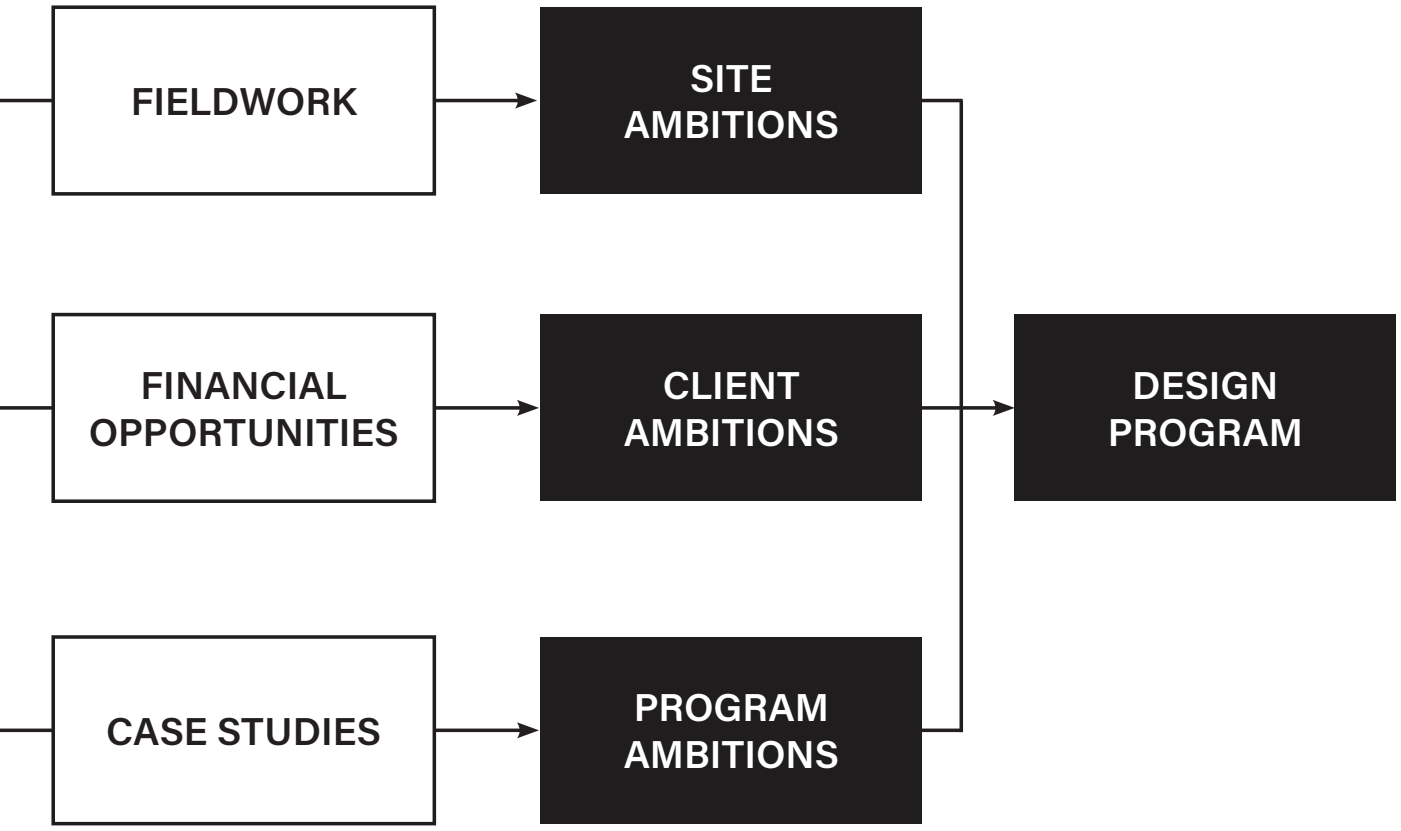
10. Many people (10) deliberately pass the lobby elevator after entering the building, going straight to the normal elevator.

11. The communal spaces have remained largely unused during this observational exercise. Possibly due to the time frame of my presence.

# PROGRAM DEVELOPMENT

# PROGRAM DEVELOPMENT STRUCTURE




FIELDWORK
SITE AMBITIONS
FINANCIAL OPPORTUNITIES
CLIENT AMBITIONS
DESIGN PROGRAM
CASE STUDIES
PROGRAM AMBITIONS

# THE SITE

The previous appendix included the site analysis and fieldwork, documenting the existing location, its users, and the potential strengths, weaknesses, and opportunities. Based on these analyses, the following program ambitions are defined for the site:

*The program aims to stimulate physical activity in response to the rising health issues in Rotterdam and the Tarwewijk (1A; 5A).*

*The program seeks to strengthen the connection between Zuidplein and the two new parks along the Maas (2A; 4A; 6B; 3D).*

*The program aims the strengthen the connection between eastern and western Tarwewijk (3D)*

*The program aims to increase local shops, amenities, small businesses, and offices, creating a mix of functions and economic opportunities for the Tarwewijk (1D; 5B; 3B; 1K).*

*The program intends to enhance the quality of greenery and walking routes in the Tarwewijk (4A; 2B; 7B; 9C; 8C; 2K; 3K; 7K).*

*The program seeks to reduce car dominance on the streets by contributing to (possibly temporary) alternatives for car parking (3A; 4B; 2D).*

*The program provides more freely accessible sports facilities for the neighborhood (2G; 3G; 4F; 3E; 5K; 6K).*

*The program supports community initiatives and organized events (4K; 8K; 2C; 7C; 2G; 1H).*

*The program utilizes the available scenic view from +4 floors to create an attractive public space and sports facilities (3E; 4D).*

*The program includes the existing football fields, but designed more multi-functional to stimulate social interaction and usage throughout the day (2F; 4F; 1G; 3G; 5F; 3F).*

# THE CLIENT

This chapter explores the possible client and what are related opportuinities and threats.
Due to the socio-economic challenges in the area (4C), it is essential that at least the sports facilities within the building are freely accessible to the public. This approach promotes higher participation among lower-income groups in the Tarwewijk (BETA, 2016). However, it also implies a more complex strategy for the building's development and financing. A hybrid development model, involving collaboration between the municipality and a private developer, would be a suitable solution. Since the program will be an office building, the client would either be a developer who builds an office as an investment, or a company who builds an office for itself.

The design location offers several financial opportunities, such as transforming the Mijnsherenlaan into a park with local shops and small businesses, and providing an alternative to car parking (3A; 4B; 2D). An adaptable alternative to car parking can be an attractive investment, especially as the municipality aims to reduce car ownership and usage in the coming years (Gemeente Rotterdam, 2023). A short-term solution to move cars out of sight could become obsolete in the future when car ownership declines. Designing the parking spaces to be transformable ensures long-term value while reducing street parking in the short term. A recent example of this strategy is a building designed by architecture firms Bruther + Baukunst in Paris, Saclay.
However, the municipality does not provide specific solutions for alternatives to street parking, as these are often highly location-specific. In the case of the Mijnsherenlaan in the Tarwewijk, the volume required for parking spaces could be utilized to achieve more height, allowing for the scenic skyline view from +4 levels. With this approach, temporary parking not only removes cars from the street in the short term but also creates additional value for the local community.

Another financial opportunity relates to the specifics of the program. This research focuses on redefining the sedentary environment of an office building. As mentioned in the first chapter, sports facilities in an office building can be designed to be financially beneficial. By separating the sports facilities from the workspaces, they can be rented out to generate additional income. In the case of the Tarwewijk, where many residents have low incomes, offering these facilities for free would provide significant value to the local community. This approach could also be financially appealing to developers or company owners, as the sports facilities could be integrated into a hybrid development model. By collaborating with the municipality, costs for providing these additional facilities for employees could be reduced.

Based on these findings, the following ambitions are defined from the perspective of the client:

*The program provides car parking, to reduce street parking in the Mijnsherenlaan.*

*The program has a separation between the workspaces and sports facilities, allowing them to be rented out or to be used as public facilities outside of working hours.*



*Figure 24: Reversible student housing Saclay*

# THE PROGRAM

This chapter summarizes the principles found during the theoretical research which can be leveraged to stimulate physical activity and social interaction. Based on these findings, the following program ambitions are defined:

*The program includes communal spaces desgined specifically for physical activity (BETA, 2016).*

*The program includes showers and changing rooms (BETA, 2016).*

*Public sports facilities will be designed for multiple target groups, including different types of sports and nearby playgrounds for children (BETA, 2016).*

*The sports facilities will be designed in a highly visible location (BETA, 2016).*

*The program will include a visible bicycle parking on the groundlfoor (BETA, 2016).*

*The program will utilize the scenic view for the attractiveness of the sports facilities (BETA, 2016).*

*The program will allow functions which are unused during parts of the day to be utilized for the community (CRa & RVS, 2022).*

*The program will include functions where residents can easily meet, such as sports, co-working spaces, café, common rooms (CRa & RVS, 2022).*

*The program will strive for multi-functionality in functions, sitmulating social encounters (CRa & RVS, 2022).*

Continuing from these principles, the specific definition of the program and its required m2 will be based on a combination of case studies and the analysis of the site. The analysis of the site will define the boundary of what the site can handle in terms of volume. The boundary is defined with the following aforementioned program principles in mind:

*The program will utilize the scenic view for the attractiveness of the sports facilities (BETA, 2016).*

*The sports facilities will be designed in a highly visible location (BETA, 2016).*

*The program aims the strengthen the connection between eastern and western Tarwewijk (3D).*

The defined volume boundary results in the following available area:

| |
|---|
| ROOFTOP: 3080 M2 |
| FLOORS: 5010 M2 |
| PLINTH: 1670 M2 |
| UNDERGROUND: 1350 M2 |

| |
|---|
| TOTAL: 9440 M2 |

The following pages will continue with the analysis of multiple projects with related program. The program of these case studies, in combination with the defined principles in this chapter wil determine the final program.

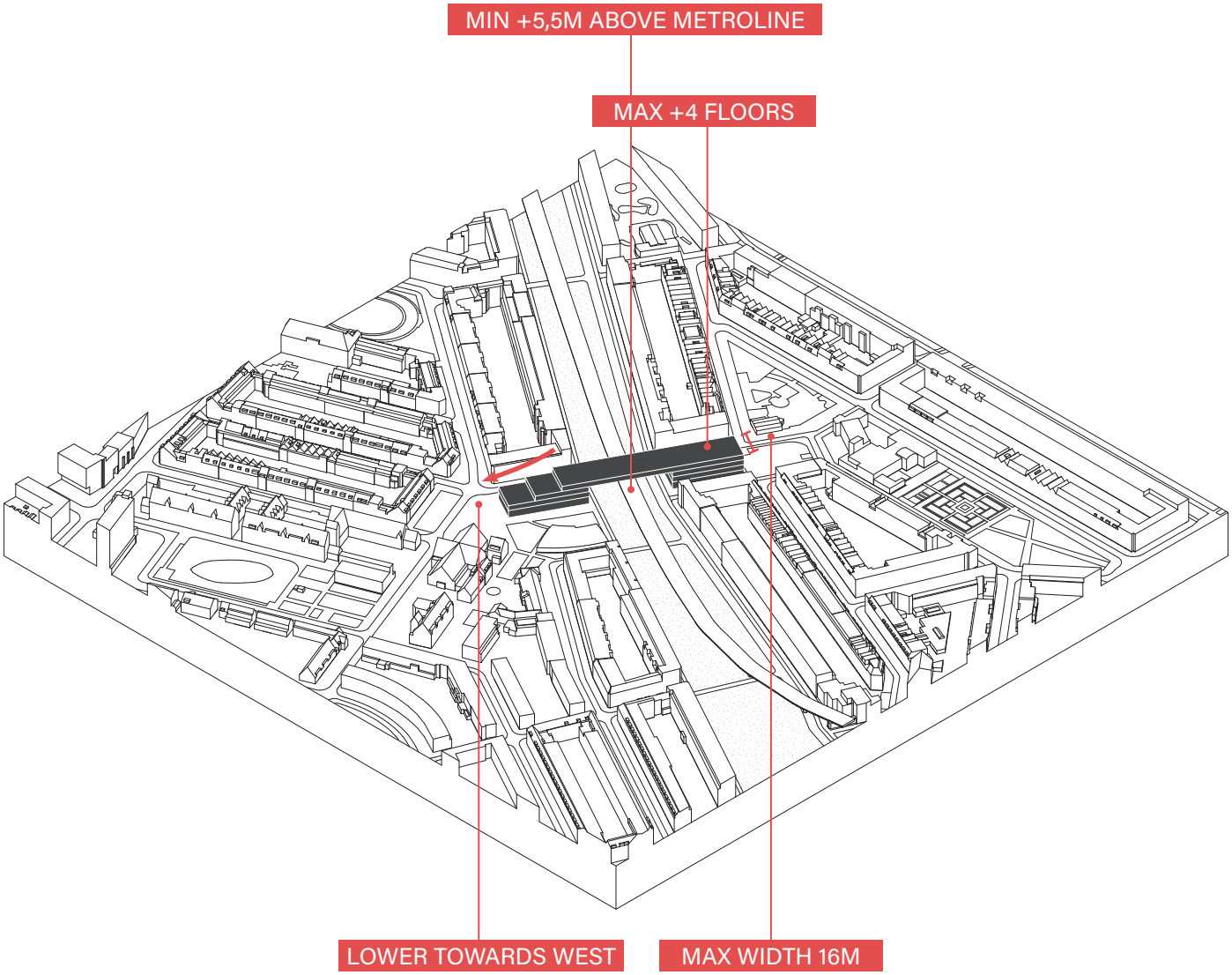



*Figure 25: Site volume boundary*

# JAJA ARCHITECTS, PARK 'N PLAY

*Rooftop program case study*

**PARK 'N PLAY**

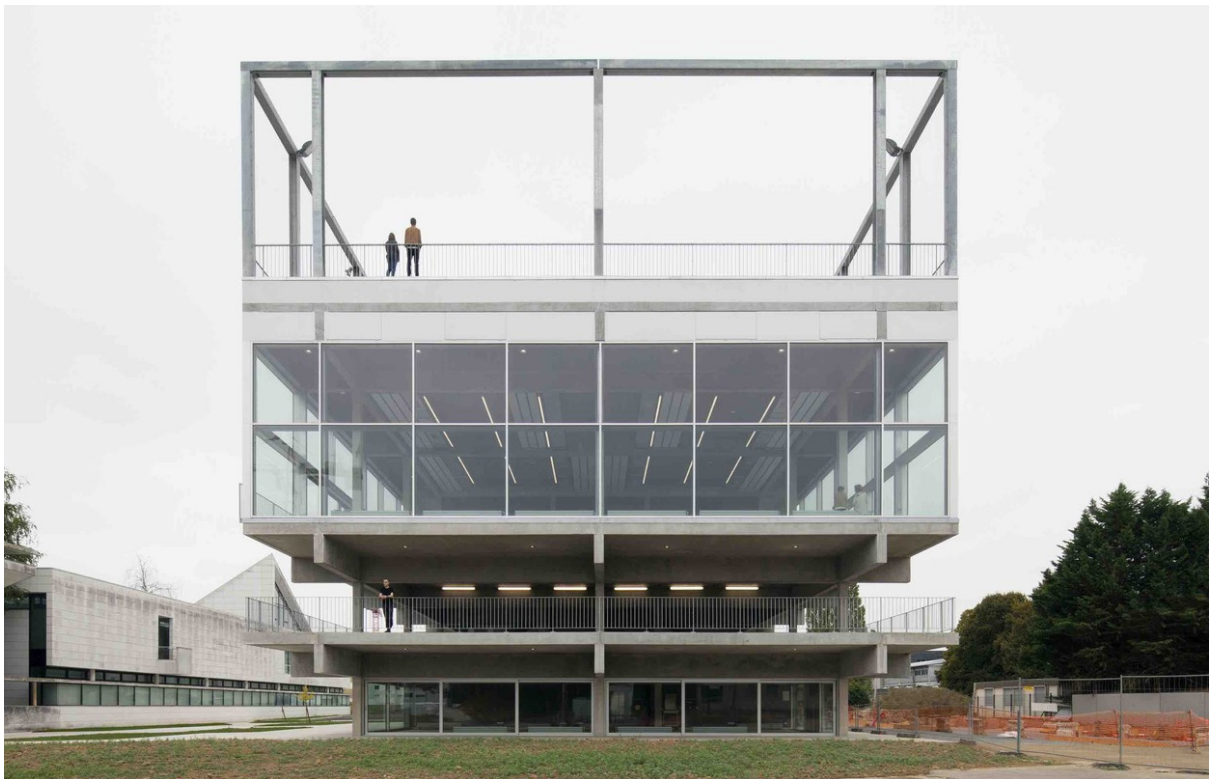
| | |
|---|---|
| Architect: | JAJA Architects |
| Program: | Activity rooftop on parking garage |
| Location: | Nordhavn, Copenhagen |
| Year: | 2014 - 2016 |
| Area: | 18,750 m2 |
| Floors: | 7 |
| Width: | 35 m |
| Length: | 73 m |

| | | |
|---|---|---|
| Parking | 11,520 m2 | 61 % |
| Circulation | 3360 m2 | 18 % |
| Playground | 1900 m2 | 10 % |
| Technical | 1470 m2 | 8 % |
| Greenery | 500 m2 | 3 % |

(JAJA Architects, 2014)

# MUOTO, PUBLIC CONDENSER

*Rooftop program case study*



**PUBLIC CONDENSER**

Architect: Muoto
Program: School

Location: Paris, Saclay
Year: 2017
Area: 4097 m2
Floors: 4

Width: 22 m
Length: 48 m

(only sports rooftop)

(Muoto, 2017)

| | | |
|---|---|---|
| Sports | 904 m2 | 54 % |
| Open space | 435 m2 | 26 % |
| Circulation | 230 m2 | 15 % |
| Storage | 41,5 m2 | 2,5 % |
| Technical | 41,5 m2 | 2,5 % |

# XDGA, MELOPEE SCHOOL

*Rooftop program case study*


**MELOPEE SCHOOL**

| | |
|---|---|
| Architect: | XDGA |
| Program: | School |
| Location: | Brussels |
| Year: | 2020 |
| Area: | 4630 (playground 2025) m2 |
| Floors: | 5 |
| Width: | 11.8 m (playgrond width) |
| Length: | 40 m (playground length) |

| | | |
|---|---|---|
| Playground | 1500 m2 | 74 % |
| Sports | 243 m2 | 12 % |
| Garden | 142 m2 | 7 % |
| Circulation | 117 m2 | 6 % |
| Toilets | 6 m2 | 1 % |
| Storage | 12 m2 | |
| Technical | 5 m2 | |

(XDGA, 2020)

# BRUTHER + BAUKUNST, FRAME

*Office program case study*

**FRAME**

| | |
|---|---|
| Architect: | Bruther, Baukunst |
| Program: | Office |
| Location: | Brussels |
| Year: | 2018 - 2025 |
| Area: | 5,485 m2 |
| Floors: | 6 |
| Width: | 15 m |
| Length: | 65 m |

| | | |
|---|---|---|
| Closed workp. | 2,250 m2 | 41 % |
| Open workp. | 2,850 m2 | 52 % |
| Toilets | 150 m2 | 3 % |
| Circulation | 225 m2 | 4 % |

(Cecilia & Levene, 2018)

# CIVIC, LOCHAL

*Office program case study*

**LOCHAL**

| | |
|---|---|
| Architect: | CIVIC Architects |
| Program: | Library, offices, horeca, study, workshops, meeting rooms |
| Location: | Tilburg |
| Year: | 2017 |
| Area: | 11,200 m2 |
| Floors: | 2 |
| Width: | 60 |
| Length: | 90 |

| | | |
|---|---|---|
| Office | 2200 m2 | 41 % |
| Study | 940 m2 | 18 % |
| Events | 920 m2 | 17 % |
| Workshop | 580 m2 | 11 % |
| Café/Bar | 380 m2 | 7 % |
| Cores | 200 m2 | 4 % |
| Meeting | 100 m2 | 2 % |

# OMA, BLOX

*Office program case study*

**BLOX**

| | |
|---|---|
| Architect: | OMA |
| Program: | DAC, offices, housing, retail, restaurant |
| Location: | Copenhagen |
| Year: | 2018 |
| Area: | 22.500 m2 |
| Floors: | 6 |
| Width: | 72 m |
| Length: | 73 m |

| | | |
|---|---|---|
| Office | 7900 m2 | 35 % |
| Exhibition | 4400 m2 | 20 % |
| Parking | 4450 m2 | 20 % |
| Housing | 3250 m2 | 14 % |
| Storage | 1500 m2 | 6 % |
| Restaurant | 600 m2 | 3 % |
| Playground | 400 m2 | 2 % |

# GROUP A, KEILEPAND

*Office program case study*

**KEILEPAND**

| | |
|---|---|
| Architect: | GROUP A |
| Program: | Co-working, climbing hall, workshops, horeca, exhibition |
| Location: | Rotterdam |
| Year: | 2021 |
| Area: | 13.945 m2 |
| Floors: | 3 |
| Width: | 48 |
| Length: | 100 |

| | | |
|---|---|---|
| Workshops | 1175 m2 | 50 % |
| Co-working | 2350 m2 | 17 % |
| Communal | 2045 m2 | 15 % |
| Exhibition | 1165 m2 | 8 % |
| Climbing | 1175 m2 | 8 % |
| Core | 230 m2 | 2 % |

# MODISTE, HET INDUSTRIEGEBOUW

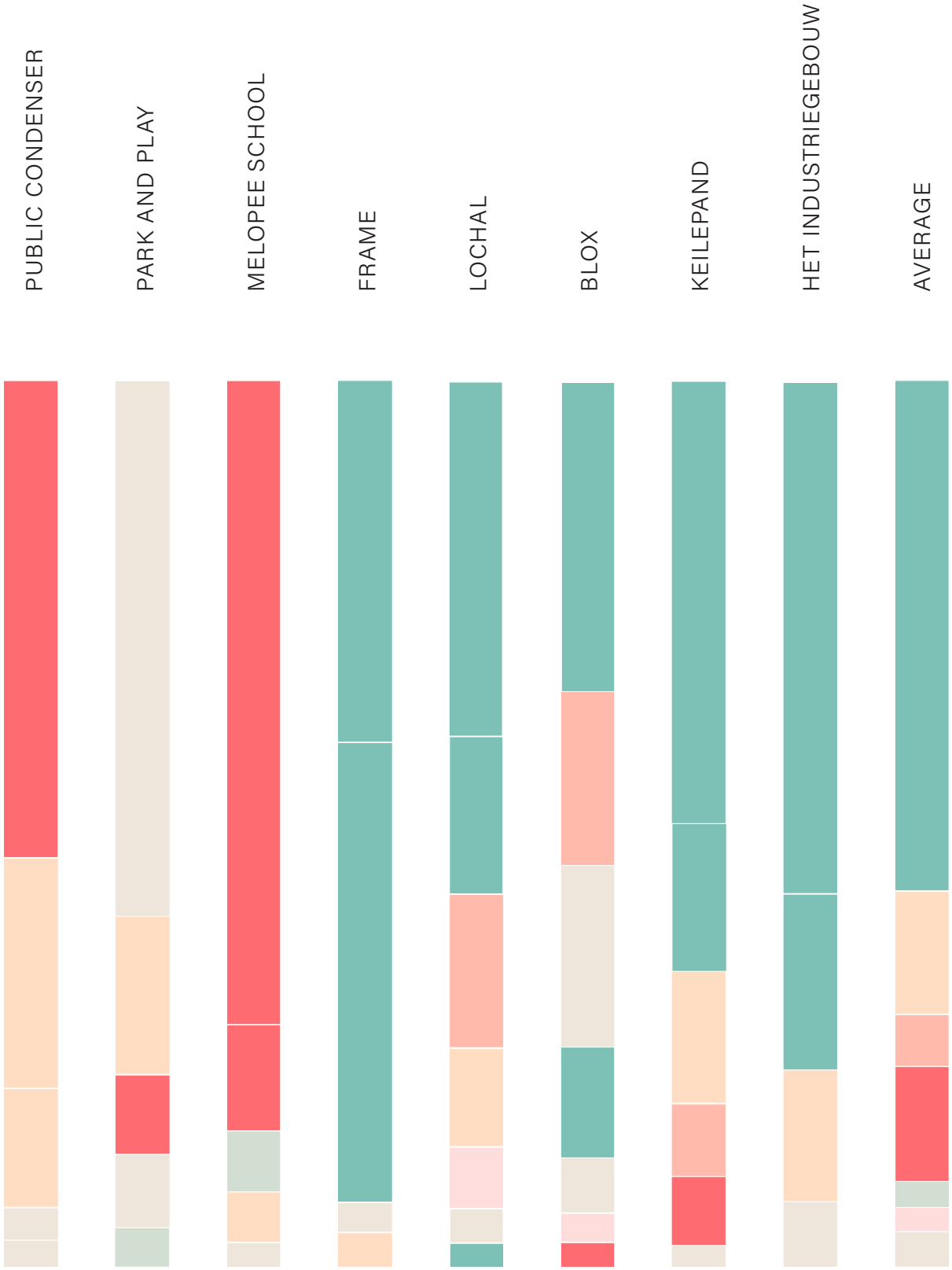
*Office program case study*

## HET INDUSTRIEGEBOUW

| | |
|---|---|
| Architect: | MODISTE, MVRDV |
| Program: | (Co-)offices, shops |
| Location: | Rotterdam |
| Year: | 2018 |
| Area: | 3240 m2 (1 floor) |
| Floors: | 3 |
| Width: | 50 m |
| Length: | 110 m |

| | | |
|---|---|---|
| Closed workp. | 1890 m2 | 58 % |
| Open workp. | 650 m2 | 20 % |
| Circulation | 500 m2 | 15 % |
| Cores | 200 m2 | 7 % |

# CASE STUDIES SUMMARY



# FINAL PROGRAM

| ROOFTOP: 3080 M2 | FLOORS: 5010 M2 | UNDERGROUND: 1350 M2 | TOTAL: 9440 M2 |
|---|---|---|---|

49 %

14 %

20 %

8%

10%

| Office | 4680 m2 |
|---|---|
| Private workingspaces | 250 m2 |
| Meeting rooms | 250 m2 |
| Small offices | 3240 m2 |
| Circlation | 940 m2 |

| Sports | 1320 m2 |
|---|---|
| Playground | 100 m2 |
| Multi-purpose Sportsfield | 1120 m2 |
| Calisthenics Park | 100 m2 |

| Storage | 1890 m2 |
|---|---|
| Bicycle storage | 300 m2 |
| Sports equipment storage | 150 m2 |
| Office storage | 30 m2 |
| Technical | 60 m2 |
| Car parking | 1350 m2 |

| Communal Spaces | 750 m2 |
|---|---|
| Lunch Room | 200 m2 |
| Coffee corners | 50 m2 |
| Printer rooms | 50 m2 |
| Toilets, showers, changing rooms | 450 m2 |

| Commercial | 900 m2 |
|---|---|
| Fitness | 350 m2 |
| Restaurant | 300 m2 |
| Coffee bar | 250 m2 |