



ARCHITECTURE FOR INTROVERTS

AN ANALYSIS OF OFFICE SPACES AND PSYCHOLOGICAL RELATIONSHIPS



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An analysis of office spaces and
psychological relationships

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ABSTRACT

There are different types of people. Some are more social, others more reserved. Some love to spend time with large groups of friends, others prefer the company of a book. The psychology field has been trying to understand what makes people different from each other, and many personality theories were created. The terms introversion and extroversion are a recurring concept and major differences exist between these two groups. By understanding the general idea of some personality theories that develop this concept, and its reflection in the human culture itself, a deeper knowledge can be achieved and, with it, a better analysis of how it can influence architecture.

The aim of this work is to understand what differentiates an introverted person from an extroverted one, which are their needs and preferences, and how society, over the history, tends to see them as a problem, as something to be “corrected”. After, by conducting a research on workplaces in office buildings, investigate how an introverted person would feel in some of these spaces, for then, identify characteristics and strategies that can create an adequate office environment.

The last part of this work is a practical application of the research conducted, by designing an office building in a large city, considering the best attributes identified to create an innovative office space.

Keywords: Introversion, Psychology, Personality, Office, Workplace, Privacy.

RIASSUNTO

Ci sono diversi tipi di persone. Alcuni sono più socievoli, altri più riservati. Alcuni amano passare il tempo con grandi gruppi di amici, altri preferiscono la compagnia di un libro. Il campo della psicologia ha cercato di capire cosa rende le persone diverse l'una dall'altra e sono state create molte teorie sulla personalità. I termini introversione ed estroversione sono un concetto ricorrente ed esistono grandi differenze tra questi due gruppi. Comprendendo l'idea generale di alcune teorie della personalità che sviluppano questo concetto e il suo riflesso nella stessa cultura umana, si può ottenere una conoscenza più profonda e, con essa, una migliore analisi di come questo può influenzare l'architettura.

Lo scopo di questo lavoro è capire cosa differenzia una persona introversa da una persona estroversa, quali sono i suoi bisogni e le sue preferenze, e come la società, nel corso della storia, abbia sempre teso a vederli come un problema, come qualcosa da "correggere". Successivamente, conducendo una ricerca sui luoghi di lavoro negli edifici per uffici, il lavoro studia come una persona introversa si può sentire in alcuni di questi spazi, per poi identificare caratteristiche e strategie che possono creare un ambiente di ufficio più adeguato.

L'ultima parte di questo lavoro è un'applicazione pratica della ricerca condotta, attraverso la progettazione di un edificio per uffici in una grande città, considerando i migliori attributi identificati per creare uno spazio ufficio innovativo.

Parole chiave: introversione, psicologia, personalità, ufficio, luogo di lavoro, privacy.

RESUMO

Existem diversos tipos de pessoas. Algumas são mais sociais, outras são mais reservadas. Algumas gostam de passar o tempo com grandes grupos de amigos, outras preferem a companhia de um livro. O campo da psicologia tem tentado entender o que faz as pessoas diferentes umas das outras, e muitas teorias da personalidade foram criadas. Os termos introversão e extroversão são conceitos recorrentes e existem grandes diferenças entre esses dois grupos. Compreendendo a ideia geral de algumas teorias de personalidade que desenvolvem esse conceito, e sua reflexão na própria cultura humana, um conhecimento mais profundo pode ser alcançado e, com isso, uma melhor análise de como ele pode influenciar a arquitetura.

O objetivo deste trabalho é compreender o que diferencia uma pessoa introvertida de uma extrovertida, quais são suas necessidades e preferências, e como a sociedade, ao longo da história, tende a vê-las como um problema, como algo a ser “corrigido”. Depois, conduzindo uma pesquisa sobre locais de trabalho em edifícios de escritórios, investigar como uma pessoa introvertida se sentiria em alguns desses espaços, para então identificar características e estratégias que possam criar um ambiente de escritório adequado.

A última parte deste trabalho é uma aplicação prática da pesquisa realizada, projetando um edifício de escritórios em uma cidade grande, considerando os melhores atributos identificados para criar um espaço de escritório inovador.

Palavras-chave: Introversão, Psicologia, Personalidade, Escritório, Local de Trabalho, Privacidade.

PART I
THEORETICAL STUDY

INTRODUCTION

Architecture for Introverts. The choice of this theme is due to my identification as an introvert and the perception that spaces for these people are not common in architectural projects, especially in workplaces and educational spaces. In order for the introvert to achieve his best performance, he needs spaces that allow his solitary and independent work (FEIST, 1999). However, such spaces have become increasingly scarce, with more open-spaces offices - without walls - and classrooms arranged in groups of desks. I see these characteristics from my own experience, at the atelier rooms in the university where I have studied; as in the company where I worked, with an open concept office and fixed work tables located side by side.

This question is not an isolated architecture case, but it is a reflection of the culture of society itself, which from the twentieth century came to value extroversion and see introversion as a “problem” (SUSMAN, 2003; NICHOLSON, 1998). A quiet person with a soft, even shy voice is encouraged to be “looser”, to go out more, to participate more (not only by relatives or friends, but by the very way of acting of companies and schools), making them feel bad, either by accepting that it is “strange” or by modifying its personality to suit the culturally desirable model (CAIN, 2012).

And what is introversion? What is the difference of extroversion?

These two terms appear in almost all personality theories, and they are considered a determining factor to define personality. Whether taking into consideration the ideas of the Psychological Types or Psychological Traits perspective, there is considerable evidence regarding the differences between introversion and extroversion, and their different needs and desires.

According to researches, a large part of the population - one-third to one-half - is introverted (BAYNE, 1995). However, the most important institutions, such as offices and schools, are usually designed focusing an extrovert approach. In addition, the idea of group thinking is increasingly being disseminated, which considers that all creativity and productivity come from a gregarious place (CAIN, 2012). How does the introvert feel in this super-stimulating world that values teamwork as an indispensable requirement? And how is their physical-spatial relationship to the environment?

For a long time, the offices were organized in a way to house one or two employees in a private space, enclosed by walls, equipped with the necessary instruments to carry out their work (DANIELSSON & BODIN, 2008). But since the 1950s a new model was put into practice - the open office, characterized by the lack of partition walls, expanding the space to house more employees in individual workstations arranged in groups (BRENNAN, CHUGH, & KLINE, 2002; BROOKES & KAPLAN, 1972). Since then, it has been estimated that over 70% of today's employees work in this type of office (DAVIS, LEACH, & CLEGG, 2011). This physical-spatial shift is partly due to the belief that creativity and achievement are accomplished in a sociable place, through teamwork and peer communication. This thought overlooks that there are those who need personal space to develop better, who require fewer distractions and external stimuli to focus on.

The same happened with schools, especially elementary schools. The traditional rows of desks facing the teacher have been replaced by cores of four or more desks joining together to facilitate numerous group learning activities (CAIN, 2012). This occurred as a reflection of the office model as a way to prepare children for a new style used in the workplace, which they would be introduced in the future.

Although there is all this diffusion of the collective work, there is a series of studies, carried out

by professionals of the area, whose results prove the inefficiency of the open offices (BRENNAN, CHUGH, & KLINE, 2002; MCELROY & MORROW, 2010; DAVIS, LEACH, & CLEGG, 2011) and of schools that implement learning in "cooperative" (BERNS, 2009; MCCROSKEY, 1980).

For this reason, this Thesis has as main objective to recognize the particular characteristics of the individual from the point of view of psychology, analyzing two main personality theories, in order to guarantee their physical and emotional well-being and, therefore, psychic when developing their activities in the professional and academic environments.

Physical spaces that respect these differences can already be found in some innovative companies, such as Google and Microsoft, that provide spaces for different work styles - from individual stations to large, team-based workrooms. However, the vast majority of corporations still have their spaces distributed so as to favor a more extroverted way of working. Thus, the focus of this study will be on research on what differentiates the introvert from the extrovert, in the psychological and cultural spheres, in order to relate how they interact with the constructed space.

The method that will be applied in the development of this Thesis will seek to integrate research in the field of psychology with studies of organizational models of workspaces, being divided into the following stages:

I. Human psycho-cultural natures - Introversion vs. Extroversion

A psychological explanation of different personalities theories; the introverted from the neuroscientific point of view; a brief history that demonstrates cultural changes over time to the "ideal type"; the new trends of group work and their impacts on the introverted; the importance of solitude; considerations about brainstorming.

II. Offices' physical-spatial natures

A historical overview on the evolution of office towers and workspaces in office buildings; considerations about the open office, its risks, benefits and health impacts; how the transition from traditional office to open office affects employees based on a longitudinal study; and the difference between workplace and workspace.

III. Psycho-spatial natures – the introvert in the office spaces

An analysis that integrates the architectural and psychological aspects, investigating eight offices from different locations and historical periods, in order to relate their spatial characteristics to the point of view of an introvert employee; the development of a case study, which evaluates an office regarding the physical-spatial relationship with its employees - how they feel in the workplace from the application of a questionnaire.

IV. Innovative office design

Identifying the main strategies to create an office environment that support the employee: which are characteristics of the innovative workplace; the importance of sustainable workplaces; the importance of privacy; considerations about outside view quality; which are the impact of colors in the office space and recommended the design actions to develop a successful workplace.

V. Conclusion – Workplace matters

After all the analysis, involving both architecture and psychology aspects, a synthesis of the work conducted, involving a critical conclusion of the importance of workplace on its users.



Img. 1 - The 16 Myers-Briggs personality types (from: <http://thewireless.co.nz/themes/knowledge/myers-briggs-a-blunt-instrument-but-not-out-of-tune>)

1. HUMAN PSYCHO-CULTURAL NATURES: INTROVERSION vs EXTROVERSION

1.1. Psychological approach

Psychology is a field that covers a big spectrum of topics. Its own definition has been long debated among psychologists, but the most adequate one is that it is a “science of mind and behavior”. It can be considered as a bridge between philosophy and physiology (BENSON, et al., 2012). While the physiology describes and explains the physical conformation of the brain and the nervous system, the psychology examines the mental processes that there take place and how they manifest themselves in our thoughts, speech, and behavior. While the philosophy worries with reasoning and ideas, psychology worries in how they occur and what they say about the mind operation.

Many psychological chains were developed, with different approaches, but almost all dealt with the question of human singularity. Mind and behavior aspects have been long investigated, and common characteristics among all of us tried to be identified. Philosophers and scientists always considered that it is the differences in psychological structures that define us as individuals.

Personality theories have been developed for a long time. Ancient Greek physician Hippocrates (460-370 B.C.) believed personality manifested itself in four different humors, and, basically, you are who you are because of your balance of phlegm, blood, and yellow and black bile (BENSON, et al., 2012). Two hundred years later, Galen expanded this theory and said that there was a direct relation between the body's humors levels and the emotional and behavioral inclinations – or “temperament”. His four temperaments – sanguine, phlegmatic, choleric and melancholic – are related to the body's humors balance.

It's during the XX century that personality became a target of a truly scientific study (BENSON, et al., 2012). After years of research and debates, many psychologists, as Sigmund Freud, Abraham Maslow, Raymond Cattell, Ernest Tupes, Raymond Christal and Hans Eysenck, contributed to the development of a personality theory. A definitive and universal theory has not been created yet, however, there are those theories that are more accepted than others. Two main personality school of thoughts are the Psychological Types and Psychological Traits.



Img. 2 - The four humors aligned with different characteristics and foods. Pictured here, going clockwise from upper left, are phlegmatic (cold and moist), sanguine (warm and moist), choleric (warm and dry) and melancholic (cold and dry) (from: www.arsgravis.com/UserFiles/image/Andrigino_NOU/androgino7.jpg)

1.1.1. Psychological Types

Many typological systems have been created since the antiquity. Those systems, according to Zacharias (1995), are based in the direct observation of human behavior and in a set of magic/religious and philosophical representations. In the vast classification of psychic types, the Typology of Carl Jung is a great example. During ten years, Jung dedicates himself to a detailed study of types approached by literature, mythology, philosophy and especially psychopathology, in which he used as a base to the development of a typological system.

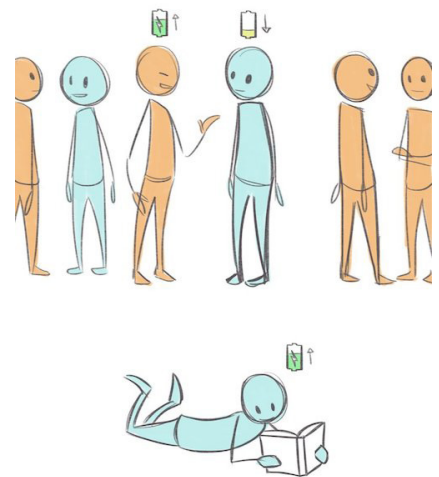
In 1921 he publishes his book “Psychological

Types”, in which he introduces the concept of psychic energy and the attention how each person is oriented preferentially in the world. The Jungian Typology gives a description of four functions: thought, feeling, intuition and sensation; besides two attitudes: extroversion and introversion.

The general types of attitude are distinguished by their peculiar behavior towards the object. While the introvert is concerned with removing the libido - psychic energy - from the object to prevent itself against a superpower of this, the extrovert has a positive behavior towards the object, affirming its importance insofar as it directs to it its subjective attitude. Therefore, the concept of extroversion and introversion is based on the way in which the movement of psychic energy in relation to the object is processed. In extroversion the libido flows towards the object; in introversion, the libido retreats in front of the object.

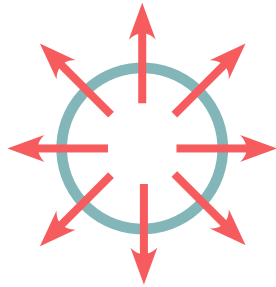
In his model, the differences between personalities basically boiled down to energy: extroverted people are energized by social interactions, while this would be energetically exhausting for introverts. Jung (1991) states that it is not possible to be completely introverted or totally extroverted - according to him, “this person would be in the asylum.”

However, it is important to emphasize that one attitude does not exclude the other. All have a capacity for both, but only one predominates in the personality, tending to direct the behavior and the consciousness of the person. Therefore, a normal extroverted attitude does not mean that the person behaves at all times according to the extroverted scheme (with the focus on the object), as well as a normal introverted attitude does not mean that the person directs all the time his attention to the subjective factors (the “self”). The non-predominant attitude continues influent and it becomes part of the personal unconsciousness, maybe affecting his behavior (MORALES, 2004, p. 102).

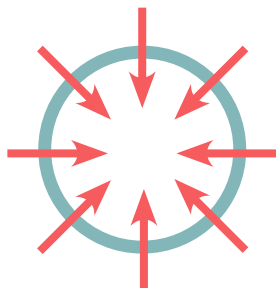


Img. 3 – Extroverts and Introverts
(from: <https://www.deviantart.com/yanguchitzure/art/Introvert-505521198>)

¹ For Carl Jung, *libido* means psychic energy, or the same energy intensity of psychic content, a concept different from Freud, which proposed that the libido was basically a sexual energy.



EXTROVERSION (E)
the natural focus is the external world



INTROVERSION (I)
the natural focus is the internal world

• **The Extroversion Attitude**

According to Jung (1991), each person is guided by the data that the outside world gives them. It speaks of an outgoing attitude, if usual, when the orientation of the object and the given objective is predominant so that decisions and actions are determined by objective circumstances and not by subjective opinions.

Carl Jung writes in his book that the extroverted type lives in such a way that the object, as a determining factor, plays in his conscience a much larger role than his subjective opinion. Their whole consciousness looks out because important and decisive determination always comes to you from the outside (CAMPOS, 2005, p. 45).

The extroverted type is attracted to the outer life of people and activities, they immerse themselves in the events around it and does not take much into account the reality of their needs and subjective precisions. According to Zacharias (1995), the psychic energy is directed to the outside world, of the objects and phenomena. They experience the world before they understand it and speech is their best way of expression.

• **The Introversion Attitude**

As Jung (1991) describes, the introvert behaves towards the object as if it possessed a power over it, so they must defend themselves. Their world is their inner, their subject; they're guided mainly by subjective factors. The superiority position of subjectivity in consciousness means a devaluation of the objective factor. To the introvert, the world presents itself as frightening and dangerous, so they protect themselves behind their inner world.

Jung writes that introversion is the turning up into the libido. This expresses a negative relation between subject and object. Interest does not go to the object, but it withdraws and goes to the subject. Those who have an introverted attitude think, feel and

act in order to make it clear that the motivator is the subject, while the object receives only secondary value (CAMPOS, 2005, p. 46).

The introverted type focuses their attention on their inner world of thoughts, impressions, and feelings; focus on the meaning they draw from events around them. The introvert has their psychic energy turned inward, tending to understand the world before experiencing it. They have greater ease with writing and an inner life rich in images and impressions.

• The functions

Despite the attitudes “introversion” and “extroversion” allow the distinction between two groups of individuals in the psychological sense, Jung considered that division as shallow and generic that it doesn’t allow more than a distinction equally generic (MORALES, 2004, p. 104-105). According to him, people can also be distinguished according to their basic psychological functions.

“The conscious psyche is an apparatus for adaptation and orientation, and consists of a number of different psychic functions. Among these we can distinguish four basic ones: *sensation, thinking, feeling, intuition*. Under sensation I include all perceptions by means of the sense organs; by thinking I mean the function of intellectual cognition and the forming of logical conclusions; feeling is a function of subjective valuation; intuition I take as perceptions by way of unconscious, or perception of unconscious contents.”

(JUNG, as cited in MORALES, 2004, p. 105)

In this way, “sensing” (S) and “intuition” (N) would be the two ways of receiving information about something (perception); and “thinking” (T) and “feeling” (F), the two ways to assess something (judgment). The preference for functions is independent of the attitudes, in the same way, any kind of judgment and align with any kind of perception. Being so, there are four combinations:

ST – sensing + thinking

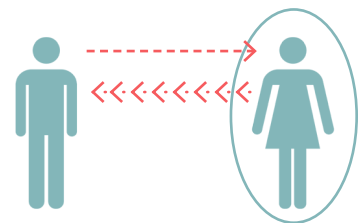
SF – sensing + feeling

1 — 2 — 3

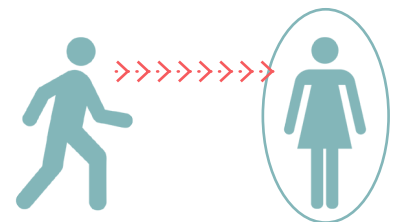
SENSING (S)
taking in and presenting information
in a sequential, step-by-step way



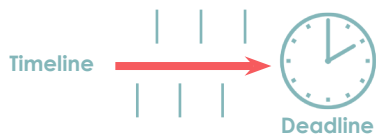
INTUITION (N)
taking in and presenting information
in a snapshot or big-picture way



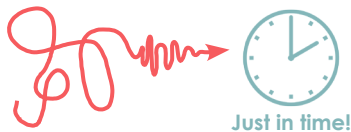
THINKING (T)
making decisions by stepping back from
the situation, taking an objective view



FEELING (F)
making decisions by stepping into the
situation, taking an empathetic view



JUDGING (J)
a planned approach to meeting the deadline in a scheduled way



PERCEIVING (P)
a spontaneous approach to meeting the deadline with a rush of activity

NF – intuition + feeling

NT – intuition + thinking

As said by Isabel Myers and Peter Myers, each one of these combinations produces a different personality, characterized by interests, values, needs, habits of thought and apparent traits that result naturally from them (MORALES, 2004, p. 108). This model gave origin to the eight types originally described by Jung in his book “Psychological Types”. Later, two North-American researchers, Katharine Briggs and Isabel Briggs Myers, added another preference: the choice between a Perceptive Attitude (P) and a Judgmental Attitude (J) as a way to live, to deal with the world. The result of all these combinations make the sixteen psychological types, that can be evaluated through the Myers-Briggs Type Indicator (MBTI) questionnaire.

ISTJ	ISFJ	INFJ	INTJ
ISTP	ISFP	INFP	INTP
ESTP	ESFP	ENFP	ENTP
ESTJ	ESFJ	ENFJ	ENTJ

• **Introversion vs Extroversion**

Isabel Briggs Myers and Peter B. Myers (1980) present in their work “Gifts Differing: Understanding Personality Type” a comparison between the two attitudes, presented as follow:

EXTROVERSION	INTROVERSION
They think later. They can't understand life unless they live it first.	They think before. They can't live life unless they first understand it.
Relaxed and confident attitude. They hope the water proofs to be shallow and dive into new and untried experiences.	Reserved and questioning attitude. They hope that the water proofs to be deep and make a pause to analyze the new.
Outward-directed minds, interest and attention follow objective events, first those closest. Their true world is, therefore, the outer world of people and things.	Inner-directed minds, often unconscious of the objective environment, interest and attention augmented by internal events. Their true world is, therefore, the world of ideas and understanding.
The civilizing genius, the people of action and practical achievements, who go from doing to thinking and doing it again.	Cultural genius, people of ideas and abstract inventions, who go from thinking to doing and thinking again.
The conduct on essential matters is always governed by objective conditions.	The conduct on essential matters is always governed by subjective values.
They generously dedicate themselves to external demands and to the conditions which to them mean life.	They defend themselves as much as they can from external demands and conditions in favor of their inner life.
Understandable and accessible, often sociable, much more at ease in the world of people and things than in the world of ideas.	Subtle and impenetrable, often taciturn and shy, much more at ease in the world of ideas than in the world of people and things.
Expansive and less passionate, they unburden their emotions as they arise.	Intense and passionate, they repress their emotions and guard them with care as highly explosive.
A typical weakness is the tendency to intellectual shallowness, very strong in extreme types.	A typical weakness is the tendency to impracticability, very strong in extreme types.
Their health and integrity depend on the reasonable development of balancing introversion.	Their health and integrity depend on the reasonable development of balancing extroversion.

Table 1 – Differences between people with preference towards extroverted or introverted attitude.
(Source: Myers & Myers, as cited in MORALES, 2004, p. 104)

1.1.2. Psychological Traits

Regarding the concept of traits, they're understood by Atkinson et al. (1995) as continuous dimensions, assuming that people vary simultaneously in many dimensions of personality, or scales. To a global description of personality, it's necessary to know the individual classification in many scales and how much of each trait one has. It will allow to characterize consistency in their behavior and then predict how he/she would respond to some situations.

Nunes (2000) says, in his studies, that personality and its evaluation is linked to the natural language and to the main principles of the Traits Theory. It says that personality can be understood through hierarchical levels between structures that regulate and delimitates the human behavior. He says that personality traits are usually described and identified by traits descriptors, that are terms identified in natural language and represent important components of observed behavior in individuals and different societies.

- **Trait theory by Gordon Allport**

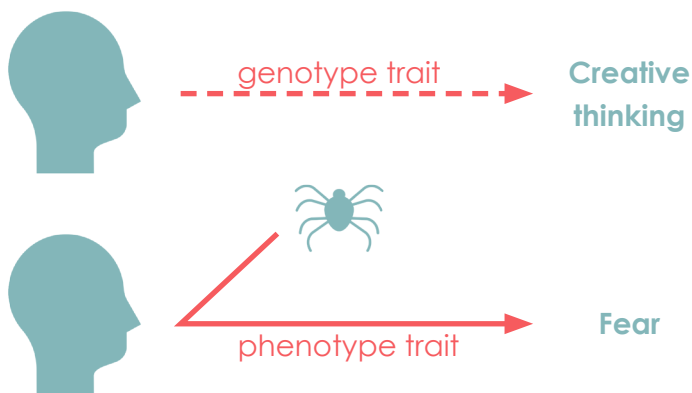
Some consider Gordon Allport one of the founders of personality psychology since he was the first psychologist of the modern era to deeply approach the personality theme, unsatisfied with the existing ideas so far. Allport claimed for a substantiated approach, eclectic and open to new concepts to the study of human learning and personality.

According to Benson et al. (2012, pp. 308-313), personality is for Allport a complex mix of characteristics, human relationships, current context, and motivation. In his first study, he and his brother, Floyd Allport, reported their research about personality traits. They concluded that it was important to identify them and try to measure them. In 1936 Allport and H. S. Odbert proposed the lexical hypothesis, that

is grounded in the idea that the most important and relevant personality differences are reflected with language. They identified over 18 thousand English words to describe personality traits.

Based on other analysis of his lexical study, Allport defined three categories of traits: cardinals, central and secondaries. The **cardinal** ones are those fundamentals to a person, that dictates all their way to live. Not everybody has a cardinal trait. The **central** ones gather all the general characteristics, found in most people. They are less fundamental than the cardinal ones, they are developed mostly due to the influence of parents and are a result of creation. The **secondary** ones have less impact on the individual, only presenting themselves in certain circumstances since they're associated with a determinate context or situation.

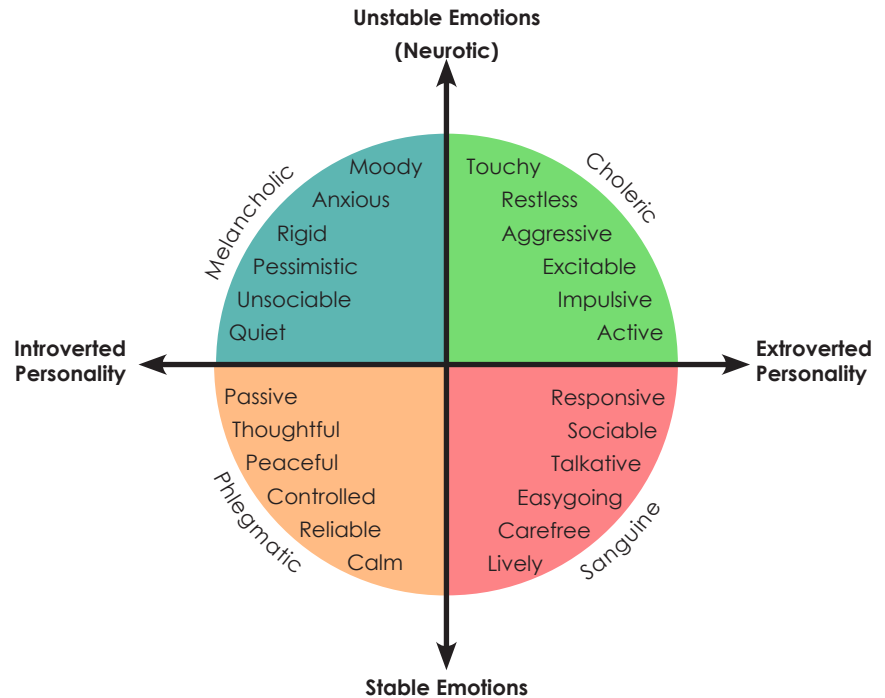
Allport was interested to know how personality traits are forged in an individual and what is their connexion with behavior. He suggested that a combination of internal and external forces influence our attitudes. Some internal forces, called "**genotypes**", orientate the way we retain information and utilize them to interact with the exterior world. At the same time, external forces, or "**phenotype**", determine the way in which the individual accepts the surrounding environment and to which point he allows that others influence his behavior. These two forces are the base for the creation of individual personality traits.



- **The factorial theory by Hans J. Eysenck**

While many psychologists tried to define and measure personality traits, Eysenck's interest lay with the human temperament. He was a biologist and believed that physiological and genetic factors determined the temperament, and he was interested in the biological approach by Galen.

According to Benson et al. (2012, pp. 318-321), Eysenck proposed a two-dimension system, or comprehensive "superfactors" – neuroticism and introversion-extroversion – that included all personality traits. He mapped them according to the four classified temperaments of Galen (sanguine, phlegmatic, choleric and melancholic).



Neuroticism is the personality dimension that includes the calm and emotional stability at one end, and the nervousness and irritability in the other. The neurotics have a narrow threshold activation of the sympathetic nervous system, part of the brain responsible for triggering the "fight or flight" reaction.

The people that have this system more sensitive are hyperactive in this area, and also have more chance to present neurotic disorders.

The second dimension is the **Extroversion-Introversion** one. The terms have the same meaning as to describe people: extroverts are sociable and talkative; introverts are shy and quiet. To Eysenck, variations in cerebral activity explain these differences. Introverts are tense and sensitives, while extroverts are chronically less sensitive and bored; the brain, therefore, looks for stimuli with relations with other people (extroverts) or looks for calm in peace and isolation (introverts).

Later, Eysenck identified a third temperament dimension, the “psychoticism”, also understood as “insanity”. While some saw this as a deviation of personality theory, Eysenck said that the psychoticism present itself in diverse degrees. He discovered that many personality traits associated themselves to produce this dimension. However, having an extreme number of those traits does not mean that the person is psychotic.

Hence, the human behavior is the result of a person position in these dimensions, combined with the circumstances in which the individual is exposed (CAMPOS, 2005, p. 29).

• **The factorial-analytical trait theory by Raymond Cattell**

Cattell defines personality as something that allows predicting what a person would do in a determinate situation. He sees personality as a complex and differentiated construction of traits. To him, traits are a mental structure, an inference made from observed behavior to explain the regularity or consistency of such behavior (CAMPOS, 2005, p. 30).

Aiming for an appropriate taxonomic system to classify personality, Cattell made use of Allport and

Odbert study, a list of English 18,000 words to describe traits, as a starting point for his multidimensional model of personality structure. First, he reduced the list to a subset of 4,500 trait terms and then, using semantic and empirical clustering procedures, as well as reviews of the literature of the time, Cattell reduced to a mere 35 variables. He conducted several oblique factors analyses and concluded that he had identified 12 personality factors, which eventually became part of his 16 Personality Factors (16PF) questionnaire (JOHN & SRIVASTAVA, 1999, p. 5).

According to Cattell, there is a continuum of personality traits, meaning, each person has all of these 16 traits to a certain degree, but they might be high in some and low in others. The following personality trait list describes some of the descriptive terms used for each of the 16 personality dimensions described by Cattell (CHERRY, 2018):

1. **Abstractedness:** Imaginative vs. Practical
2. **Apprehension:** Worried vs. Confident
3. **Dominance:** Forceful vs. Submissive
4. **Emotional Stability:** Calm vs. High-strung
5. **Liveliness:** Spontaneous vs. Restrained
6. **Openness to Change:** Flexible vs. Attached to the familiar
7. **Perfectionism:** Controlled vs. Undisciplined
8. **Privateness:** Discreet vs. Open
9. **Reasoning:** Abstract vs. Concrete
10. **Rule-Consciousness:** Conforming vs. Non-conforming
11. **Self-Reliance:** Self-sufficient vs. Dependent
12. **Sensitivity:** Tender-hearted vs. Tough-minded
13. **Social Boldness:** Uninhibited vs. Shy
14. **Tension:** Impatient vs. Relaxed
15. **Vigilance:** Suspicious vs. Trusting
16. **Warmth:** Outgoing vs. Reserved

- **The Big-Five Model**

After years of research, Trait Theory is approaching a consensus on a general taxonomy of personality traits, called the “Big Five” personality dimensions. Previous models, like the one from Allport and Cattell, contributed to its formulation. This theory emerged to describe the essential traits that serve as the building blocks of personality.

Current personality researchers believe that there are five core personality traits. Several investigators were involved in the discovery and clarification of these dimensions, like Fiske (1949), Norman (1967), Smith (1967), Goldberg (1981) and McCrae and Costa (1987). While there is a significant body of literature supporting this model, researchers don’t always agree on the exact labels for each dimension (CHERRY & GANS, 2018).

The “big five” structure does not imply that personality differences can be reduced to only five traits, rather, these dimensions represent personality at the broadest level of abstraction, and each one summarizes a large number of distinct, more specific personality characteristics (JOHN & SRIVASTAVA, 1999, p. 7). The traits are openness, conscientiousness, extraversion, agreeableness, and neuroticism.

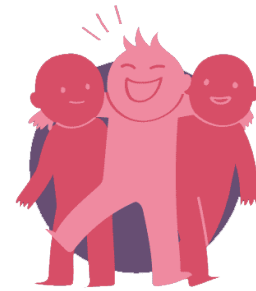
Each of the five personality factors represents a range between two extremes. For example, **openness** can range, on one end, from being totally open to new things and variety, or wanting strict, regular routine on the other end. **Conscientiousness** can translate into being impulsive and careless, or careful and disciplined. Someone high on the **extroversion** end will be sociable, while those on the low end will be shy and reserved. A very **agreeable** person, meanwhile, is helpful and trusting, while someone at the opposite end may be suspicious or uncooperative. And finally, on the **neuroticism** spectrum, an emotionally stable person will be calm and secure, while a less stable person is often anxious, insecure, and self-pitying (CrashCourse, 2014).



OPENNESS



CONCIENTIOUSNESS



EXTROVERSION



AGREEABLENESS



NEUROTICISM

McCrae and his colleagues found that these five traits are also remarkably universal. One study conducted by them looked at people from more than 50 different cultures found that these five dimensions could be accurately used to describe personality. Also, psychologist David Buss has proposed that they have biological origins. According to him, these traits represent the most important qualities that shape our social landscape (CHERRY & GANS, 2018).

It's important to underline that these traits are hypothesized to predict behavior and attitude. By adulthood, trait theorists affirm these characteristics are pretty stable, but it is not to say that they can not flex a little in different situations. Therefore, personality traits are better at predicting average behavior over what one would do in a specific situation; and research indicates that some traits, like neuroticism, seem to be better predictors of behavior than others (CrashCourse, 2014).

1.1.3. Neuro-personality

In addition to the field of psychology, there are other theories about personality that involve neurobiological explanations, which rely on experimental evidence to prove that the brains of introverts and extroverts are really different.

In one experiment, conducted in 1999, researchers found that introverts had more intense blood flow in regions of the brain involved in recalling events, making plans, and solving problems. However, extroverts had blood flow in the areas of the brain involved in the interpretation of sensory data (JOHNSON, et al., 1999). The data suggest that, as Jung believed, extroverts have their attention turned outward and introverts, inward.

Another psychologist, Hans Eysenck (1967), developed a more biology-based model to explain the origins and implications of Extroversion-Introversion. According to his theory, the different behaviors are

due to differences in cortical excitation (speed and amount of brain activity). Introverts naturally have a higher level of cortical arousal, unlike extroverts, which causes them to be able to process more information per second. Therefore, when this person is in an environment with a high degree of stimulation, it will be quickly overloaded. In the case of the extroverts, their brain is only minimally excited in these situations, so they tend to look for highly stimulating environments to increase their arousal levels.

In an experiment conducted by psychologist Richard Howard, in which printed labyrinths were distributed to a group of 50 people, introverts not only did better but spent more time inspecting the problem before they started. This is not necessarily linked to intelligence, but to insistence on the challenge (CAIN, 2012). This extreme concentration also causes introverts to detest being interrupted. In addition, no matter how hard they try to work together, they do better on individual tasks.

1.1.4. Introversion summarized

Introversion and extroversion traits appear in almost all personality models, and the distinction between them was considered a determining factor to define personality (BENSON, et al., 2012, p. 314). These terms were popularized through the work of Carl Jung, developed as one of the four areas identified by the Myers-Briggs Type Indicator, and later, become one of the main dimensions identified through the Big-Five Model. According to many theories of personality, everyone has some degree of both introversion and extraversion. However, people tend to lean one way or the other.

Introverts tend to be more quiet, reserved and introspective. They expend energy in social situations, unlike extroverts, who gain energy from these events. After spending time in a large group of people, introverts often feel a need to “recharge” by spending some time alone. They tend to be inward turning, focused more

on internal thoughts, feelings and moods rather than seeking out external stimulation. Some common traits include self-awareness, self-knowledge, quietude around unfamiliar people, and learning through observation (CHERRY, 2016).

People high in the introversion trait present some characteristic behavior. They tend to have a smaller group of friends, with their closest relationships tending to be profound and significant. They prefer to interact with others on a one-on-one basis rather than in a large group setting. It's important to emphasize that introversion does not necessarily equate with shyness. Shyness indicates a fear of people or social situations. Introverts, on the other hand, simply don't like to spend a lot of time interacting with other people. They appreciate, however, being around people to whom they are close.

According to estimates, extrovert to introvert ratio is about three to one (CHERRY, 2016). Introverts often find that other people try to change them or suggest that there's something "wrong" with them – what is false. Although introverts make a smaller portion of the population, there is no right or wrong personality type. Instead, both should strive to understand each other's differences and similarities.

Img. 5 – Common signs of Introverts
(adapted from: <https://www.verywellmind.com/signs-you-are-an-introvert-2795427>)



Being around too many people drains their energy



Introverts are very self-aware



Introverts have small group of close friends

1.2. The Ideal of Extroversion: a cultural paradigm

In general, until the nineteenth century, the population grew at a slow pace and most people lived in the countryside, dedicated to land-related activities. In a rural neighborhood with few families, all were known. With the arrival of the twentieth century, there was a very rapid population growth and lifestyle began to change, resulting in mass immigration to cities (SCARLATO & POTIN, 1999). In this way, people no longer work with their neighbors, but with complete strangers. This history summarizes one of the reasons for cultural evolution that, as the historian Warren Susman (2003) calls it, went from Cult to Character for Cult of Personality.

In the Cult of Character, the ideal attitude was of someone serious, disciplined, and honorable. What counted the most was how the individual behaved in the private sphere, and not so much as the impression one made in public. But the rise of the industry was a powerful force that propelled cultural change. The nation moved quickly from an agrarian society to urban centers, which brought a storm of big business that ended up altering the relationship between people. Thus, in an increasingly anonymous world of business, the first impression has become crucial. It was then that the Cult of Personality took place, where people began to focus on how others saw them, trying not only to sell the latest releases of the companies but also themselves.

These new conditions eventually favored extroverts, those who had the gift of communication. They spoke more, with security and sympathy. They conquered hearts, minds, customers and turned the extroversion into a cult in which everyone needed to be like them, simply because it was more accurate (CAIN, 2012).

One of the ways in which we can see this cultural



Img. 6 - Fleet Street, London, 1920's by George Davison Reid (from: <https://www.vintag.es/2012/09/old-photographs-of-london-from-1920-1933.html>)



Img. 7 - An unidentified woman wearing a 'flapper'- style skirt dances at a party in a still from the film, 'The Great Gatsby,' directed by Elliott Nugent, 1949 (from: <https://www.thoughtco.com/what-inspired-the-great-gatsby-739957>)



Ever tried
selling *yourself*
to **YOU** ?

*It takes a smile that would
help . . . or hinder ?*

*Favorable first
impression is the greatest
single factor in business
or social success*

FOR WHITER TEETH
there's a way all
men should know

You can use, in the small diagrams
here, to show these advantages you
offer others: smile, sparkle,
all daylong. (1) *Whitening*
the *World's*

REELS we apply, including others,
we make: designs applied by
others, including us.

“ . . . why it pays a man to check
he. Corner daily brushing, wash the
proper brush, will polish teeth and
improve your appearance.”

For more reasons, millions use “the
smile” (2) *the World's*

[illegible]

Publicity sold the same concepts. While the old advertisements were direct advertisements for the products, the new ones were personality-driven, which took consumers as stage-fright artists that only their products could save. They focused on the hostile gaze of the public spotlight, on the anxieties of salespeople and managers, on women's difficulties in the game of seduction, among others. The Culture of Personality valued those who knew how to project trust. Those who had an introspective personality were seen as strangers and losers.

HUMAN PSYCHO-CULTURAL NATURES: INTROVERSION VS EXTROVERSION 35

The habit of the time valued confident and social people. In schools, children who did not socialize were labeled as problematic, suffering interventions from the institution to eliminate this “tendency” (MCDANIEL, 2003). In the companies, the bosses looked for social and active employees, who could make a good impression. Those who did not fit this standard had to adapt in the best possible way, and many had succumbed under such pressure. The proof is the high consumption of anxiolytic drugs and tranquilizers (ELLIOT, 2004).

1.3. About the New Group Thinking

The Ideal of Extraversion eventually unleashed a new phenomenon - The New Group Thinking, as Susan Cain (2012) calls it. In this concept, teamwork matters the most. It insists that creativity and intellectual achievement come from a sociable place, and there are many defenders, from journalists to organizational consultants.

This thought was accepted by many corporations, who increasingly organized their workforces into teams (KOSLOWSKI & ILGEN, 2006), and this practice gained popularity in the early 1990s. As a consequence, there was a spatial shift in how workplaces were organized, reflected in the open offices, which at the end of the 20th century began to present more “casual” tendencies.

New Group Thinking also hit schools through a shift to “cooperative” or “small group” learning. Thus, the organization of the traditional classroom, with rows of desks facing the teacher, was changed to cores of four or more desks grouped together to facilitate group activities (WILLIAMS, 2004). This new approach is rooted in progressive learning policy, but it is also a reflection of business practice. Thus, children are being “prepared” for the method used in the workplace, where they will be introduced in the future.

This new concept has no precise origin, since



Img. 10 – Teamwork at university
(from: <https://campustechnology.com/Articles/2013/02/20/Tools-for-Teamwork>)

the impacts on learning methods, teamwork, and open offices have emerged at different times for different reasons. But the strength that brought these trends together was the advent of the internet, which provided a new insight into the idea of collaboration. Its results in the field of computer science, whether with the Linux open operating system or shared sites such as Wikipedia, helped spread the image that collaboration was the key to multiplying success (CAIN, 2012).

Despite all the popularity of this way of thinking, it has the potential to affect productivity at work and deprive children the skills that will be needed in a world increasingly competitive. A series of studies on the nature of creativity was conducted by the University of California between 1956 and 1962. One of the most interesting discoveries was that more creative people tended to be socially classified as introverts (FEIST, 1999). One explanation for this is that introverts prefer to work independently, and solitude can be a catalyst for innovation.

1.4. About Solitude

When one looks at the lives of great inventors, engineers, and artists one realizes that many of them worked alone, at least at the time of creation. Since most of them can be considered introverts, as in the case of Steve Wozniak (WOZNIAK & SMITH, 2006), one of the pioneers in the creation of personal computers, loneliness becomes essential for innovation.

Studies by psychologist Anders Ericsson (1993) have examined exceptional individuals in the field of sports, the arts and sciences to try to identify the causes of such extraordinary abilities and performances. One of his experiments analyzed a group of violinists, dividing them into three groups according to their abilities. It was found that the best violinists spent more time practicing alone, which is the most important of their activities related to music. Similar results were found with other types of skilled people, such as great chess



Img. 11 – Playing chess with myself, by Renè Maltete (from: <http://www.fubiz.net/en/2015/10/25/funny-black-and-white-street-photography-by-rene-maltete>)

masters (CHARNESS, Tuffiash, Krampe, Reingold, & Vasyukova, 2005) and elite athletes (ERICSSON & STARKES, 2003), who devoted a lot of time to solitary practice.

Ericsson (1993) then concluded that Deliberate Practice, essential for exceptional achievement, was best conducted when the person is alone. In this way, he identifies the tasks or knowledge that are beyond his reach, strives to improve his performance, monitors his progress and corrects himself accordingly. Loneliness helps Deliberate Practice for several reasons. It requires intense concentration, since other people may distract; requires deep motivation, often “self-generated”; and involves working on something challenging yourself, something extremely personal.

Loneliness is a choice and a need for introverted people, who often wish to stay in a less stimulating environment to focus on a task, or just to “recharge their batteries” after a tiring day. This characteristic can be interpreted by “others” - usually extroverts - as an antisocial and strange aspect, resulting in a social withdrawal from the introverts of others, mainly observed in childhood and adolescence. This experience, though painful, is typical of highly creative people. A study by psychologist Mihaly Csikszentmihalyi between 1990 and 1995 found that most of the 91 individuals studied - exceptionally creative people in the arts, sciences, business and government - were socially marginalized in adolescence (CSIKSZENTMIHALYI, 1996).

Although Deliberate Practice is essential for exceptional performance, emphasizing the importance of time alone to achieve it, it is not the only requirement. It takes the right working conditions, and in contemporary professional environments, they are difficult to attain.



Img. 12 – Introvert recharging
(from: www.cielhr.com/introvert-or-extrovert-it-doesnt-matter/)

1.5. About Brainstorming

Just as adequate workspace is essential for creativity, freedom from “peer pressure” is also. That is why Alex Osborn in 1948 developed the concept of Brainstorming, a process in which members of a group generate ideas in a non-critical atmosphere. He had realized in his own company, the advertising agency BBDO, that his employees were not creative enough. Although they had good ideas, they were reluctant to share them for fear of their colleagues’ judgment (OSBORN, 1948).

Brainstorming has four rules:

1. Do not judge or critique ideas
2. Be free. The crazier the idea, the better.
3. Go by quantity. The more ideas, the better.
4. Build upon ideas from other group members.

Osborn (1948) believed that groups, once freed from the handcuffs of social judgment, produced more and better ideas than individuals working alone. To defend his method, he presented quantitative results in which brainstorming groups produced far more ideas than traditional groups. His theory, then, had a great impact, and business leaders enthusiastically embraced brainstorming. It is common to see today offices that adopt this practice, grouping their staff around a whiteboard and encouraging everyone to associate freely.

Despite all the excitement, there is a serious problem with this practice - brainstorming does not really work. The first study to demonstrate this was conducted in 1963 by a professor of psychology at the University of Minnesota. It brought together 48 research scientists and 48 advertising executives, each set being divided into twelve groups of four, and asked to attend brainstorming and solitary sessions. The result was that men in 23 of the 24 groups produced more ideas when working alone than when working in a group, as well as being ideas of better or equal quality



Img. 13 - Brainstorming (adapted from: <http://creativitywise.com/blogpost-brainstorming-made-simple/>)

when they acted individually (DUNNETTE, CAMPBELL, & JAASTAD, 1963).

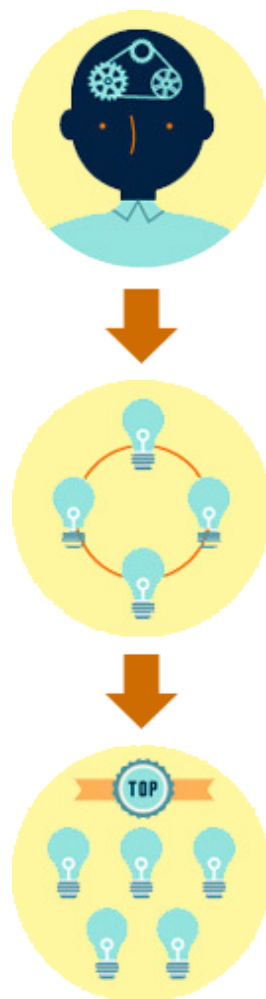
Since then, other studies, such as “Reconsidering Brainstorming” (MONGEAU & MORR, 1999) and “Idea Generation and the Quality of the Best Idea” (GIOTRA, TERWIESCH, & ULRICH, 2010), show that performance becomes worse when group size increases. Adrian Furnham (2000), an organizational psychologist, states that “if you have talented and motivated people, they should be encouraged to work alone when creativity or efficiency is the top priority.”

The only exception is online brainstorming. When it is conducted on the internet and appropriately administered, the results are very positive: the groups do better than the individuals, and they perform better the larger the group (MONGEAU & MORR, 1999). Some examples would be the very creation of Linux or Wikipedia. However, the power of online collaboration impressed in such a way that it over-valued all group rather than individual work (CAIN, 2012).

Psychologists usually offer three explanations for the failure of group brainstorming:

1. Social idleness: some individuals relax and let others do the work;
2. Productive blockage: only one person can speak or produce one idea at a time, while the other members of the group are forced to remain passive;
3. Evaluative apprehension: fear that colleagues will find their idea inferior.

Although Osborn’s “rules” of brainstorming have been made to counteract anxiety, studies show that the fear of humiliation is a potent force (OPT & LOFFREDO, 2000). A behavioral economist, Dan Ariely (2008), conducted a study in which he was able to observe such phenomena. He asked 39 participants to solve anagrams, alone or with others watching. The result was that those who solved it alone solved better. He then concluded that an audience may be a stimulus,



Img. 14 – Steps to independent brainstormers (adapted from: <http://blog.mavenlink.com/are-we-brainstorming-the-wrong-way>)

but it is also stressful.

The problem with evaluative apprehension is that there is not much to do about it. Recent research in neuroscience suggests that the fear of judgment is much deeper and has wider implications than ever anticipated, as demonstrated by the studies of Solomon Asch between 1951 and 1956 and Gregory Berns in 2005. In summary, the findings suggest that groups can change our minds. If the group thinks that the correct answer is A, it is very likely that you will believe that too (BERNS, 2009).

However, there is no need for an “abolition” of collaborative work. Research shows that face-to-face interactions create trust in a way that online interactions can not (LUSCOMBE, 2010). Another study suggests that population density is linked to innovation, that is, people in populous cities benefit from the network of interactions that urban life makes possible (LEHRER, 2009). What is needed, however, is to refine how face-to-face interactions are made. It would, for example, actively seek out symbiotically introverted and extroverted relationships in which leadership and other tasks are divided according to people’s natural capacities and temperaments (CAIN, 2012).



Img. 15 – Problematic group thinking (adapted from: <http://blog.mavenlink.com/are-we-brainstorming-the-wrong-way>)



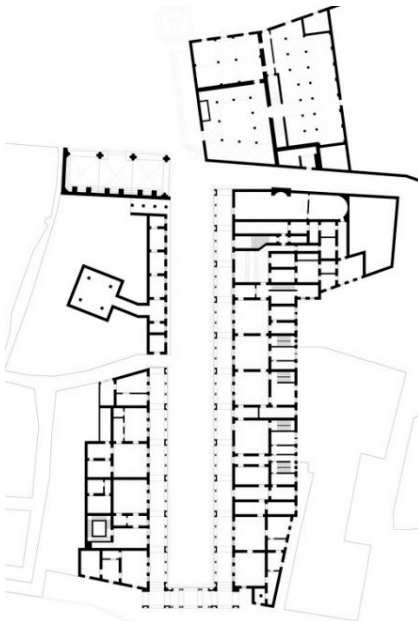
Img. 16 – Chicago skyline by Andrew
Horne (from: [https://www.flickr.com/
photos/70832171@N07/7911273990](https://www.flickr.com/photos/70832171@N07/7911273990))

2. OFFICES' PHYSICAL-SPATIAL NATURES

Img. 17 - Galleria degli Uffizi, Florence
(Photo by the author)



Img. 18 - Galleria degli Uffizi floorplan
(from: <https://caruso.arch.ethz.ch/archive/references/project/62>)



2.1. About the evolution of the office tower²

The tradition of the bureaucratic work environment - “office” - goes back to ancient Egypt, and several of its basic characteristics remain constant. But it was only in the eighteenth century that the foundations of the current office architecture were created, with the foundation of entities linked to bureaucratic work, which began the construction of office buildings for rent.

The first specialized administrative building was the Galleria degli Uffizi (which in Italian means offices), built in Florence by Giorgio Vasari between 1560 and 1574. It consisted of two narrow, long buildings, aligned along a kind of inner street, it was a succession of three-story office halls designed to receive generous natural ventilation and lighting.

The expansion of industry, commerce and rail traffic from the mid-nineteenth century onwards will be fundamental elements for the expansion of buildings for this purpose, which, together with technical advances, have allowed almost unlimited vertical growth since 1880. The verticalized tower of offices can then be considered a product of the need for administrative centralization of the production and management of services created by the Industrial Revolution and the advent of modern capitalism.

From the constraints of each particular country, there was a distinct development of the typology of the office building. If the first commercial office buildings and administrative headquarters arose in European countries, where the industrialization began, the vertical office tower actually emerges in the United States of America after the Civil War.

¹ Based on research by Roberto Fialho, 2007

- **Chicago School**

Chicago, due to its location as a center of traffic of different modalities, was already an ideal place for the development of buildings dedicated to bureaucratic work. In the 1880s, the great demand for buildings produced strong speculation, as there was no limitation of height or legislation on built-up depth. It is with the First Leiter Building (1879), by William LeBaron Jenney, that a period of architectural innovation begins, known as the Chicago School. The building already counted with a principle of the independent structural system and the floor-type, with its repetitive reflection in the facades.

The metal or concrete skeleton would become the definitive image of modern architecture. The buildings of the Chicago School aimed at meeting functional needs, with rational spaces and industrialized construction, besides presenting economy of elements and consistency of themes. They were, however, open to the technological innovations of a revolutionary era.

The Rookery Building (1885/86) of Burham and Root can be considered one of the first buildings to house a mix of shops and offices, around an inner semi-covered square. It featured a number of technical innovations, such as the “skeleton frame” in the central atrium, elevators, and fireproof coating.

Louis H. Sullivan advocated adopting an architectural language of his own for a new moment in architecture and technique. His office buildings did not have a sophisticated expression in plan, since the program required only a minimum of planning of the internal spaces. In this way, the metallic structure was the ideal structural solution, combined with the rationalized design process, with maximum utilization of useful area, circulation and architectural expression of the façades.

The Wainwright Building (1890/91) was the first large office tower of Louis Sullivan/ Adler and Sullivan Architects, but built in St. Louis, Missouri. It is a building

Img. 19 - The Rookery Building (from: www.britannica.com/biography/Daniel-H-Burnham/images-videos)



Img. 20 – The Wainwright Building (from: <http://www.architechgallery.com/artist/sullivan.htm>)





Img. 21 - View of New York City from
Rockefeller Center in 1936 (from:
<https://profiles.nlm.nih.gov/LW/B/B/H/V/>)

composed of ground floor, mezzanine, 7 floors-type and roof. The architect makes explicit on the facade the vertical and independent character of the steel skeleton, despite the horizontal stripes that marked the “stacked” structure.

- **Manhattanism**

In Manhattan, the conformation of the New York skyscraper of the nineteenth century was the result of the orthogonal grid of its streets and avenues defined by the first urban plan of Manhattan, resulting in blocks that were subdivided into lots of 8 x 30 m. The oldest example of New York skyscraper still standing is the Flatiron Building (1902). It has a steel structure, but a facade with a Florentine Renaissance style.

In 1916, New York adopted a local law of urban zoning, which defined a limitation for the height of buildings, seeking to provide lighting and ventilation to the “canals” created by the huge buildings, formally creating staggered buildings. These restrictions reinforce the process that installed Art Deco in Manhattan from the 1920s. Some of the major buildings built in this style are:

- Chrysler Building (1930) by William Van Allen: The 319-meter-high building is characterized by the set of staggered volumes, crowned in the pinnacle crown; and the decorative treatment of walls.

- Empire State Building (1931) by Shreve, Lamb and Harmon office: it was the tallest building built for a long time, with 381 m high.

- Rockefeller Center (1939) by Raymond Hood: a group of 21 buildings organized around two private streets. It presents a great artistic ornamentation and quality of the created public spaces.

- **Modern Movement**

The skyscrapers of the European *avant-garde* for a long existed only on paper due to the economic difficulties of the post-World War I period. Le Corbusier presents its *Ville Contemporaine* in 1922, a city plan for 3 million inhabitants, with a core of 24 office skyscrapers, buildings with a cruciform plan to allow for maximum insolation and natural ventilation, which would be repeated in the *Plan Voisin* for Paris in 1922/1930 and the *Ville Radieuse* in 1924.

For the European *avant-garde*, the skyscraper was seen as an abstract function of a structure, an instrument of the modernist ideology of social salvation by the renewal of the city in crisis. In this way, the independent structure became the solution to a universal problem: the architecture of the industrial city itself.

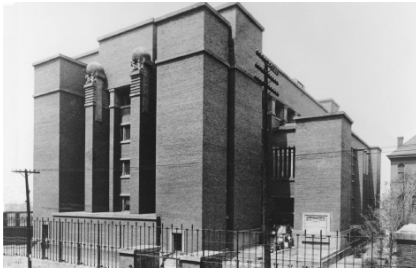
But the commercial towers did not assume uniform form, as functionalist theory would have imagined in its proposals, due to the discontinuous nature of the capitalist venture, the variety of forms, technical solutions, programs and languages.

The advent of World War II paralyzes the experiences of the Modern Movement in Europe and the United States. Thus, the skyscraper that would proliferate after this period is conceptually different from the typology defined by the Chicago School, since it is inserted in the proposals of the CIAM 1928/1933 congresses and the Charter of Athens (1941), which saw the skyscraper as part of a new urban order.

The break with tradition allowed a succession



Img. 22—Le Corbusier's Plan Voisin for Paris (from: <http://www.fondationlecorbusier.fr/corbuweb/morpheus.aspx?sysId=13&IrisObjectId=6159&sysLanguage=en-en&itemPos=2&itemCount=2&sysParentName=Home&sysParentId=65>)



Img. 23 – Larkin building (from: <https://flwright.org/researchexplore/wrightbuildings/larkincompanyadministrationbuilding>)

of formal experiences of the Modern Movement, which aimed at liberating the architecture of academic dogma and defined that the main thrust should be an opening to the technical and social reality, with emphasis on the relation between form and function and, in this context, vertical architecture constituted an ideal object for these experiments.

Frank Lloyd Wright was critical to the North-American architecture of Classical and Gothic Revivals, lamenting the forgetfulness of Chicago School innovators. He then designed the Larkin Building in 1904 in Buffalo, NY, a building of high spatial and technical innovation. With its cathedral-like spaces, it appeared with a massive volume aspect to protect against the high noise and atmospheric pollution of the industrial district of Buffalo.

The first office tower to follow the concepts of rational-functionalism of the Corbusian current would emerge in Rio de Janeiro in the 1940s. Although the movement emerged in Europe, it was in Brazil during the war period, that the possibility of realizing their ideas came. The *Capanema Palace* appears as the first office tower of the Modern Movement according to Lúcio Costa. Headquarters of the MEC - Ministry of Education and Culture, the group is formed by two blocks in uneven height in a “T” shaped arrangement, which divides the court into two open spaces. The vertical prism raised by pilotis consists of 14 floors-types of offices. The horizontal block accommodates offices and the exhibition hall.



Img. 24 – Gustavo Capanema Palace in 1945 (from: <https://somenteboasnoticias.files.wordpress.com/2013/06/palacio-gustavo-capanema.jpg>)

Its solution allows the liberation of the Agache Plan block, the creation of ample public spaces, within the spirit of the Charter of Athens. The entire Corbusian rationalist-functionalist ideal is applied: the liberation of the soil, the garden terrace, the glass curtain, the *brise-soleil*, the free floor plan, added to the expressiveness of the Carioca School.

The office building, after World War II, acquired as function-type a much greater importance, never

envisaged by the avant-garde. The corporate towers were the first to incorporate technologies used during the war, exhibiting new materials, techniques and processes of rationalization; and sustain, since then, as the vanguard of the public solutions in the civil construction.

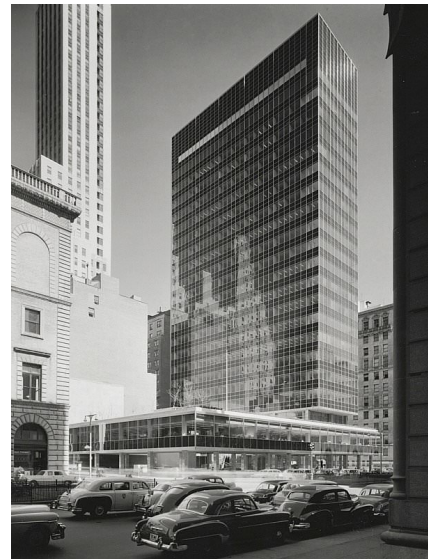
In this context, the first rationalist skyscrapers emerge in New York, confirming the Americans' adoption of the International Style brought by Bauhaus graduates and other avant-garde movements: Mies van der Rohe, Breuer, Gropius, Schindler, and Neutra, among others.

Lever House (1952) by Gordon Bunshaft and Skidmore, Owings and Merrill was one of the major skyscrapers built in steel structure with curtain wall. It consists of a 21-story thin vertical prism and a horizontal volume. It assumes its technological vocation by the use of the technique available in the market. Due to the restrictions of the zoning law of the time, it occupies only a fraction of the lot's projection, which allowed a greater height for construction. The building characterized an architectural and urban innovation by breaking up the massive tower into two volumes, in addition to introducing the concept of an indoor garden open to the public.

Mies van der Rohe's Seagram Building (1954/58) reincorporated the idea of a front plaza into the city's design by pulling back the building almost 30 meters from the lot boundary to Park Avenue. Its main tower, facing the square, has 38 floors and a steel structure. Its plaza is not on the same street level, being raised three steps above the sidewalk. The setback creates a transition breath and its entrance is announced by a delicate canopy.

Despite the popularity of the International Style, there was resistance to its little dynamics, as can be seen in the works of Robert Venturi and Philip Johnson. One of the examples of this phase is Johnson & Johnson's AT&T Building, in New York, implemented

Img. 25 – Lever House in 1952 (from: www.som.com/projects/lever_house)



Img. 26 – Seagram Building (from: www.375parkavenue.com/History)



between 1978 and 1984. The building follows Sullivan's orientations, with base, body and crown identified, and its upper profile delineates the shape of an old-fashioned cabinet.

A few years later, in Asia, "smart buildings" emerge, such as the headquarters of HSBC (1986) in Hong Kong, project of Norman Foster. This term designates those who add technological qualities in their design and systems. The design of the buildings seeks to organize them to make layout possibilities flexible, meeting the frequent demands of changing the ways of use and appropriation of technological innovations.

This brief history of office tower architecture is significant in understanding a "macro" scale where workspaces are included, and how intimate the building relationship is, how the number of historical and stylistic scenarios, with its interior, where professional activities were to develop.

Img. 27 – HSBC Headquarters in Hong Kong (from: <https://www.spacious.hk/en/blog/feng-shui-the-mystical-energy-of-hong-kong/>)





2.2. The evolution of the workspace in office buildings

Img. 28 – Larkin Building interior view
(from: <http://wrightchat.savewright.org>)

Since ancient times, it is possible to observe “bureaucratic” workspaces, be it in Ancient Egypt, Mesopotamia or the Middle Ages. Analyzing these spaces, one can see that the work environment presents functions that are constant and that only adapt to the society to which they belong. In the wide range of possibilities, the fundamental element is the man and his needs, not only professionals but, above all, of interaction and social life (FIALHO, 2007).

The birth of the office and ‘white collar’ work happened between 1860 to 1920, where the number and kinds of positions in the office rapidly expanded, and administration and bureaucracy had taken over the world of business (SAVAL, 2014, p. 34). The massive scales of industrialization due to advancements in technologies made many businesses to consolidate into larger firms, trusts and corporations, demanding new and faster ways of communication (SAVAL, 2014, p. 41). This highlighted a problem – there was no office design in place to accommodate and store the vast amount of new styles of work being done.

It’s in the pursuit of worker efficiency that the

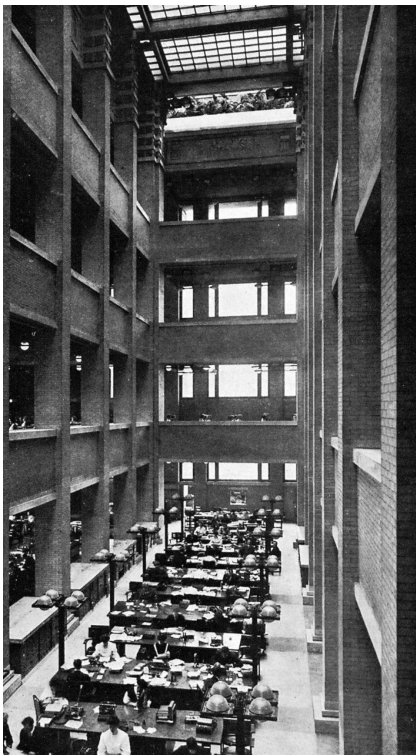
first scientific administrative theory of labor emerged, elaborated by Frederick W. Taylor (1856-1915) – the *Taylorism*. While he might have been trying to make the industrial shop floor more efficient, it had a profound impact on office management, where efficient systems and models were designed for every detail of office life. Soon, employees were monitored to eliminate ‘unnecessary’ movements, as well as the introduction of ergonomic furniture, in order to ensure employees could work at optimal efficiency (SAVAL, 2014, p. 63).

Regarding spatial conception, his ideas advocated spatial segregation as a way of reaffirming hierarchical differences, aiming at encouraging internal competition and stimulating individual performances. Thus, was constituted a new type of office called American layout or Taylorist. It presented a spatial organization that resembled an industrial plan, with lower-level employees clustered in large central halls, watched closely by supervisors. All around, the managers’ private rooms were located, and on the higher floors were the high-ranking staff, with comfortable rooms and better views (FONSECA, 2004). Suddenly, employees became very aware of their motions in their workspace and how it influenced their behavior.

With Larkin Building (1904) by Frank Lloyd Wright, there is the first office building in the mold of Taylorism, where new guidelines for occupancy of spaces are presented, especially in the concern for the well-being of employees.

In the 1930s there was the rise of more aesthetically pleasing offices, as well as spaces designed for efficiency and speed, rather than organization and manufacturing. The vigor of the 1920s came to an abrupt halt with the Wall Street Stock Market Break in 1929, and so major corporate companies became interested in two things: offices that expressed corporate image; and perform the work more cheaply and in less time (MORGAN LOVELL, 2015).

Img. 29 – Larkin building atrium view
(from: <https://offramp.sciarc.edu/articles/possible-volumes>)





The rationalized office was developed in conjunction with Modernist architecture buildings: structures based on the European style of “changing society”. More modern, richer and spaces for the workers were achieved, using rationalized and radiant materials to compensate for the lack of interaction with the outside world.

One representative building at the time was Frank Lloyd Wright’s Johnson Wax Building in Buffalo, completed in 1939. Low-level employees were placed in a single large hall, and managers and executives were arranged in separate rooms. The main difference between this project and its Taylorist predecessors was the presence of clear lighting and pleasant spaces. In this project were adopted the famous pillars of circular chapter (like big “mushrooms”) and furniture of rounded corners disposed in an organic way, anticipating the new transformations that occur from the decade of 1950 and 1960 with the crisis of the Taylorism (FIALHO, 2007).

Img. 30 - Johnson Wax Corporation
Building Interior (from: <https://www.printcollection.com/products/johnson-wax-corporation-building-interior-from-balcony#.Wz4W39IzZPY>)

According to Shoshkes (1976), in the 1930s, architects, interior designers and other specialists began to worry about the inadequate design and environmental conditions of workplaces and, throughout the 1940s and 1950s, they devoted themselves to the analysis of issues related to the ways of individuals working and how the environment could be designed according to the demands of its users.

The early 1950s brought new advances in construction with modern materials such as steel and glass. The architecture of the International Modern Movement was adopted as the new image of the corporate service. With the widespread use of advanced air-conditioning and fluorescent lighting techniques, these new skyscrapers had little need for ventilation and natural light through windows that open. With these technological developments, the 1950s saw the corporate office become completely autonomous from the outside world, as well as allowing broad free plan, where workers could be placed almost anywhere - it was the rise of Open Plan Offices. This “formula” was soon adopted on a worldwide scale (MORGAN LOVELL, 2015).



Img. 31 – Lever House interior view in 1939 (from: <https://www.metalocus.es/en/news/gordon-bunshaft-and-som-nueva-york-lever-house>)

An iconic example of this new conception was the Lever House, completed in 1952. It was the first skyscraper in New York to adopt the glass curtain wall, where its floor-type was dimensioned to allow that no worktable was very far from a window, thus allowing natural light to illuminate it.

At the same time, in Germany, a new proposal of spatial organization of offices appeared, known as *Bürolandschaft* or Office Landscape - the panoramic office. It was first presented in 1958 by the company Quickborner Team. Unlike the strict and regimented banality of Taylorism, Open Plan or rational offices that came before, the Panoramic Office consisted of an open and free plan with furniture scattered in large spaces divided with different environments. These varied spaces were divided less rigidly, with creative

use of partitions and plants, with their nature generally dictated by the type and function of the workers who inhabited them.

Its spatial conception condemned massification and hierarchical segregation, as in Taylorism. The result was more organic layouts and distribution of furniture according to flow lines and neighborhood relationships, according to the reality of everyday relationships among employees. Although the hierarchical differences continued to exist, they were softened by coexistence in the same space of chiefs and employees. The isolation of managers and management was abolished, as well as the physical separations between the different departments (FONSECA, 2004).

It was no surprise that the Landscape Office emerged in northern Europe, parallel to the Cold War, bringing with it an egalitarian management approach. Based on progressive principles and socio-democratic, the system encouraged employees from diverse hierarchies to work together. Although this type of office had enjoyed a brief period of popularity in Europe, its open, scattered nature did not work for its worldwide adoption.



Img. 32 - Osram's Office in Munich, 1963
- Example of a panoramic office (from:
[www.scientificamerican.com/article/
the-origin-of-cubicles-an](http://www.scientificamerican.com/article/the-origin-of-cubicles-an))



Img. 33 – A promotional image for Action Office I's debut in 1964 (from: <https://www.wired.com/2014/04/how-offices-accidentally-became-hellish-cubicle-farms/>)

Img. 34 - Herman Miller's Action Office, 1965 (from: <http://www.lacasainordine.it/2018/05/icone-di-design-george-nelson>)



Following the socio-democratic principles of the Panoramic Office, Herman Miller's *Action Office* emerged, a series of desks, workspaces and other modular furniture designed to allow freedom of movement and work flexibility in a suitable position for service to be done. It was developed and disseminated under the supervision of George Nelson and Robert Propst, who were among the first designers to argue that office work was mental work and that mental effort was linked to an appropriate work environment (MORGAN LOVELL, 2015).

The Action Office can be seen as the first prominent example of a system of office spaces built on the postwar Modernist European principles, responsible for offices such as the Seagram Building by Mies van der Rohe.

Because it was originally designed for small offices, where employees worked in the same room, on the same furniture, it presented a serious problem. As the furniture was made of high-quality materials, it was too expensive for business managers worried about costs, as well as they were difficult to assemble. This, combined with the need to exchange furniture according to the flexibility of the office, made it financially and practically unsuitable for larger corporate offices.



With the slow adoption and scarce sales of the Action Office, Propst and Nelson began to develop their second version, in which it was capable of frequent modifications to adapt the necessities of employee change, without having to change the furniture. This new system is designed to allow the employee a degree of privacy, as well as the option of customizing their workspace without affecting their colleagues. It was a three-sided vertical partition, defining territory and allowing privacy without completely cutting off the employee from the outside world – the Action Office 2, that later would become the Cubicle, popular in the 1980s.

Although the Cubicle was imagined as a way to release employees from the dull, mechanic nature of Taylorist's open office, it was driven to its absolute dystopic limit because it had been created out of the reality in which supervisors, managers, and executives would be most concerned with the well-being of its employees than with its profitability. Robert Propst himself realized that "not all organizations are intelligent and progressive. Many are run by rough people, who take the same kind of equipment and create infernal

Img. 35 - Herman Miller's Action Office II (from: <https://www.dezeen.com/2015/02/01/office-cubicle-50th-birthday-herman-miller-robert-propst/>)

places. They make tiny cubicles and thrust people into them" (ABRAHAM, 1998).

In the 1980s, the main objectives of the companies were costs reduction, agility in work processes and increase production capacity. This openly super-economic mindset, combined with the fast-paced nature of the period, resulted in a rapid increase in middle management employees - very important for a simple table on a Taylorist work floor, but not enough for a private room. These workers needed to be accommodated in their own space - but in the most flexible and cheap way possible. It was the rise of the sea of cubicles.

Architects and Designers of the time viewed the cubicles as extremely flexible from the viewpoint of the ground floor, but once in the built environment, they saw the oppressive nature they had created, imprisoning people in giant gates, when the original idea was to free them. The "sea of cubicles" is one of the lessons in history that proves that any good idea can be corrupted by anyone with more interest in economics or efficiency than in human resources. It shows that large corporations had little interest in creating autonomous environments for employees. Instead, the cubicle and its various variations were used to crowd people in small spaces, as cheaply as possible, as quickly as possible.

One of the largest, if not the largest, development of the 1990s was the rise of information technology and the increasing ease of Internet access. This brought about a revolutionary effect on the way of working, which could not be ignored. This new technology, with its laptops and cell phones, was able to move offices away from the typical desk to outside locations, such as in homes or cafes. The recession of the early 1990s, combined with increasing competition in increasingly globalized markets, has impacted many companies, where Executive Directors could not ignore the economies of the "work away" and the outsourcing

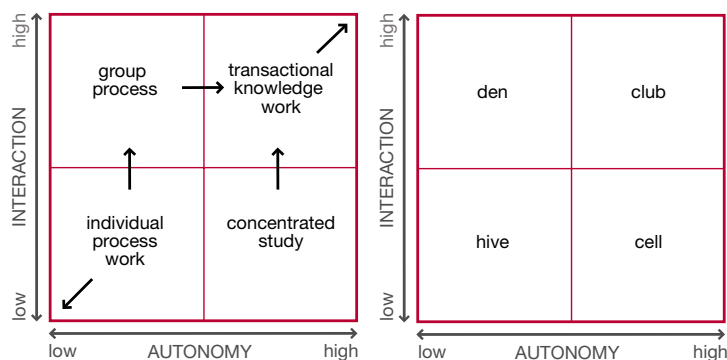


Img. 36 – Cubicle farm (from: www.thewhitereview.org/feature/on-work-roundtable/)

facilitated by advanced telecommunication.

The rising land and rent prices in consolidated areas have led to more and more multinational corporations moving out of urban centers, to industrial parks and underutilized plots accessible only by small train stations and highways.

Many experimental office designs were introduced in the mid-1990s, that suggested an implicit relationship between office design and company success. Frank Duffy addressed to this subject by bringing structure into the debate, proposing a workplace typology which focused on the level of autonomy and interaction of staff, by means of a matrix which placed workplace designs in one of the following categories: the Den (an office which hosts group processes), the Hive (host individual processes), the Cell (hosts concentrated study), and the Club (hosts transactional knowledge) (GULLSTROM, 2010).



Img. 37 - Patterns of work – four major types (from: BRITISH CONCIL FOR OFFICES. (2006). The impact of office design on business performance. BCO Research, pag. 10)

Intense changes in office design in the 1990s also occurred in Internet Companies. Major advances in the development of telecommunications technology have led to the first advances in distance and flexible work. A large number of Internet Companies joined smaller, quirky and colorful offices that spoke to the company's progressive and exciting image. One of the companies presenting these principles is Google. Having always inspired a working culture of collaboration, contribution, sharing of opinions



Img. 38 – Microsoft's Office interior in Redmond (from: www.andrewpogue.com/work)

and ideas, regardless of the employee's role in the company, Google's offices across the world reflect a completely revolutionary style of work at the turn of the 21st century.

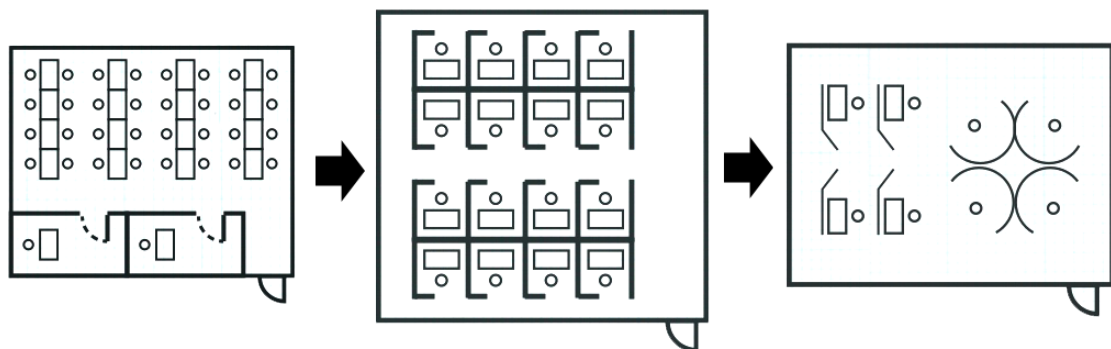
The casual office has been a trend since the mid-1980s, in which creative industry companies born of the advent and rapid arrival of the information age have paved the way. Companies like Apple, Intel, Microsoft, Yahoo, Tesla, among others, have adopted more casual office styles, designed to encourage highly customizable workplaces, suitable for long hours of service (MORGAN LOVELL, 2015).

Nowadays, even companies that do not adopt the concept of "casual style", present more flexible workspaces, due to the rapid technological evolution in recent years, which has provided greater freedom, increased communication and information exchange, more motivation and personal knowledge. In addition, these factors have led to a new project configuration, in which they emphasize the common spaces of work and tend to integrate the upper ranks to the team.

Fonseca (2004) says that standardized work areas tend to be open at this time, with low partitions that allow visual contact between staff members. The same need for eye contact affects the height of other equipment, such as files, usually grouped together for ease of use and rationalization. Eventually, areas with a certain degree of privacy are required for management-level employees, in which case higher partitions or even floor/ceiling partitions may be used, often tinted with transparent materials, ensuring a certain visual permeability. In this new configuration, there was a proliferation of large common spaces, small meeting rooms and areas equipped with coffee machines, soft drinks and tables for chats and group work.

From the evolution of the offices over the last 200 years, it is possible to see that many design elements come, go, reappear and are proposed again. From the great “production line” of the Taylorist offices to the “sea of cubicles,” most office designs have been an extension of the capitalist business character: productivity, profitability, and growth. However, in the last decades, there was the perception that efficient work is closely linked to the quality of the work environment, being the key both to productivity and employee well-being in the workspace.

Img. 39 – Office space evolution – from Taylorist, to the Action Office, to Casual (adapted from: www.officedesk.com/blogs/news/11577469-anatomy-of-the-perfect-office-space)



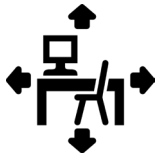
2.3. About the Open Plan Office

The Open Plan Office, since its appearance in the 1950s, has become the most popular spatial organizing style ever since, undergoing changes and modifications over time, but with the same basic principle maintained - the absence of walls which divide spaces. Throughout its application, several studies were conducted in order to relate the interaction of individuals with the built environment. Its defenders anticipated a number of benefits, especially in financial terms and increased communication and collaboration among employees. But after its introduction, failures began to appear, which compromised the environment (DAVIS, LEACH, & CLEGG, 2011). Below is an analysis of the benefits and risks of these workspaces:

- **Benefits of Open Plan Office**



- **Economy:** the reduction of internal walls allowed a greater reach of areas, allowing a greater number of employees to be accommodated, which became an important method in which the organizations managed to reduce their expenses.



- **Flexibility:** it is easier to rearrange furniture in open-plan offices than in closed rooms. This flexibility reduced the costs of future reorganizations, depending on the activity performed or the new technologies implemented.



- **Communications:** it has been suggested that offices that facilitate communications and interactions, both internal and external, between teams would increase interpersonal relationships, reduce conflicts, increase job satisfaction and motivation.



- **Symbolism:** the physical space has the power to inform about the company and its values. Design has been used to connect employees to the mission and organizational functions, symbolically reflecting and promoting the company and its work culture.



- **Professional practices:** the open plan office has been proposed as a means to start and assist more collaborative work practices, to integrate business functions and to reflect the absence of hierarchy.

- **Risks of the Open Plan Office**

- **Lack of privacy:** often associated with such design, reduction of architectural privacy (lack of walls or partitions) and psychological privacy (about the amount of control individuals perceive they have by adjusting their social contact with others, as well as the degree to which they feel visually and/or acoustically exposed) may result in clearly inhibited behaviors, as well as negatively contribute to the cognitive process, task performance, and increased stress.



- **Uncontrollable interactions:** high density in open offices can increase the frequency of uncontrollable interactions (such as conversations that other employees can not avoid hearing). In this way, the space contributes negatively affecting the cognitive process, the performance in the tasks and the increase of stress.



- **Distractions:** cognitive theories indicate that negative outcomes will occur as individuals are subjected to excessive social interactions or distractions, which causes them to be overwhelmed or over-stimulated, resulting in decreased work performance and attention. Increased distractions or disruptions, coupled with reduced levels of concentration and motivation have been consistently associated with the high density of open offices.



- **Low satisfaction with the environment:** especially in open offices with high density or proximity between employees, can lead to a low level of satisfaction with space, being a potential risk of a decrease of job satisfaction.



- **Noise:** it has often been denounced as the biggest problem of dissatisfaction that employees complain about when asked about their work environment, being described as the issue they would most like to be able to control. Studies have found a relationship between increased background noise and the detriment of work performance.





Img. 40 - Illness in the office (from: <https://realbusiness.co.uk/health-and-wellbeing/2017/09/11/absenteeism-vs-presenteeism-worse-remaining-staff/>)

- **Health impacts**

Recent studies have proved that open-plan offices may be detrimental to an employee's health, wellbeing and productivity. According to a survey from Canada Life Insurance (LANDAU, 2014), only 6.1% surveyed thought it was healthy to be in an open-plan environment and just 6.5% thought it was productive. It has also been discovered that employees who worked in this type of space took over 70% more sick days than those who worked from home – 3.1 days off for open plan office workers, over 1.8 sick days off for home workers.

Those working in an open-plan office are also almost six times more likely than home workers to believe their working environment promotes stress (28% vs 5%), with previous research demonstrating workplace stress can significantly increase absence levels (LANDAU, 2014).

According to researcher Dr. Vinesh Oommen, from the Queensland University of Technology's Institute of Health and Biomedical Innovation (2009), "in 90% of research, the outcome of working in an open-plan office was seen as negative, causing high

levels of stress, conflict, high blood pressure, and a high staff turnover". This could be due to the fact that when workers are expected to process a huge amount of information (mostly available through technological means) in an environment of constant stimuli and distraction, they feel overwhelmed (CHUI & VARGA, 2016, p. 21).

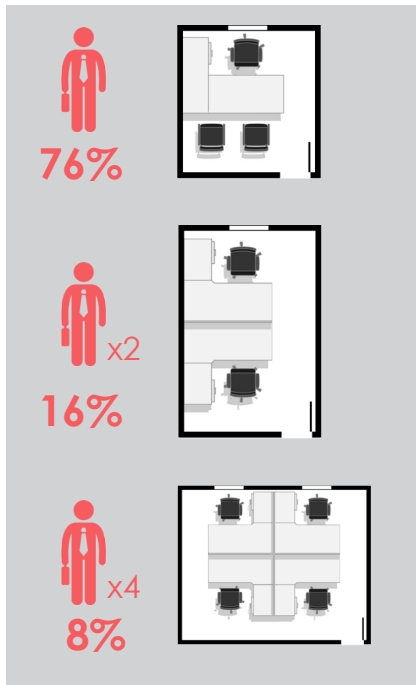
Illness is also an issue in open-plan offices. A study from the University of Arizona (BLUE, 2012) found that when someone comes into work sick, about half of the commonly touched surfaces (telephones, desktops, doorknobs, etc.) will become infected by lunchtime, meaning that employees faced a 40 to 90% chance of infection. Other factors which decreased productivity were employees who were unable to control their own lighting, air temperature, and air quality (CRAIG, 2010).

In general, employees who transitioned from private to open-plan offices experienced a decrease in health, pleasurable work environment experience and performance.

- **The impacts of transition from traditional to open plan office**

A longitudinal study was conducted in 1997 by researchers at the University of Calgary (BRENNAN, CHUGH, & KLINE, 2002) to investigate the effects of the relocation of traditional office workers to open plan offices, consisting of three evaluation periods, to assess the impact of long-term change from office to employee satisfaction with the physical environment and work productivity, as well as to determine if perceptions have changed over time.

Data were collected before, shortly after and after 6 months of relocation, in which employees were questioned using four outcome variables: (a) satisfaction with the physical environment; (b) perceptions of physical stress in the office environment;



PREVIOUS ORGANIZATION



NEW ORGANIZATION

(c) satisfaction with team members, and (d) perception of performance at work. Twenty employees participated in the study.

The originally occupied office was located in a skyscraper in the center of a large metropolis. The employees were then relocated to a building in an industrial park in the same city. In addition, most of them changed from a traditional office organization (76% had private rooms, 16% shared a room with another employee, and 8% shared a room with two to four employees, with partitions to separate them) to an open plan space (81% shared a room with two to four employees, with partitions to separate them, 5% worked in an open space with up to nine employees, and 14% shared a room with another employee).

The questionnaire developed for the research consisted in the evaluation if the participant agreed or disagreed with items in the following categories: Physical environment, Physical stress generators, Relationships with team members, Performance, and Protocols. The results obtained in all categories indicated that employees were significantly less satisfied with the open office, and such opinions remained constant in Time 2 (shortly after the change) and Time 3 (after 6 months of change). As for the Protocols, which were "rules" applied by the office to control employee behavior (such as to control the volume of phone conversations), employees replied that they were non-existent.

It is possible to perceive that the employees appeared to be negatively affected by the relocation to the open offices, reporting a decrease in their satisfaction with the physical environment, an increase of physical stress, a decrease in the relationship with the colleagues and less perception in the performance in the work, besides that such factors did not change over time. This indicates that the employee did not adapt to the new office environment, in addition to continuing to find the increase in the number of disruptions and

counter-productive distractions.

The results obtained are consistent with other studies, such as Sundstrom et al. (1980) who found that employees with more demanding jobs were more negatively affected by open plan office conditions, just as employees generally prefer privacy rather than affordability. Other studies by Marans and Yan (1989), Sundstrom et al. (1994) and Spreckelmeyer (1993) suggest that small-scale attributes such as workplace lighting, individual work surface size, office privacy, and noise are responsible for a substantial increase in employee satisfaction with their work environment and beyond the organization of the office itself. Hedge (1982) indicated that the most frequently reported disruptions in open offices are related to peer behavior, suggesting that protocol implementation would be useful.

The study then ends with some suggestions for change in the space analyzed, such as the addition of break rooms (for private conversations, meetings and phone calls), the establishment of protocols in the office and the adequacy of sufficient workspace for employees who complained about insufficient space.

2.4. The difference between workplace and workspace

The office design for an organization depends on a variety of factors, including economics costs and worker performance. Facilities cost constitute the second largest financial overhead for most organizations, with staff being the first (FANGER, 2012). Therefore, a balance must be achieved, given the significant cost of these variables on an organization. It's important, then, to comprehend why there's a resistance with densifying work environments, meaning to understand people's emotional attachment to what the space symbolism for them.

Workspace exclusively references the physical

elements of the office, while *workplace* is meant to signify the emotional aspect that people are attached to (CHUI & VARGA, 2016, p. 15), it can reflect the employee's status and identity in the organization. According to Dr. Vischer (2005, p. 46), seemingly rational and innocuous design decisions carry significant consequences in regards to how they are perceived by the employees, that is, it can have unanticipated and unintended consequences which can intensify opposition and reaction to office changes between management and staff. She conducted a research that analyses the symbolic meanings of workspace decision can have on employee's perception in the workplace.

- **Flexible furniture layouts:**

Companies require environments to be both flexible and constantly producing, where the employees can change and reform into different teams depending on the nature of the project, moving to several locations throughout the year. Therefore, the *workspace* should be easy to modify to suit different needs. This can also mean, as a *workplace*, that there are fewer opportunities for personalization and representation, where the employee without an assigned workspace can feel 'homeless'.

- **Shared file storage:**

With technology, much of the office work has become computerized. However, there is still a significant amount of paperwork for record keeping and the need for a hard copy/paper trail. The *workspace* has changed to reduce clutter, whether with a sharing file storage, digital storing on a cloud or external hard drive, or use storage spaces in a different location. As *workplace*, the employee can feel as a loss of one's "history" since it is a physical manifestation of a person's past with the company. It disposal can make people feel unrooted, where the record of your personal contribution to the company may be lost.



Img. 41 – Flexible office in Los Angeles (from: www.thecollection527.com/monthly-shared-spaces.php)



Img. 42 – Off-site record storage space (from: www.cordmoving.com/commercial-services/document-storage)

- **Shared offices:**

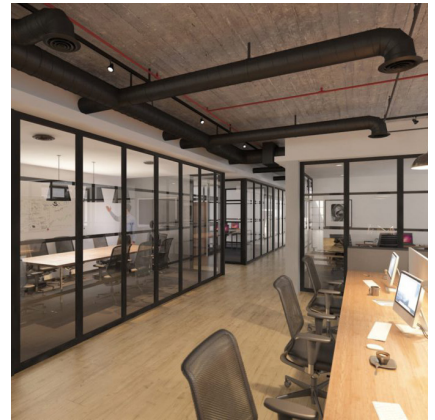
Greater mobility and flexibility has been granted to people, with the advancements in technology, meaning that employees often are away from their desks for long periods of time. To increase use of this empty space, certain office design concepts transform these spaces into collaborative areas, meaning a workspace with meeting rooms, project rooms and even private offices for use on a shared basis. An employee can perceive, as workplace, no right to privacy, not having a place to identify as your own, what weakens the sense of belonging to the company.

- **Low partitions:**

In a workspace, a reduction towards the number and height of partitions between work desks have many reasons – to allow more natural light, the reduce the “forest” feeling, to create a more interesting visual environment, to improve communication and information exchange between people, to increase visibility of teams, to help air circulate better. As a workplace, however, this means a lack of privacy, a constant surveillance. Constantly being under observations means the performance is being checked up on and there’s less autonomy in how you do your work. With increased visibility, there’s less control over information.

- **Informal meeting places:**

Aiming to facilitate increased collaboration and creativity, companies look towards office design as spatial opportunities for people to see each other and communicate informally, increasing choice and diversity of places to meet in the workspace, like open kitchen/coffee areas, alcoves off corridors, town squares, and many other. The interpretation of these spaces depends on the mindset of the individual. For some, these can represent a workplace with lack of formality necessary for the presentation of their work. To others, they are not a legitimate work environment.



Img. 43 – Shared office space to rent (from: www.thebusinessexchange.co.za/shared-office-space-to-rent/)



Img. 44 – Office desk with low partition (from: <https://bit.ly/2zc2Vk5>)



Img. 45 – Communal office area (from: www.camenzindevolution.com/Office/Google/Google-Hub-Zurich)

Many employees may feel like these spaces are meant solely for socializing, where they could be “penalized” because they are not doing the “traditional” forms of work.



Img. 46 – Working from home (from: www.womansday.com/life/work-money/g934/best-work-at-home-jobs)

- **Mobility**

Companies are now looking into alternative ways of interpreting what constitutes a workspace. From programs of work-at-home to encouragement of employees to work at areas more convenient to them, such as coffee shops or libraries, a company can reduce its accommodation cost, or even eliminate the office space at all. For an employee, this can imply a feeling of instability and uncertainty, in a workplace rarely visited – where can you do your work, where others can find you, where can you store your files? A sense of being “replaceable” may come up.



Img. 47 – GSA's meeting to enlist employees in the workplace design process (from GSA OFFICE OF GOVERNMENTWIDE POLICY, 2006, Workplace matters. Pag. 18)

- **Employee participation**

To improve the employee adaptation to new workspaces, companies provide opportunities to engage them in design decision-making, by exposing drawings, models, and furniture mock-ups. As workplace, the employee participation process needs to be designed to fit the resources and opportunities available. If the management has already made up its mind, asking workers opinions is an empty gesture, and they may feel they are being deceived.

1960



1970



1980



1990



2000



2010



3. PSYCHO-SPATIAL NATURES: THE INTROVERT IN THE OFFICE SPACES

3.1. Evolutionary analysis

Whether introversion is seen as a type or psychological trait, it's clear that people in this group have some specific characteristics and needs. They tend to respond more intensely to sensory stimuli, and they need typically need quiet, calm, distraction-free environments to be truly productive. Such spaces are scarce in office environments, from the pinnacle of Taylorism to contemporary open-plan offices. As consequence, they feel often uncomfortable when being watched, and the stress of a shared office can lead to a state of constant overstimulation, which is incredibly detrimental to their overall health (GREENE, 2017).

Only in recent years have some companies been truly concerned with the quality of the workspace and its relationship to employee productivity, thus enabling happier employees and more efficient results. This is achieved through flexible spaces, that combine private rooms, collaborative zones, and communal areas to create a hybrid office, wherein employees have the autonomy to work in the location that best benefits their tasks and mood.

To perceive this evolution in a more visual way, an analysis of some significant offices, in different locations and of different time periods, will be conducted, in order to relate its spatial characteristics with the impact of a possible introvert employee.

Img. 48 – The evolution of office furniture
(adapted from: www.officedepot.com/cm/article/the-evolution-of-office-furniture)

The parameters of analysis, in order to compare different case studies, are:

Building characteristics:

General characteristics of the building architecture, as well as the office organization.

Health conditions:

Investigates the healthfulness of the office environment, such as ventilation, air quality, and natural lighting.

Comfort:

Examines proprieties related with the employee comfort in the office, such as adequate furniture, acoustic and lighting systems control and the possibility of outside view.

Privacy:

Analyse if the office organization is capable to provide privacy for the employee.

Flexibility:

Through the office disposition analysis, it seeks to understand if the space was capable of a flexible rearrangement and if the employees have the power to vary their workplace.

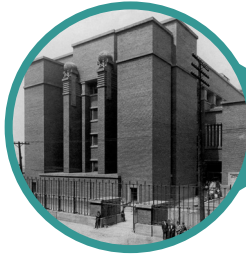
Distractions/stimuli control:

Analysing the office arrangement, it investigates if the physical conditions would create an environment where distractions would easily occur; and if the employee has any power to control the surrounding stimuli.

Conclusion:

Taking into consideration the parameters investigated, it seeks to deduce how an introverted employee would feel in such office space.

1904
Larkin
Building



1960
Bertelsmann
Office



1986
Lloyd's
of London



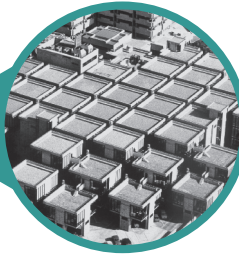
2012
PNUD
Building



1952
Lever
House



1972
Centraal
Beheer Office



2008
Google
Hub



2017
Shanghai
Sunrise Polymer
Material Office





Img. 49 - Larkin building exterior (from:
<https://flwright.org/researchexplore/wrightbuildings/larkincompanyadministrationbuilding>)

3.1.1. Larkin Building

Building characteristics:

The project aimed to ensure the highest levels of efficiency, productivity, and cooperation among its employees. The five-story building was hierarchically divided, a way for managers to control employees and promote efficiency among them. At the central atrium, employees with lower positions were arranged in groups of tables. As the importance of the job position increased, they were arranged in upper gallery levels, reaching the last one, with private offices.

Location: Buffalo, NY – USA

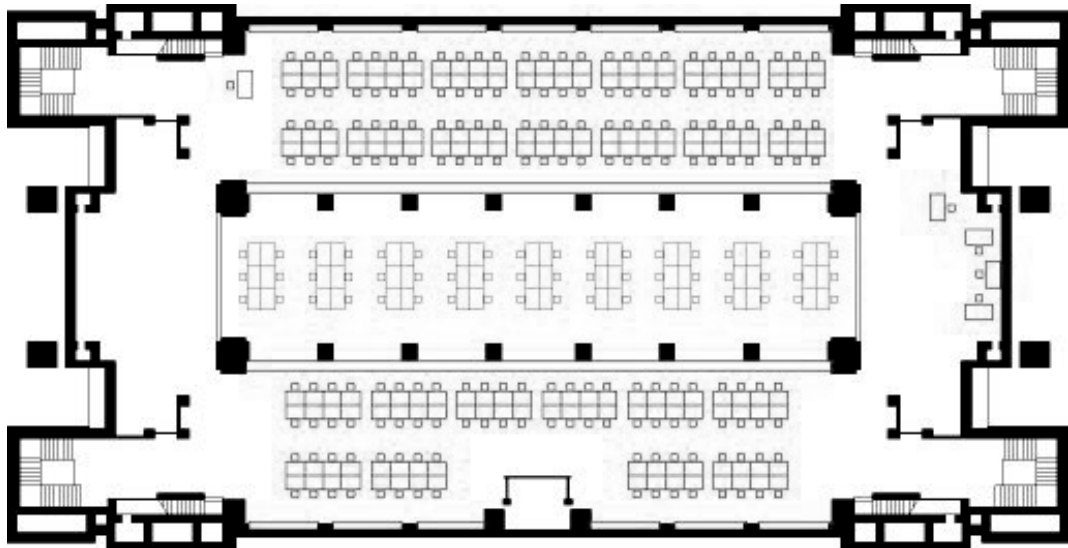
Architect: Frank Lloyd Wright

Year of inauguration: 1906

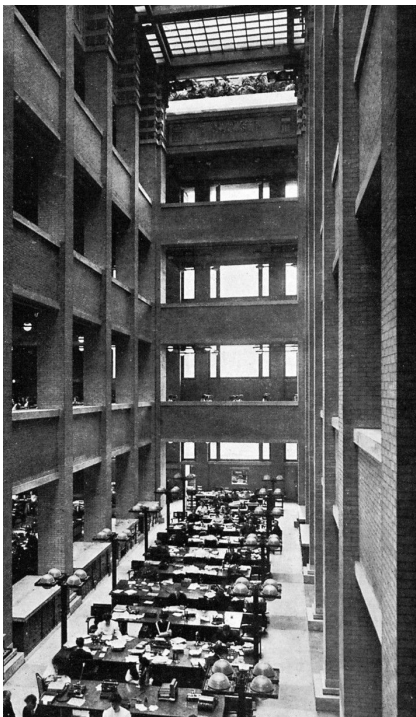
Purpose: headquarter of the Larkin Company

Type of work: Bureaucratic

Office concept: Taylorist



Img. 50 – Second level floor plan (from: <http://fredvanamstel.com/blog/the-flexibilization-of-workspaces>)



Img. 51 – View of the central atrium (from: <https://offramp.sciarc.edu/articles/possible-volumes>)

Health conditions:

An innovative central system of air renewal and climatization was designed by the architect, that included pipes embedded in the masonry and supply and return louvers. The central atrium was illuminated by a wide skylight. Large windows helped to illuminate the gallery levels, but the high sill made impossible for people to look outside.

Comfort:

The furniture was designed by Wright and counted with folding chairs that cantilevered from most metal desks. While it made cleaning easier, the limited arc of movement may have been uncomfortable over the workday. Good quality furniture was present only in the boss private office. The building presented a communal dining facility, classrooms, and lounge area, that desired to promoted a congenial office culture.

Privacy:

Since the work was conducted mostly in collective, shared spaces, privacy wasn't easily achieved. Most of the employees worked in desks disposed next to one another, having a supervisor facing them directly. Some in the management level had enclosed offices, that was shared with a few others. Only the boss, John D. Larking, had a private office.

Flexibility:

Employees had fixed workstations and did not have the possibility to change it as they wished. The office organization did not make it easy to rearrange the furniture.

Distractions/stimuli control:

Due to the collective arrangement, visual and auditive distractions did not have a way to be controlled, what would generate a high level of stimuli.

Conclusion:

Typical of a Taylorist office, the worker efficiency was the goal to be achieved, following the rationalist principles of Frederick Taylor. The space was planned to advocate segregation as a way to reaffirm hierarchical differences, aiming at encouraging internal competition and stimulating individual performances. However, this competitive atmosphere, of clustered workspace and constant supervision, without the possibility to an outside view, in fixed and uncomfortable furniture, overexposed to all the distractions, should have created a considerable level of stress, especially for introverted workers.

Sources: Frank Lloyd Wright Trust, Fonseca (2004), Pei (2014), Puma (1978)



Img. 52 – Desks in the ground floor (from PEI, 2014, pag. 6)



Img. 53 – Collective workspace (from: <http://wrightchat.savewright.org>)

Img. 54

Shared enclosed office
(from PEI, 2014, pag. 8)

Img. 55

Typewriter operator's department on
the second floor (from Ibid, pag. 7)





Img. 56 – Lever House exterior view (from: <https://medium.com/@SOM/how-the-leopard-got-its-spots-c5eafced505b>)

3.1.2. Lever House

Building characteristics:

Following the Modernist International Style, the Lever House was the first rationalist skyscraper to adopt the curtain wall. It's composed by a 24-story vertical slab rising above a horizontal base, which introduced the concept of opening a portion of the ground floor to public use and of providing an open courtyard at its base. The second floor, which hovers over the entire site, contained the dining room. Above, the tower rises to house 19 floors of executive and administrative offices of the company, accommodating approximately 1200 employees. Three additional floors accommodate the mechanical equipment.

Location: New York, NY, USA

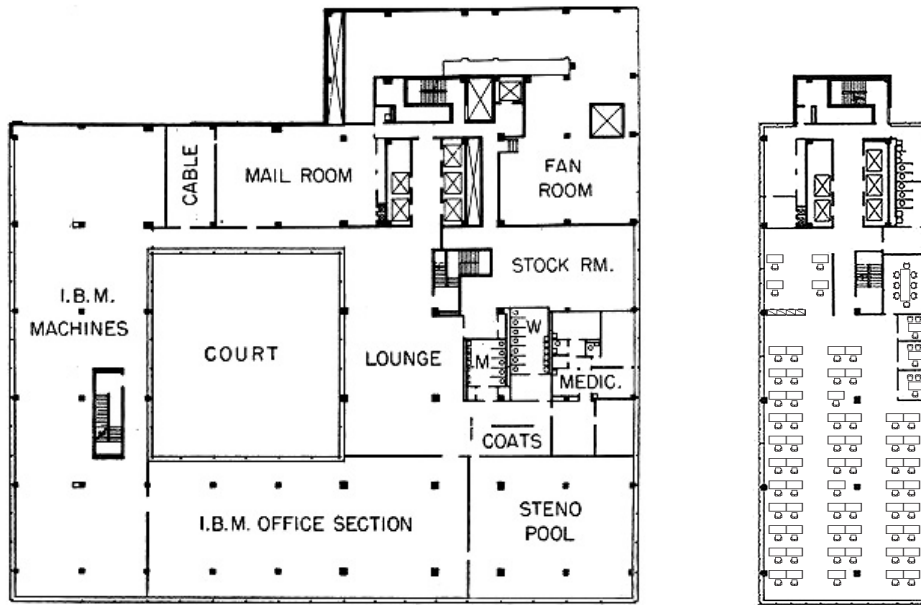
Architect: Skidmore, Owings and Merrill

Year of inauguration: 1952

Purpose: headquarters of the soap company Lever Brothers

Type of work: Bureaucratic

Office concept: Open-plan



Img. 57 – Floor plan of second floor and typical floor (from: ARCHITECTURAL RECORD, 1952, pag. 132)



Img. 58 – Exterior view (from: <https://medium.com/@SOM/how-the-leopard-got-its-spots-c5eafced505b>)

Health conditions:

The curtain wall allows ample natural lighting on its pavements. Besides, since all of the building glass is fixed, a mechanical system provided all ventilation, heating, and cooling.

Comfort:

The attention to occupant's comfort was a special feature of the building, including the provision of employee lounge and recreation space. Criteria for such spaces include being near to the workspace but providing a 'real change of scenery'; selecting interior finishes and furnishings to create a 'cheerful atmosphere'; connecting to the outdoors where possible; and considering air, light, and sound controls. The curtain wall and the tower width of 15.24 m made it possible an outside view accessible to all workers. The desk was old-fashioned, with rounded corners and adjustable heights, was never too far from a window.

Privacy:

Since most of the office levels had an open-plan concept, employees worked in a shared space, with a fixed workstation. This reduced the possibility of privacy, but the presence of spaces to rest, such as the cafeteria and the lounge, contributed to creating a variety of environments, where the employee could achieve privacy. There were individual offices present in some levels, reserved for higher-rank employees.

Flexibility:

Its independent structure admits various arrangements of internal organization. In its standard pavements, the free-plan allowed a wide range of arrangements, from private rooms to shared spaces.

Distractions/stimuli control:

Due to the open-plan concept of the office, the collective spaces where most of the work were conducted were subjected to all the visual and auditive distractions, without a way to be controlled by the employee.

Conclusion:

Lever House is considered a mark of the modern International Style in postwar America. Since its conception, it showed concerns with the human-scale. It was committed to creating more than an effective or pleasant office space. Indeed, the egalitarianism in the use of spaces, as the interior decoration, shows how it becomes a receptacle for human-centered values. For those reasons, an introverted employee should feel more comfortable in this space, especially because of the differentiated range of areas to rest, although the open-plan environment should create enough distractions that could affect their well-being and productivity.

Sources: Architectural Record (1952), Fialho (2007), Herrera (1982), Munson (2012), Saval (2014), Som (2015).



Img. 59 – Private office (from: Ibid)



Img. 60–Cafeteria (from: www.metalocus.es/en/news/gordon-bunshaft-and-som-nueva-york-lever-house)

Img. 61
Empty office view (from: Ibid)

Img. 62
Office interior view (from: Ibid)



61



62



Img. 63 – Bertelsmann office interior
(from: <https://www.buerolandschaft.net/en/landscapes/detail/buch-und-ton/>)

3.1.3. Bertelsmann Office

Building characteristics:

During the 1960s, the German consulting company Quickborner Team idealized a new office concept - the Bürolandschaft or Office Landscape. Following the principles of communication, flexibility, and technology, the internal space was deprived of private rooms, with the furniture and equipment being arranged in a way to follow the information flows. Employees, regardless of their job position, were accommodated in the same ample space, thus eliminating the hierarchical order. The first panoramic office project developed was for the German company Bertelsmann, in Gutersloh. The building had a large rectangular floor-plan with removable partitions and lightweight furniture as the main structuring elements.

Location: Gutersloh, Germany

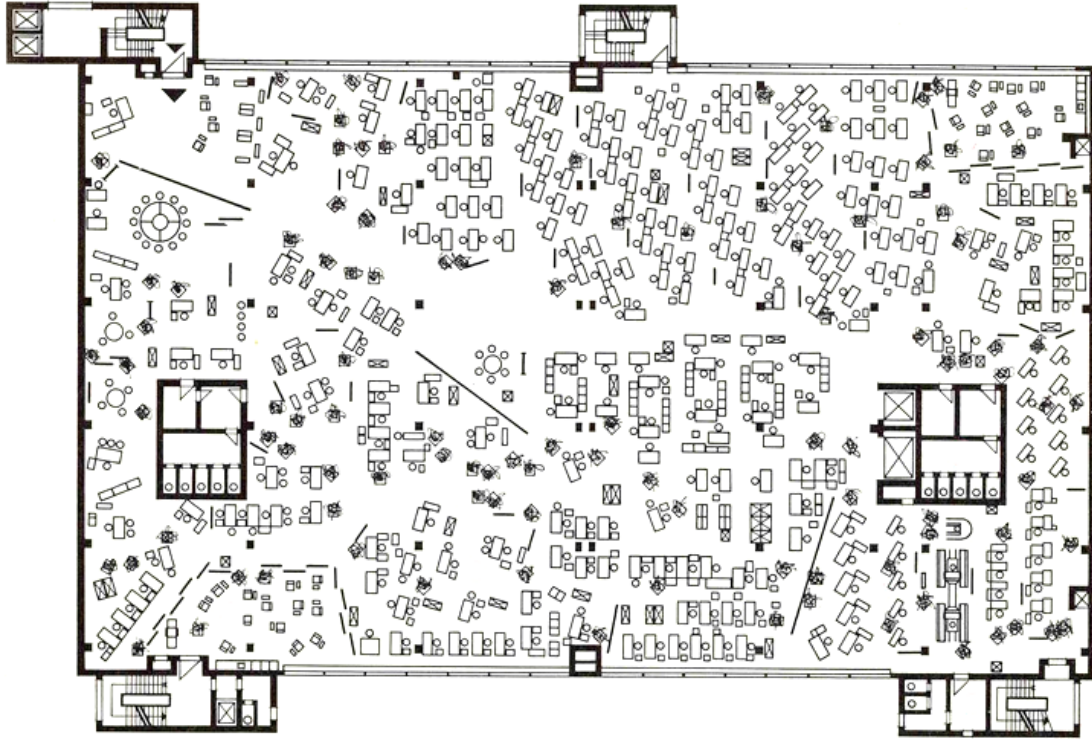
Architect: Quickborner team

Year of inauguration: 1960

Purpose: Bertelsmann Publishing Company office

Type of work: Creative and clerical

Office concept: Bürolandschaft



Img. 64 – Floor plan (from: <https://www.stylepark.com/en/news/how-the-office-became-what-it-is-today>)

Health conditions:

Due to the great depth of the floor plan, there were few tables capable of receiving natural ventilation and lighting. Mechanical systems were responsible for the ventilation and artificial lighting illuminate the floor.

Comfort:

The Bürolandschaft presented informal break areas, delimited by acoustic screens and plants, where employees could retreat for conversation and coffee at their leisure. It was, however, not possible control over environmental systems (temperature and lighting), what could affect the employee level of comfort. An outside view through the large windows was possible, although many workstations found themselves far from them.



Img. 65 – Break area (from: <https://www.buerolandschaft.net/en/landscapes/detail/buch-und-ton/>)

Privacy:

There were no closed offices, all desks and equipment were disposed in the same open floor. All employees, regardless of their rank or position, were accommodated in the same space, in an organic and free-flowing pattern. A few mobile partitions and plants shielded certain sections and workers from other. Therefore, it's possible to affirm that privacy wasn't possible in this workspace.

Flexibility:

This was the main goal to be achieved with this office concept. The space could be rearranged at will, at virtually no expense at all, due to the large open-plan. Nearly every aspect of the design is mobile, making it easy to change furniture position according to the needs. The employee, however, didn't have access to a variety of workspaces, being bound to his own desk.

Distractions/stimuli control:

Carpets, ceiling treatment and partitions with acoustic treatment surfaces tried to control the noise, a common problem in an open plan, but it was never fully solved, since high-pitched noises, like ringing telephones and typewriter strokes, carried unimpeded throughout the office. The space "openness" also created visual distractions, since all office was visible, with only some vertical partitions and plants to shield certain sections.

Conclusion:

This innovative office concept was successful in its proposition – to create a space to promote higher interaction between employees, faster communication and reduce hierarchical segregation. However, the completely open organization reduced considerably the access to privacy at the office, subjecting the employees to high levels of distractions and stimuli, without control over environmental systems. For an introvert, this space, although interesting, should compromise his work efficiency and personal well-being.

Img. 66

Test set-up in the space in order to test the visual effect of the layout (from: www.archplus.net/home/news/7,1-4651,1,0.html?referer=131)

Img. 67

Interior view of the accounting division of the Bürolandschaft (RUMPFHUBER, Andreas. 2011. The Legacy of Office Landscaping: SANAA's Rolex Learning Centre. IDEA Journal, pag. 23)

Sources: Fonseca (2004), Saval (2014), Van Meel (2000).





Img. 68 - Centraal Beheer office building
exterior view (from: www.ahh.nl/index.php/en/projects2/12-utiliteitsbouw/85-centraal-beheer-offices-apeldoorn)

3.1.4. Centraal Beheer Office Building

Building characteristics:

The structuralist office building was designed as a single articulated unit, consisting of 56 tower-like cubes connected on each floor by overpasses. The building, that presents a repeated standard pattern, consists of four quadrants separated by a neutral zone containing circulation, toilets and plant rooms. Three quadrants serve as office space, the fourth contained general spaces, as a restaurant, recreational areas, and public functions. Inside, the space is equally developed in vertical and horizontal direction, with an extensive central street area.

Location: Apeldoorn,
Netherlands

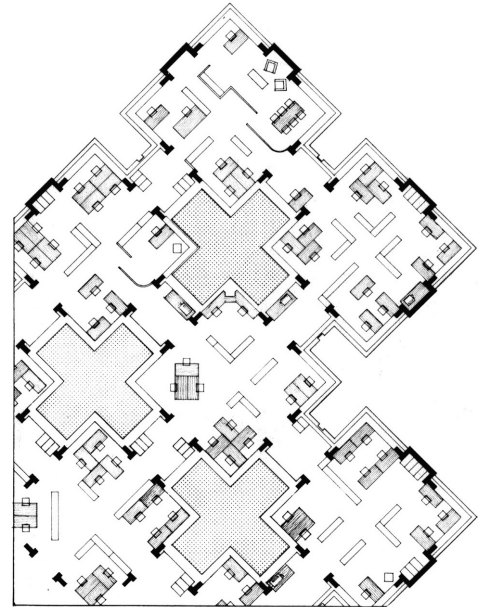
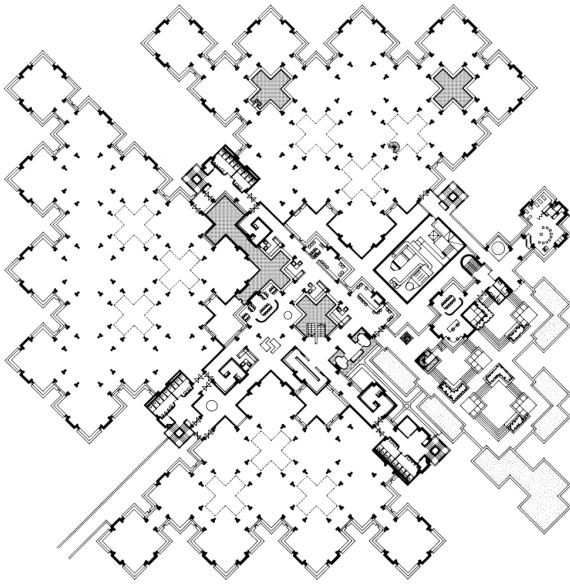
Architect: Herman
Hertzberger

Year of inauguration: 1972

Purpose: Centraal Beheer
Insurance Company office

Type of work: Bureaucratic

Office concept: Open-plan



Img. 69 – Ground floor plan and closeup view (from: Ibid)



Img. 70 – Interior view (from: Ibid)

Health conditions:

The illumination throughout was an integral part of the architecture, conceived in terms of street lighting. Large windows at the cube's corners and the transparency of the glass-roofed at the atria provide natural illumination. Mechanical systems were responsible for the office ventilation.

Comfort:

Since the beginning of the design process, user satisfaction and well-being were one of the principal concerns. Hertzberger wanted a place where the employee would have the feeling of being part of a working community, without being lost in the crowd. Adequate workspaces, that could be decorated with the employee own furniture or ornamentation, helped to create a comfortable environment. There were also communal areas in each corner, to have coffee, relax or to hold meetings.

Privacy:

The concrete cubes were the building blocks of the design. With 9 by 9 meters, each cube accommodated around 10 employees. They provided enough privacy to allow employees to concentrate on their work when it was required, but they were also open enough for communications between staff of different departments to take place. The communal areas also were an option when the employee needed a more reserved space.

Flexibility:

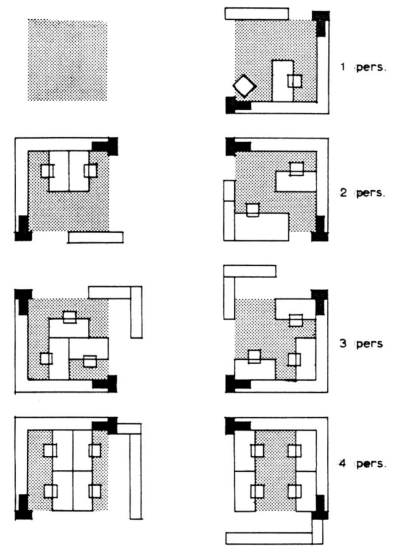
The structuralist characteristic of the project granted regular spaces (cubes) that could be used in many different ways, allowing different functions (workspace or common space) and furniture dispositions. Although the employee had a fixed workstation, he could choose from a variety of spaces to work with.

Distractions/stimuli control:

The small number of occupants in the cubes and the threshold that separate them minimized the acoustic and visual distractions usually caused by open plan offices.

Conclusion:

After the fading of Bürolandschaft, new office solutions began to arise, aiming to balance the employees' personal liberties and the free flow of communication within the office. The Centraal Beheer office manages to solve important problems usually present in open-plan configurations. It used the building shell to define but not enclose units of space, creating a well-balanced proportion between privacy and openness. The user personalization to the workspace, as the presence of plenty common areas to relax, helped to create a more comfortable environment, where the employee could control the level of distraction and achieve a better performance. For those reasons, an introverted employee would feel more comfortable, being productive without compromise his well-being.



Img. 71 - Examples of offices arrangements (from: Ibid)



Img. 72 – Office view (from: Ibid)

Img. 73
Common area (from: Ibid)

Img. 74
Interior view (from: Ibid)

Sources: Architectureguide (n.d.),
Hertzberger, Lin (2016), Saval (2014),
Van Meel (2000).





Img. 75 – Lloyd's of London exterior view
(from: https://commons.wikimedia.org/wiki/File:Lloyds_building_London.jpg)

3.1.5. Lloyd's of London Building

Building characteristics:

The building design was a response to the client's need for flexible space to accommodate its growing demand over the years. It consists of six service towers attached to the glass office box and its 13-story central atrium space, topped by a barrel-vaulted roof of glass. Around the atrium, on the lower floors, are the underwriters' boxes of each insurance syndicate. The higher floors contain offices for the management and executive staff. The building also presents a semi-public area housing Lloyd's restaurant and coffee shop, a wine bar, library, meeting rooms and reception. Concrete, steel, and glass are the main materials used in this High-Tech building.

Location: London, UK

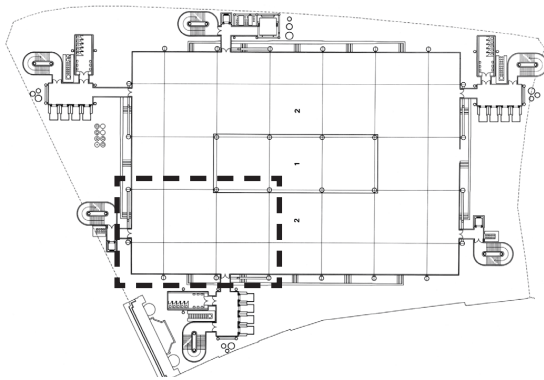
Architect: Richard Rogers and Partners

Year of inauguration: 1986

Purpose: Lloyd's of London Insurance Company

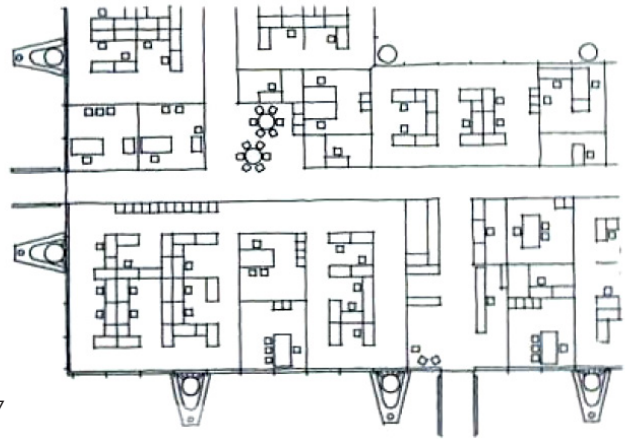
Type of work: Bureaucratic

Office concept: Open-plan



76

Img. 76 – Typical floor plan (from: www.rsh-p.com/projects/lloyds-of-london/)



77

Img. 77 – Typical floor plan – closeup (from: VAN MEEL, 2000, pag. 45)



Img. 78 – Atrium view at 11th floor (from: https://commons.wikimedia.org/wiki/File:Lloyd%27s_Building_-_Atrium_11th_floor_looking_at_the_Walkie-Talkie.jpg)

Health conditions:

The essence of Lloyd's servicing system is the use of the atrium form, concrete structure and triple-glazed cladding as active elements. Conditioned air is distributed through a sub-floor plenum into the offices, while stale air is extracted from above through the lighting units, that passes to the perimeter of the building and forced through the triple-layered glazing. The large atrium and the glass panels that envelopes the building brought daylight into the deep plan form, complemented by custom light fixtures.

Comfort:

Productivity issues dictated a high level of occupant comfort. The custom-designed modular workstation consists of the only principal interior element. It's readily demountable and easily connects to distributed services beneath the floor panels. Each workstation provides individual controls for task lighting and air distribution.

Privacy:

Due to the nature of work conducted inside the building, the workspace required constant communications between the staff, especially the underwriters, that occupied the four lower levels. Their space consisted of a complete open-plan and their office stalls, or boxes, consisted of a desk shared by 4 or more employees. They didn't have an easy access to privacy in the office. Only managers and executives had private or shared enclosed offices, in the building's higher levels.

Flexibility:

Lloyd's expected this building to serve its expansion, or contraction, for the next 50 years. Therefore, the flexibility of spaces and the ability to change their functions without disruption were vital. This need gave form to the building, by allocating all renewable elements required by a complicated office building to the extremity of the floor plate and giving the central plan the flexibility to act as a space-efficient, single marketplace. More sections could be added to the large concrete frame, if necessary.

Distractions/stimuli control:

The open spatial planning, combined with the intense activity of work, should create a highly stimulant space, with visual and acoustic distractions that could affect any employee, that didn't have a way to control it.

Conclusion:

The activity inside Lloyd's resembles that of the trading floor of a stock market rather than the business of a typical office. Despite the quality of the spaces, many distractions could occur, whether by the constant noise of the work, or by the broad view to practically all levels through the atrium, and therefore negatively affect the employees, especially an introvert one. However, to work for this type of company, one should expect to know how to deal with this particular office environment.



Img. 79 – Office view (from: www.theworkplacecompany.co.uk/London-Buildings/TheLloydsBuilding.html)



Img. 80 - 'Box' workstation (from: <https://dasbf.com/case-studies/lloyds-of-london/>)

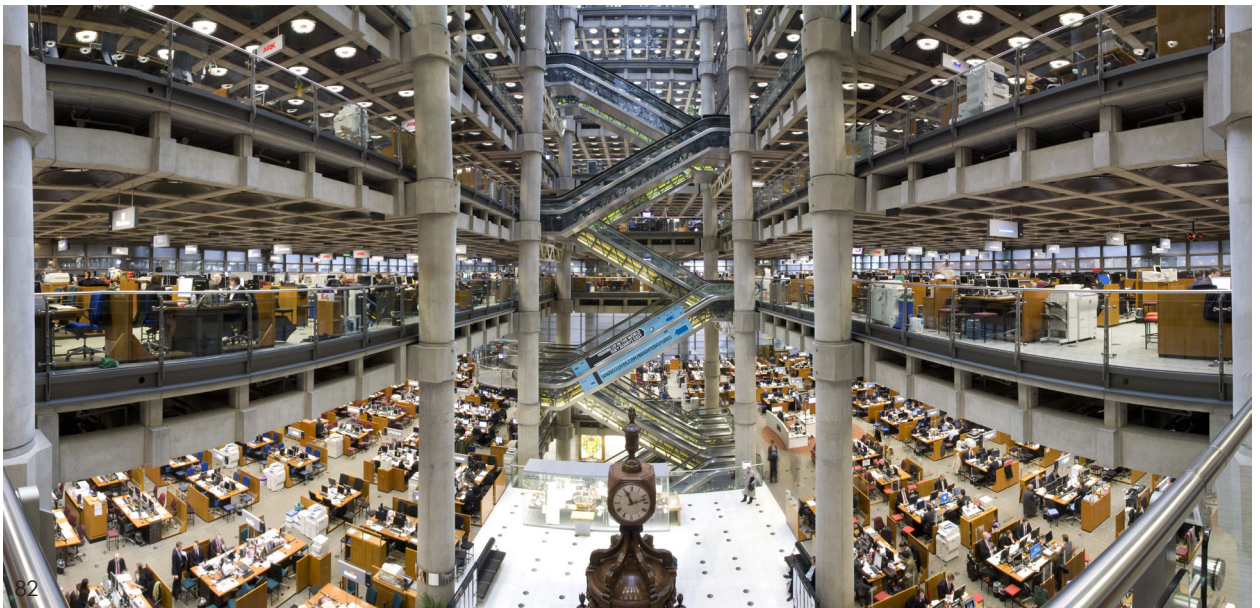
Img. 81
Trading floor (from: <http://thelondoncityguide.co.uk/lloyds-of-london/>)

Img. 82
Interior view from the atrium (from: https://commons.wikimedia.org/wiki/File:Lloyd%27s_building_interior_2.jpg)

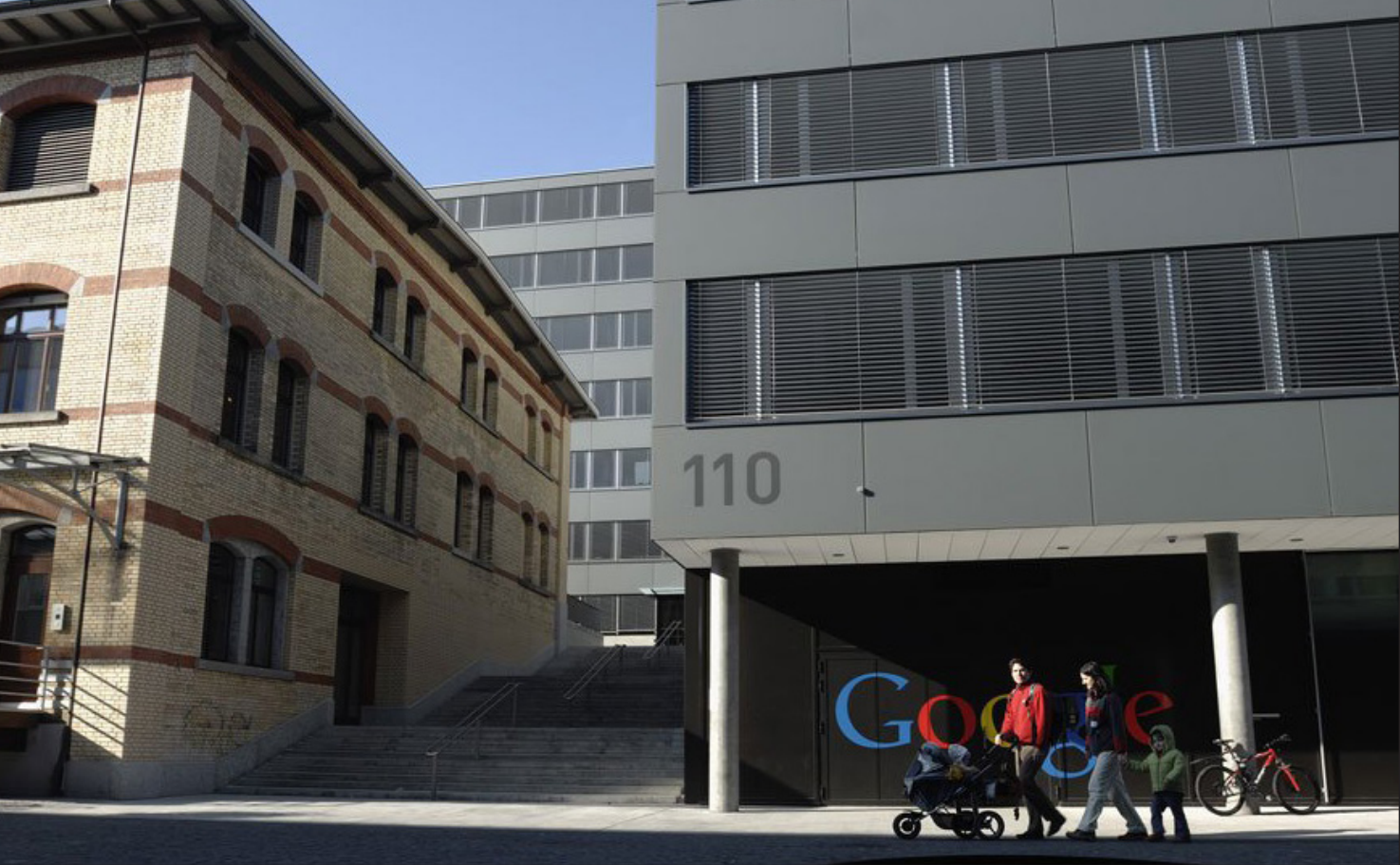
Sources: Bachman (2004), Goldberger (1987), Kroll (2010), Rogers, Stirk, Harbour + Partners (n.d.), Van Meel (2000)



81



82



Img. 83 – Google Hub exterior view
(from: <http://www.businessinsider.com/googles-zurich-office-2013-12?IR=T#its-a-pretty-nondescript-building-from-the-outside-1>)

3.1.6. Google Hub

Building characteristics:

The Google building is a contemporary seven-story shell and core office block offering 12000 m² floor area for up to 800 staff. The employees were a key element during the design process to create their own local identity. The office areas are organized along a central core and are a mixture of open-plan workspaces for 6-10 people and enclosed offices for 4-6 people. To have more communal and meeting areas was also a requirement decided by the employees. Consequently, there are a large number of small to medium-size meeting rooms situated throughout the office space, besides the many informal meeting areas, which have a more relaxed atmosphere.

Location: Zurich, Switzerland

Architect: Camenzind
Evolution

Year of inauguration: 2008

Purpose: Offices for Google's
EMEA Engineering Hub

Type of work: IT related

Office concept: Flexible



Img. 84 – Floor plan level 2 (from: <http://www.camenzindevolution.com/Office/Google/Google-Hub-Zurich>)



Img. 85 – Interior view (from: Ibid)

Health conditions:

The building shape (like a “Z”) allowed that the large windows provided natural lighting to the office, optimized by the glass partition system of office enclosures, which maintains transparency and optimizes daylight. Mechanical systems deal with the air quality and conditioning, while artificial lightning complement the office illumination.

Comfort:

Through questionnaires, workshops, and interviews, information about the employee’s personality type, representational systems, values and motivational factors were provided, thus revealing that their optimal working environment needed to be diverse and at the same time harmonious whilst making it a fun and enjoyable place to work in. This is reflected in a diversity of working and communal spaces, providing a great choice of environments to suit their individual needs.

Privacy:

The employee's survey showed that the personal workspace needed to be functional and more neutral. They were therefore designed with a high degree of space efficiency. All office enclosures are constructed using a glass partition system, which contributes to achieving the required degree of privacy for working teams. Besides, the employee can choose between a variety of spaces, like Igloo cabins or ski-gondolas, to suit individual needs of privacy.

Flexibility:

The flexibility is achieved in this office with the great variety of working and communal spaces. Besides, since the employee moves on average twice a year within the building, the office layout was designed for maximum adaptability so that all groups and departments can use any part of the office space.

Distractions/stimuli control:

The office was designed to suit different working needs. From shared working spaces to individual ones, the employee is able to control the degree of stimuli it receives, since he has the liberty to choose where to work.

Conclusion:

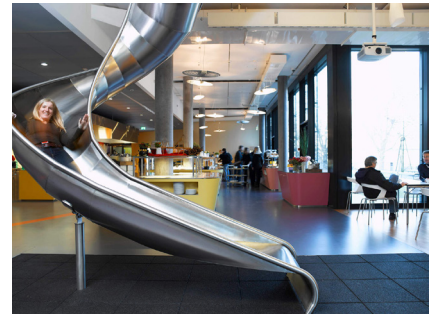
For an introvert, this office should be ideal. Starting with the involvement in the design process, which was able to identify their preferences, to the creation of spaces suitable for all. The solution of a diverse workspace is fundamental to suit a variety of types of people, who have varied and not always constant preferences about their workspace. An introvert, like the extrovert, is then able to choose where to work, sometimes reserved, sometimes as a team; sometimes routine, sometimes casual.



Img. 86 – Igloo meeting pods (from: Ibid)



Img. 87 – Contact with vegetation
(from: Ibid)



Img. 88 – Slider to communal area
(from: Ibid)

Img. 89
Office view (from: Ibid)

Img 90
Ski-gondolas as working area (from: Ibid)

Sources: Archdaily (2009), Carmenzind
Evolution (n.d.).



89



90



Img.91 – PNUD Building exterior view (from: www.galeriadaarquitectura.com.br/slideshow/newslideshow.aspx?idproject=1106&index=1)

3.1.7. PNUD Building

Building characteristics:

The project to the local UN headquarters was chosen through an architecture competition. The original program foresaw around 15,000 square meters of built area to house agencies, funds and programs of the UN in Brazil. However, due to complications, the winning project has remade to adequate new conditions and now covers a building with about 1/5 of the originally planned area. With two levels, the building of horizontal volume and contemporary language accommodates offices and meeting rooms, besides an underground floor that houses services and parking space.

Location: Brasilia, Brazil

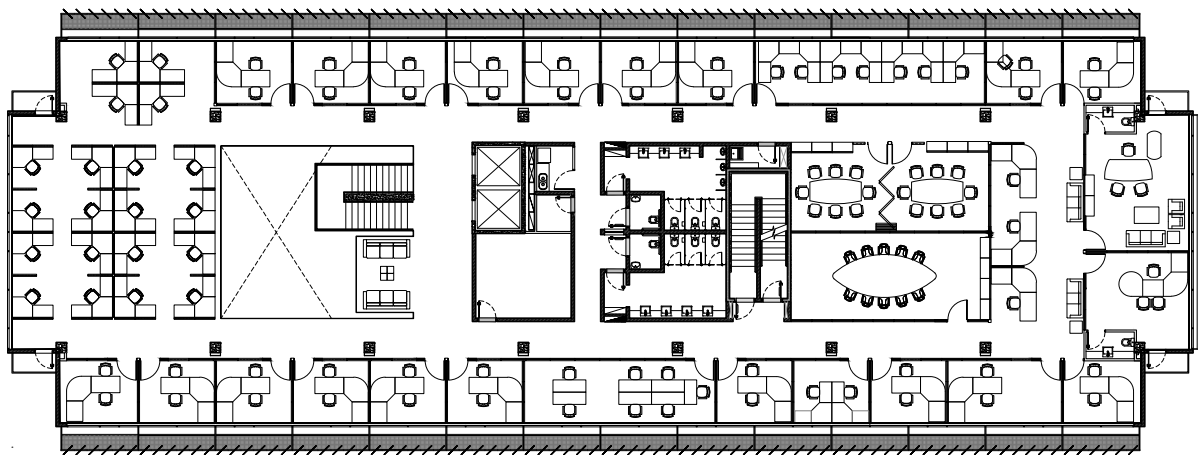
Architect: Paulo Bruna and Gomes Machado Associate Architects

Year of inauguration: 2012

Purpose: United Nations Development Programme (PNUD) office building

Type of work: Bureaucratic

Office concept: Cellular



Img. 92 – Floor plan of level 2 (from author's personal file)



Img. 93 – Main façade with brise-soleil (from: www.galeriadaarquitectura.com.br/slideshow/newslideshow.aspx?idproject=1106&index=1)

Health conditions:

Designed focusing an environmental performance, its facades present vertical white glass brises-soleil and wide openings that allow broad natural lighting and ventilation, in order to dismiss the use of air conditioning systems during most of the year. The building meets all the sustainability criteria required by the United Nations.

Comfort:

The environmental comfort is one of the building's primary characteristics. Seeking to use the most of the natural resources, especially lighting and ventilation; the use of local and appropriate materials; a landscape design that looks to maximize views or to shade important areas, all lead to an improved quality of work environment. The employee counts with a space adequate to the local climate, with a comfortable interior and a pleasant outside view from the offices.

Privacy:

Since the building is mostly composed of private offices, with a few shared offices and a small area of collective space, it can be said that privacy is easily achieved. However, the cellular configuration, effective to allow workspace control, can reduce the interaction among the employees.

Flexibility:

The building's concrete structure allowed a wide floor plan, with service core (like restrooms and vertical circulation) concentrated in the center. The perimeter is mostly occupied by private offices, divided by lightweight partitions. Although they are not meant to be mobile, its character grants the possibility of easy modifications, like the reduction or increase of an office. Regarding the working space, the employee does not have the possibility to choose where to work, being restricted to his workstation.

Distractions/stimuli control:

The cellular office concept is optimum at controlling distraction and stimuli of the surroundings. With a private office, the employee can determine how much interaction he wants to be submitted on, whether by closing the door to reduce the noise or opening the curtains to look outside.

Conclusion:

The new headquarter of the United Nations Development Programme in Brasilia is a building of contemporary architecture, focused on sustainability and user comfort. Its private offices constitute an ideal place to work for an introverted employee – the ability to regulate his privacy and the distractions of the surroundings being the main features. Although the cellular office configuration isn't adequate to promote office interaction and communication, it can be suitable for the type of work conducted by the organization.



Img. 94 – Interior view (from: Ibid)

Img. 95
Interior view from ground floor
(from: Ibid)

Img. 96
Second floor view (from: <http://baueco.com.br/projeto/pnud-onu/>)

Sources: Corbioli (2012), Mello (n.d.)





Img. 97 – Open office zone view (from: www.archdaily.com/879602)

3.1.8. Shanghai Sunrise Polymer Material Office

Building characteristics:

Located at the Shanghai Pingfu Road Poly Xin Industrial Park, the office design purpose was to maintain the space's advantage and enlarge its visual perception. Placed in a building of rectangular shape, which floor area is about 2100 m², the space includes a reception, conference area, cafeteria, alumni home, experimental area, polymer office and office area of the company partner. The office area has been divided into four zones: recreational, open office, conference collaboration and executive offices. These working areas communicate and interact in the space, creating an atmosphere for an efficient and collaborative team.

Location: Shanghai, China

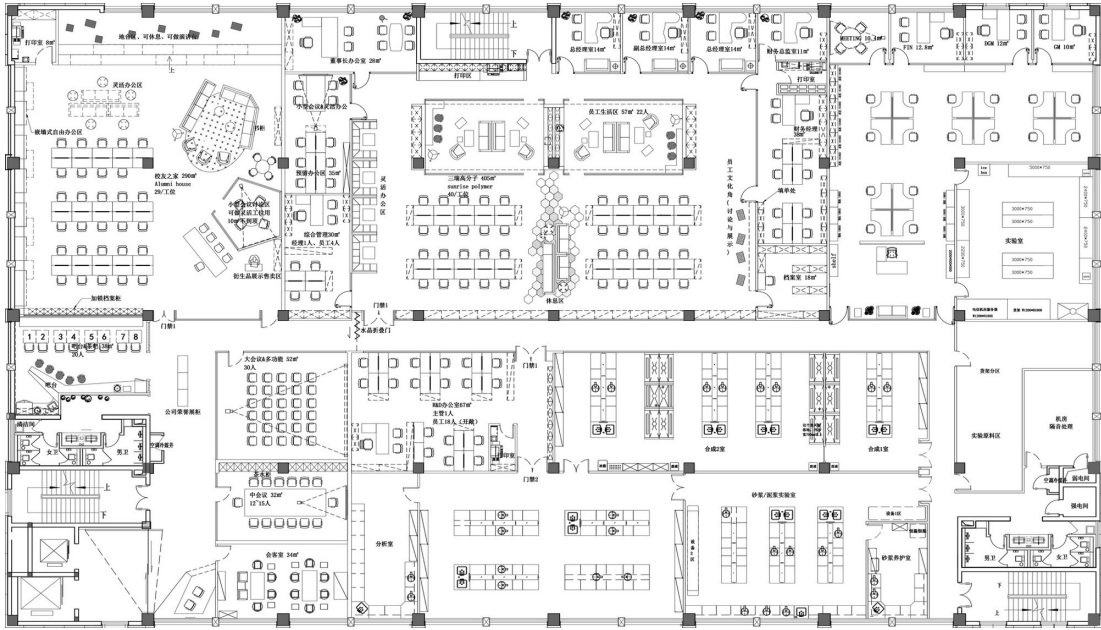
Architect: CCDI GW Design

Year of inauguration: 2017

Purpose: Shanghai Sunrise Polymer Material Company office

Type of work: Research and bureaucratic

Office concept: Flexible



Img. 98 – Office's floor plan (from: Ibid)

Health conditions:

Three sides of the floorplan have large windows, and in order to allow the maximum of daylight to enter the space, the office interior counts with glass vertical partitions. However, due to the great dept of the floor, natural lighting doesn't reach all of the office areas, being complemented by artificial lighting, usually in hexagonal irregular lamps. The office presents mechanical air conditioning and ventilation systems, in order to better regulate the interior air quality.

Comfort:

The space and materials quality granted to the office a high level of comfort for its employees. The diversification of the spaces allows the employee to choose between different environments to work, from fully opened to semi-private spaces. When close to the windows, large trees can be observed from the seats, which not only create a beautiful scenery but also helps to ease the staff's visual fatigue.



Img. 99 – Interior view (from: Ibid)

Privacy:

Despite most of the workspaces presented a shared configuration, with large tables to work collectively, the office presents some areas of higher privacy, like the discussion area located beside the open office zone. This way, the employee can have a quieter place to work. There are also some private offices, reserved for the executive staff.

Flexibility:

Flexibility in this office is achieved through the diversity of working spaces, where the employee can choose where to work from, besides counting with spaces to relax, like the recreational areas or the cafeteria. This combination not only brings diversification to working forms but also create unlimited possibilities for stimulating inspirations to take place.

Distractions/stimuli control:

Despite the openness present in the office, the variety of working and common areas allows the employee to regulate the stimuli of its surroundings, therefore being able to control the distractions. However, the complete transparency of the partitions could create a feeling of being watched.

Conclusion:

At this office, transparency was the basis to its design. Since it accommodates a big variety of areas, like office, conference, recreational and science laboratory, their integration is possible through glass partitions, which also helps to illuminate the space. For an introverted employee, this should be a pleasant office to work, due to the diversity of environments, allowing the power of choice. However, the partitions transparency reduce the privacy feeling.

Source: Archdaily (2017)



Img. 100 – Privacy zone (from: Ibid)

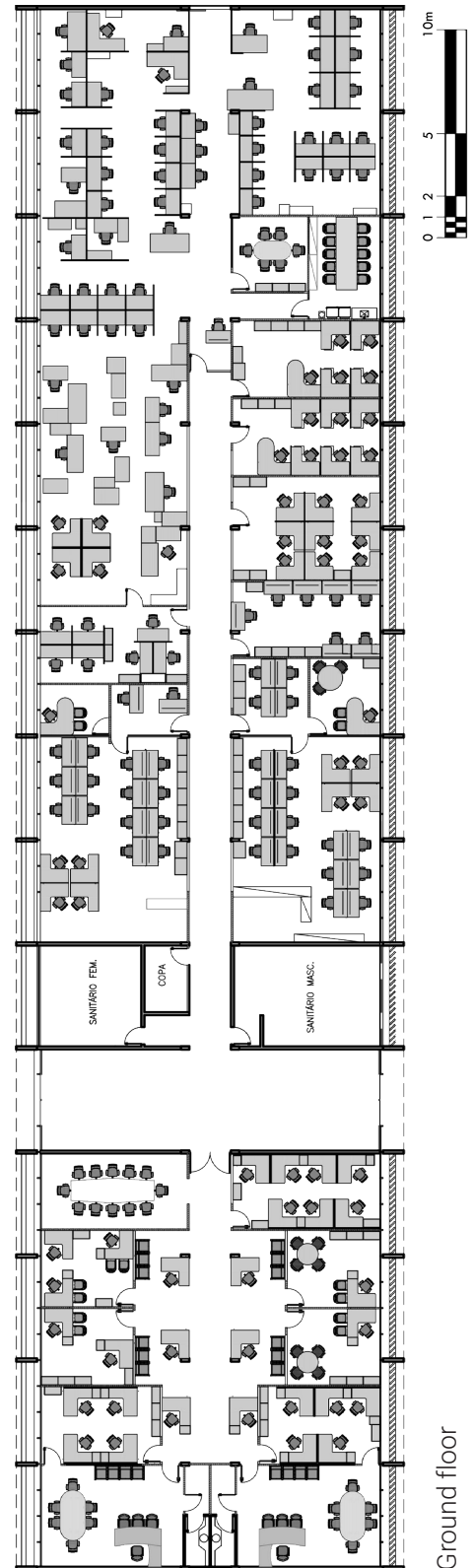


Img. 101 – Enclosed office (from: Ibid)

Img. 102
Open office zone (from: Ibid)

Img. 103
Recreational zone (from: Ibid)





3.2. Case study

Brasília

Following the research conducted in 1997 by (BRENNAN, CHUGH, & KLINE) (described in chapter 2.3 – About the open plan office - Impacts of the transition from traditional to open offices), a case study was conducted in a public company in Brasília, whose spatial configuration has open and private workspaces. The company deals with architecture and urban planning services, having a team composed of architects, engineers, inspectors, accountant, etc. The objective of the research was to relate the employee's psychological type to his/her degree of satisfaction in the workspace.

The questionnaire developed (see Appendix 1) was structured as follows:

- **Personal information:** without informing the name, the employee identified his/her gender, age, and position held in the company;
- **Personality:** aims to identify the psychological type of the employee, composed of 10 statements related to introversion that should be marked if the individual agreed with the statement;
- **Work environment:** the individual points out his/her type of workspace between the options - private closed, private shared, open individual, open shared and open grouped.
- **Questions about the degree of satisfaction with the work environment:** divided into 5 categories, the employee should mark each statement according to the degree of agreement (from Totally Agree to Totally Disagree).
 - a) Professional performance: affirmatives about the relation of the office physical space with the performance in the work;
 - b) Relationship with co-workers: affirmatives about the relation of the individual with other colleagues;
 - c) Relation with the physical environment: affirmatives about the physical conditions of the office.
 - d) Relationship to physical producers of stress: affirmatives about environmental conditioning factors capable of producing stress in the individual;
 - e) Distractions: affirmatives about the existence of factors capable of generating disturbances to the individual.
 - f) Suggestion of change: free space for the employee to write their opinion.

In total, 50 questionnaires were distributed in the company, seeking to divide in a balanced way between the open and private spaces, of which 40 were delivered answered. The results obtained were as follows:

• **Personal data:**



55% are men



45% are women



The average age is 42 years old

• **Personality:**



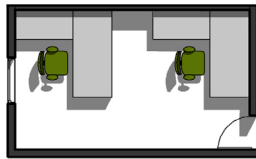
33% scored five or more statements related to introversion, and although this is a simple test, one-third of the interviewees may be considered introverted for these purposes.

• **Work Environment:**



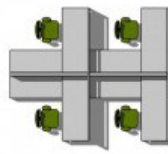
Private
Closed

0%



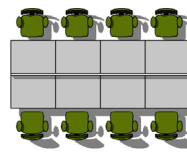
Private
Shared

30%



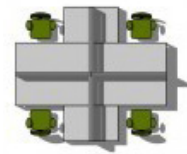
Open
Individual

20%



Open
Shared

20%



Open
Grouped

30%

• **Questions about the degree of satisfaction with the work environment:**

To better analyse, it will be divided into four groups: introverts working in open spaces (IO), introverts in private spaces (IP), extroverts in open spaces (EO) and extroverts in private spaces (EP). In addition, the items in each category have been summarized in order to facilitate understanding. The results are an average of the opinion of each group, being YES (✓), NO (X) and MIXED ANSWERS (~):

	IO	IP	EO	EP
My workspace positively influences professional performance	✓	✓	✓	✓
Privacy is easy in the workspace	X	~	X	X
Relationship with colleagues is positive	~	✓	✓	✓
Interruptions are frequent	~	~	~	X
Relationship with the physical environment is positive	✓	✓	~	✓
Confidential information is handled appropriately with the layout	✓	~	X	~
There are protocols	X	X	X	X
Environmental constraints are adequate	~	~	✓	✓
Noises are frequent and uncomfortable	✓	~	✓	✓
There are visual and sound disturbances	✓	~	~	X
I feel observed in the workspace	✓	~	✓	X



With these results, it is possible to observe that everyone agrees that the **workspace** influences in a positive way in the professional performance, that is, they think that the organization facilitates the teamwork, the capacity to be productive, to be focused in the work and that the team works cohesively.



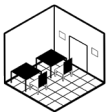
However, most feel that **privacy** is not easily achieved by the kind of spatial organization of the office, and only the IP group responded in a mixed way, which may indicate the more reserved space of a private office. It is interesting to note that the EP group disagreed on this point, because they are in a more reserved environment, but do not think that privacy is easy.



Most agree that the **relationship with colleagues** is positive, that is, they feel part of the team, can easily ask their colleagues for advice and like to have supervisors nearby. However, the IO group presented mixed responses, which may indicate a personal characteristic combined with the type of open space.



Regarding the **interruptions**, IO, IP, and EO responded in a mixed manner, indicating varied opinions on the subject. The EP group responded negatively, meaning they are not interrupted frequently, which is compatible with the type of private space, where there is more control over the relationships between employees.



In relation to the **physical environment**, IO and IP responded that it is positive, as the EP. However, the EO responded in a mixed way, indicating that this group of people have varied views about their work environment.



As for the **confidential information**, the IO group replied that it is rather properly treated with the layout, while the EO group replied that it was not. This divergence of opinions is interesting because it is the same space - the open one - and how the two groups have different perceptions about privacy. The IP and EP groups responded in a mixed manner, indicating the more controlled nature of private spaces.



As for the existence of **protocols**, the response of all groups was unanimous - they do not exist. This indicates that the absence of rules to control employee behavior can influence the negative perception of distractions caused by colleagues - conversations, noises, interruptions, etc.



Regarding the **environmental conditioners**, such as adequate air quality and temperature and sufficient lighting, the Extroverts responded positively, while the Introverts responded in a mixed way. It is possible that this result is due to the way introverts perceive the environment with more “attention”, causing some to respond negatively to the question.



As for the presence of **noises** and the annoyance caused, the majority responded positively, being one of the main causes of complaint. Only the IP group obtained mixed responses, which may be a reflection of the more controlled work environment.



Concerning the existence of visual (like mess) and auditory **disturbances** (music, conversations, etc.) the IO group responded positively, indicating that, in an open office, such distractions are difficult to control, and how this group of people is more sensitive to them. The IP group responded in a mixed way, which can be attributed to the more controlled space of a private office. The EO group also responded in a mixed way, which may be linked to the characteristics of these people, where some may not bother with these disorders. Nevertheless, the group of EP responded negatively, being able to indicate a combination of controlled space with the personality of these people.



As for the sensation of **being observed** in the workspace, both IO and EO responded positively, a reflection of the open feature of the work environment and the lack of privacy. The IP group responded in a mixed way, demonstrating that some people, even in a more reserved space, still felt observed. In the case of the EP group, the response was negative, indicating that these people, in a more reserved space, did not have that perception.



For **suggestion of change**, some proposals were: expansion of the physical space, reserved space and equipped with materials suitable for private meetings, better use of natural lighting and ventilation, higher privacy partitions, newer more functional layout, larger work surface, new furniture and equipment, acoustic insulation between rooms, quieter environment, adequate temperature and more beautiful environment.

Finally, it is possible to conclude that the perception of the work environment is able to vary according to the type of space and the type of person, where the typical characteristics of each one contributes to the obtained result. However, some limitations of this research need to be mentioned: the reduced number of participants and the lack of an objective result, since the data were based on empirical questions. Despite this, the research carried out is important to verify the relationship between personality and work environment, especially the role of the introvert in this professional context.



Img. 106 – Capital One Labs in Arlington, USA – An example of innovative office (from: www.gensler.com/projects/capital-one-digital-labs)

4. INNOVATIVE OFFICE DESIGN

The physical working environment is considered one of the most influential factors in employee satisfaction (DING, 2008). It is, therefore, crucial to create a satisfying work environment, in order to increase employee productivity and well-being. This can be achieved through an innovative design, that looks to improve the health of the workers, at the same time it provides a more positive and supportive work environment.

One of the most debated topics is the balance between public and private workspaces, that shifted from either closed office spaces to complete open-plan designs. However, going from one extreme to the other is not likely to produce a cohesive work environment. Instead, there has been a recognition of the importance of flexibility in the workspace, to match the type and variety of work being done. Besides, the continual progress of information technology will continue to change work patterns, making communication and collaboration increasingly common. In this way, workplaces need to be designed as environments to

foster interaction and collaboration, at the same time it provides its employees individual workspaces to accommodate solitary tasks (CHUI & VARGA, 2016, p. 22).

The workplace impact on employee productivity has been widely studied and acknowledged as a significant contributor to their satisfaction. According to a two-year workplace study conducted in 2001, with 1500 interviews, the premise of the workplace affecting their productivity and job satisfaction was supported (DYG Inc., 2001). They also cited a list of factors as having a “major” or “moderate” impact on their performance and satisfaction:

Major

- *Technology* – providing the right technological tools and support to work effectively.
- *Storage space* – supplying ample storage within close proximity to their desk.
- *Climate control* – allowing employees to control the workplace climate to provide comfort.
- *Quiet space* – minimizing noise that causes distractions and disruptions.
- *Adjustable and adaptable space* – supplying space that can be personalized to fit an individual’s work style.

Moderate

- Personal lighting control
- Ergonomic equipment and chairs for physical comfort
- Proximity to exterior windows, providing natural light and views
- Privacy and space for personal items at the workstation
- A visually appealing workplace with a professional atmosphere



Technology



Storage space



Climate control



Quiet space



Adjustable and adaptable space

Failing to address these variables will have detrimental long-term effects on the employee, such as negative mental health, decreased productivity, absenteeism, dissatisfaction, and overall unsatisfactory performance, which eventually leads to detrimental effects on the organization. Consequently, innovative workplaces need to focus on all these concerns to maximize employee productivity and reduce long-term operating costs.

4.1. Innovative workplaces characteristics

Cost-efficient, flexibility and sustainability are the main characteristics of an innovative workplace, which end goal is to provide a high-performance work environment. It can only happen when executives, managers, designers, and employees all actively participate in developing and owning the workplace. To design these spaces, it's necessary a new approach that links together people, space, and technology to support changing business practices.

Through extensive research and literature review, a North-American public institution identified specific innovative workplace characteristics, termed the “Hallmarks of the Productive Workplace” (GSA Office of Governmentwide Policy, 2006). They are:

- ***Spatial Equity:*** A humane, well-designed workspace that meets the user's functional needs and provides individual access to privacy, daylight, outside views, and aesthetics. This means that all workers have the necessary support, equipment, and space to excel at their job, with equal access to natural light, outdoor view, and place to work privately.
- ***Healthfulness:*** Clean and healthy work environments with access to air, light, and water—and free of contaminants and excessive noise. Proper ventilation and good air quality should be provided in the space in order to minimize negative health impacts.

- **Flexibility:** Easily adaptable workplaces that support varied work strategies, with systems and furnishings that accommodate organizational change with minimal time, effort, and waste. Infrastructure and furniture easily reconfigured and flexible work strategies contribute to employee satisfaction and work-life balance.
- **Comfort:** Occupant-adjustable temperature, ventilation, lighting, acoustic, and furniture systems providing personal and group comfort. By allowing people to control their workspace, providing the ability to adjust the environment to suit their needs, can result in more satisfied and productive employees.
- **Connectivity:** A robust communications system providing access to people and/or data from any place, at any time. Wireless voice and data technology and virtual networking are some examples of how these systems can improve employee productivity.
- **Reliability:** Efficient and state-of-the-art building, security, computer, and telecommunication systems that are easy to maintain. This includes the ability to provide proper and consistent service with minimal disruptions of power, ventilation, air conditioning, lighting, security, telecommunication, and heating.
- **Sense of place:** A workplace that has a unique character, with an appropriate image and identity, instills a sense of pride, purpose, and dedication for the individual and the workplace community. Adding some recreational amenities in the workplace, such as media lounge, informal seating or lunch areas, can improve the feeling of the worker towards the space.

4.2. The Importance of sustainable workplaces

An innovative workplace accommodates not only employees and the organization but the environment as well. To produce a sustainable workplace, it is necessary to combine the concepts of sustainable design, development, and maintenance. This would create a place that respects the environment, improves health and performance, maximizes human capital, supports an efficient organization and makes the best use of resources (GSA Office of Governmentwide Policy, 2006, p. 20).

By integrating “greener” building practices and work habits not only minimizes the environmental impact caused by humans but can improve employee health and productivity. It means creating a healthier workplace through better physical and psychosocial working environment, while simultaneously encouraging better uses or improving the natural

Img. 107 – Oxygen Halifax Studio by Oxygen - The sustainable and innovative office has been designed to minimise energy consumption through hydronic heating, LED lights, cross-ventilation as well as insulation (from: www.businessinsider.com.au/here-are-5-of-australias-best-sustainable-office-designs-2015-9)



resources. Some practices could be the use of alternative work strategies, like desk-sharing, or mobile working – this would minimize the needed office space, consequently decreasing the building’s overall greenhouse gases production and employee resource use (CHUI & VARGA, 2016, p. 25). Another practice would be the investment in employee wellness, work/life balance benefits, and competitive incentives – this way, the company is more likely to attract talented workers and have higher retention rates.

Since buildings consume 40% of the world’s energy (CHUI & VARGA, 2016, p. 26), its conservation and efficiency can be one the largest, most cost-effective opportunity to reduce the financial, health and environmental impact. Building’s certification standards, such as LEED and WELL, help to promote buildings with high-level sustainable practices in the design, construction and operation. This ensures that buildings are not only sustainably produced but provide a high standard of indoor environmental quality that will benefit the health, well-being, and productivity of all employees who work there. Recent studies (SINGH, SYAL, GRADY, & KORKMAZ, 2010) (FRONTCAZAK, et al., 2012); (MACNAUGHTON, et al., 2016) show that employees who transitioned from a conventional office building to a green building reported a decrease in asthma and respiratory problems, lower heart-rate, stress-related absenteeism, and depression, as well as an increase in cognitive capability, productivity, and satisfaction.

Dr. Judith Heerwagen summarizes well the importance of a sustainable workplace: “A guiding principle of sustainable design is to create places that are not only healthy and productive, but which also lift the human spirit. The premise is a simple one: healthy, happy people will be more productive and more engaged with their work and their organization” (GSA Office of Governmentwide Policy, 2006, p. 21).



Img. 108 – LEED Certified Standard logo
(from: <https://new.usgbc.org/leed>)



Img. 109 – WEEL Building Standard logo
(from: www.wellcertified.com/)



Img. 110 – Headphones at work – one way to signalize the need of privacy (from: www.steelcase.com/research/articles/topics/privacy/privacy-crisis/)

4.3. The Importance of privacy in the workplace³

The most popularized workplace organization, and present today, is the open plan office, with its promises of collaboration, promoting learning and nurturing a strong culture. Although their idea is correct, it is often poorly executed, resulting in overly open environments where employees have little or no control over their space. In this context, it is important to emphasize the differences between the types of people who work there, where especially the introverts are harmed because as previously analyzed, they are more sensitive to external stimuli and prefer more reserved spaces.

Collaboration needs a natural pace to occur. People first need to generate ideas or process information alone or in pairs, then come together to develop the work and then separate to take the next steps. This is a different process from Osborn's brainstorming, which believed in the "efficiency" of a team, as well as the New Group Thinking. However, the more demanding the collaborative efforts, the more individuals need to intersperse them with moments of

³ Based on CONGDON, FLYNN, & REDMAN (2014)

private time to think or re-energize. This privacy and its balance with the public workspace is an arduous task, where companies have been trying to reach for decades. Currently, studies indicate that collective space has been too prominent and that employees feel a greater need for privacy.

Traditionally, privacy has been defined in physical terms (acoustic, visual and territorial), but in the workplace today, we are always connected, whether in the physical or virtual sense. Such accessibility can increase our interactions, but it can also make us feel overexposed. Thus, two notions of privacy arise - the individual's ability to control information (both personal and professional) and the stimulus (any kind of disturbance).

Fundamentally, stimulation control governs the ability to focus attention. Neuroscience, then, identifies three basic modes of attention:

- **Controlled attention:** work on a task that requires intense concentration, in which interruptions and other distractions are not welcome;
- **Stimulus-driven attention:** shifting focus when something attracts our attention. Most common when we perform routine tasks, in which distractions are tolerable or even desirable;
- **Rejuvenation:** periodic breaks made throughout the day to rest from concentration.

The need to control the stimulus when we switch between the three modes of attention means that we need **varied workspaces** that provide greater or less privacy. The challenge is to find the right balance between social and private and offer spaces that improve the three modes.

Factors such as organizational culture, type of task, mood and individual personality, as demonstrated in the case study, define the level of privacy that people need and how to achieve it. In the case of introverts,

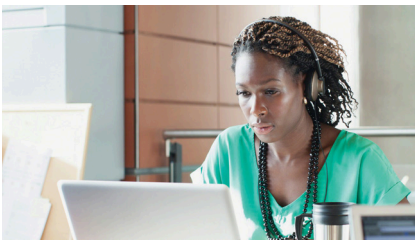
they prefer places where they feel they have more control over the stimulus because they are more sensitive to it. In this way, people use some strategies to achieve more privacy, such as: strategic anonymity (privacy in the midst of a crowd of strangers), selective exposure (revealing information to certain people, not others), entrusted confidentiality (private conversations in reserved places), intentional shielding (guarding your thoughts to protect your individual ideas) and purposeful solitude (separating from a group to focus, replenish energies, or do personal activities).

Organizations are gradually understanding the need for privacy, and that they are able to enrich and strengthen collaborative activities, contrary to what was previously thought. For this, a series of strategies can be adopted. Some require investment in new types of spaces, but others require only minor reconfigurations, along with behavioral and cultural changes. Some effective options are:

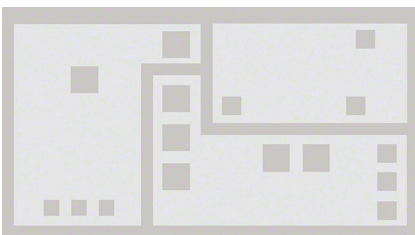
- **Protocols:** establish rules that define acceptable privacy behaviors, which may cover the entire company or specific to particular departments, times, or places;
- **Signalization:** adopted by employees themselves, communicate their privacy requirements, such as using headphones or their placement in a room;
- **Strategic space planning:** there are two design approaches to accommodate privacy needs in physical space, such as:
 - Distributed model: spaces that support stimulus control are mixed with individual and group work areas. This allows for easier switching between working modes.
 - Zone Model: defines certain locations within the wider working space as private, quiet spaces. They are physically separated from open areas and are useful for dealing with disturbing noises.



Img. 111 – Protocols (from: www.entrepreneur.com/article/276238)



Img. 112 – Signalization
(from: www.steelcase.com/research/articles/topics/privacy/privacy-crisis/)



Img. 113 – Distributed model (from: Ibid)



Img. 114 – Zone model (from: Ibid)

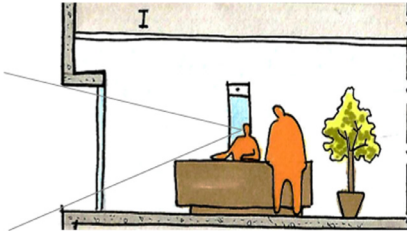
It is also important that employees have control over their workspace, such as temperature, daylight, and furniture; as well as customize it, with decoration or personal items. In doing so, there is an increase in comfort, the ability to do the job and reduce employee stress, which leads to increased productivity, their sense of belonging, and their physical and mental health (HERMANMILLER, 2007).

To achieve a more successful work environment, it must provide a series of spaces - an ecosystem - that allow people to choose where and how they want to do their jobs. It is necessary to combine, in addition to the **open spaces**, that have characteristic advantages, **closed or semi-enclosed spaces**, more effective in allowing the user to control stimuli.

Providing the ability to easily move between group time and individual private time, each with its proper environment, creates a pace that is essential for the modern organization, as well as ensuring that people - introverted or extroverted - work in an environment that pleases them and provides them with a physical and psychological well-being.

Img. 115 – Example of how office furniture can create different spaces where people can connect, collaborate and concentrate (from: www.steelcase.com/eu-en/revit/b-free/)





Img. 116 – Preference of workers for places with outside view (from: FERNANDES, 2016, pag. 77)

4.4. About outside view quality⁴

When evaluating what constitutes a pleasant office, usually the outside view quality is not taken into consideration, despite the findings of a variety of studies and researches that states that it can bring emotional benefits, satisfaction, and well-being to the people.

The International Energy Agency (1999), in a study about natural lighting, emphasizes the valorization that should be given to the outside view provided by the window. Alteration of natural lighting levels during the day can be stimulating, as well as the visualization of references or outside scenes can give a sense of place and increase the safety feeling. Places with windows of insufficient dimension to outside views can cause a claustrophobic feeling.

Another study shows that there is a preference of workers to exterior view of window. Boyce (2003) associates the user satisfaction with natural lighting conditions, including the exterior view. Those with access to a natural view have fewer health issues. The view, however, depends directly on the user location in the office. Usually, in open-plan offices, the outside view is obstructed by partitions. To workers close to windows, the biggest concern is with direct radiation and chances of obfuscation.

During a research of Heschong Mahone Group (2003), the outside view quality was mostly determinate by view dimension and by vegetation, suggesting that nature view is more pleasant and more desired. It's important to highlight, however, that it's hard to evaluate the quality of a point of view because it includes the subjective judgment value. It's not only the result of an environmental sensitive perception, but also influenced by previous experiences, by values, beliefs and attitudes; by its social and economic well-being; and by its future expectations (ZUBE, BRUSH, & FABOS, 1975).

Nevertheless, some exterior view characteristics

⁴ Based on FERNANDES (2016)

seem to be usually appreciated, while others are not. Generally, people prefer:

- Natural landscape view rather than a built environment view;
- Water view preference (sea, lakes, rivers);
- Broad viewpoints, with further information.

Studies also indicate that, compared with urban views, nature views have a stronger positive effect in the user health and well-being (KAPLAN, The role of nature in the context of the workplace, 1993; KAPLAN, 2001; VELARDE, FRY, & TVEIT, 2007). Likewise, the distance or amplitude of a global view affects the internal space appearance. The presence of a window can make the space looks more spacious than it is (HELLINGA, 2013). This effect was studied by Ozdemir (2010), and the results showed that rooms in higher floors of an office building were perceived as larger because the window view was wider.



Img. 117 – Example of an office with wide outside view (from: <http://safest2015.info/the-bright-open-multi-level-offices-of-c-media/office-ideas-for-small-spaces-workplace-strategies-that-enhance-performance-health-and-wellness>)

Tuacharoen (2006) found that the more information the view has of the exterior environment, the more interesting it is, supporting the idea that individual needs information and variability during the day. Studies show that the most important characteristic of almost all viewpoints is its horizontal stratification, divided in three layers: sky; urban or landscape; and soil. To a pleasant view, a balance in proportion between



Img. 118 – Hellinga's Scale Model study – Window Design Type 1, view 2 (from: HELLINGA, 2013, pag. 366)



Img. 119 – Hellinga's Scale Model study – Window Design Type 2, view 1 (from: Ibid, pag. 366)



Img. 120 – Hellinga's Scale Model study – Window Design Type 3, view 1 (from: Ibid, pag. 367)



Img. 121 – Hellinga's Scale Model study – Window Design Type 4, view 2 (from: Ibid, pag. 368)

the layers is recommended. Each layer has a function:

- The sky is the main light source, and keep the building users in contact with seasonal, time and weather changes.
- The point of view mostly horizontal of landscape or city gives the maximum information about the inanimate environment, that is, the surroundings.
- The soil view and the activities there happening allow the human and social character notion.

According to literature research and studies (FERNANDES, 2016), four building's characteristics influence in outside view quality:

- *Distance between buildings*: if a view has buildings too close to each other, the exterior view quality is negative;
- *Maintenance*: Better maintained buildings are preferred in an exterior view;
- *Complexity*: Buildings with a greater degree of complexity are usually preferred;
- *Age*: Usually, older buildings are preferred over contemporary buildings. However, if they are badly preserved or if their complexity is low, newer buildings are preferred.

Bell and Burt (1995) also say that to look to a distant point in the horizon through a window allow an ocular muscles relaxation, and natural scenes views with plants and sky arouse interest due to the variety and movement they offer. When the exterior view is urban, dynamic views of human activities, as the weather changes, are preferred by most people.

Based on the theoretical referential, the outside view is an important variable to determinate the space quality, and it can have a positive or negative impact on users. Despite nature views are preferred over city views, a well-balanced proportion of layers can generate a pleasant perspective, bringing satisfaction and health benefits to people.



4.5. The impact of colors in office environments

There are many myths and preconceptions about the psychological effect of colors, such as that red is energetic and aggressive, blue is tranquil, and yellow is uplifting. However, the experimental evidence to support these views is sparse, contradictory, and of limited usefulness in predicting the effect of color in the interior environment on office workers' productivity and mood.

With the goal of understanding more how color within the work environment affects occupants, studies have been conducted at the University of Texas at Austin, USA (KWALLEK N. , 2005). Over 15 years, a series of experiments were made, to determine the possible effects of colors in closed office spaces on worker well-being, productivity, performance, and satisfaction. One of the findings is that the contrast of value, saturation, and the interrelationship of adjacent colors are what office workers perceive. Such color dimensions and their relationships within the environment may be more important than the color itself.

In addition, researchers suggest that individual differences in the ability to screen out irrelevant stimuli may interact with how different colors affect an individual's mood and performance. It's the individual differences in arousal response that may be the central reason why individuals respond to the environment in a

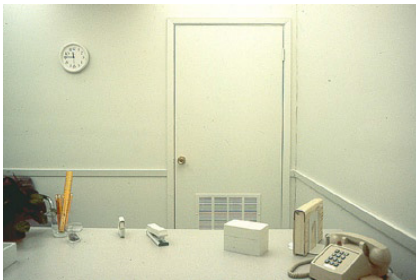
Img. 122 – BigBek Office in Armenia – Use of bright colors, geometry and brutal concrete ceiling to create a dynamic, playful and creative atmosphere for work (from: www.archdaily.com/802291)

particular way. While some are more easily distracted by irrelevant stimuli, leading to decrement in performance, other actually improved their performance on tasks when they were introduced.

When a groundwork study (KWALLEK, WOODSON, LEWIS, & SALES, 1997) was conducted, examining the effects on productivity of three different color schemes, the result found suggests that color scheme alone may not have a discernible impact on productivity, unless when individual differences in the ability to screen irrelevant environmental stimuli were taken into account. In summary, the findings propose that color scheme alone may impact people's mood. However, mood and productivity were not related to each other, suggesting that the impact of colors and stimulus screening in both mood and productivity are independent.

As an advice, since individual screening ability may influence how people experience the color of a particular interior, they should be designed with maximum flexibility to allow for variations within the same general space according to each individual's characteristics.

Another study, however, suggests differently. Angela Wright is a color psychologist and developed a color theory called The Color Affects System (WRIGHT), focused on how color affects a person's behavior. Her research, similarly as the one previous discussed, has shown that it is not a color itself that affects the individual behavior, but how intense it is. A strong bright color will stimulate, while a low saturation color will soothe. She proposes, in contrast, that there are four psychological primaries, and each one affect a different part of us: red (the body), blue (the mind), yellow (emotion) and green (balance) (BAILEY, 2013). To determine which color to use, it should first be determined which part it would like to affect. Nevertheless, color can be very personal. Everybody has a preference, and that color can make one feel the most productive.



Img. 123 – Monochromatic white as office color scheme 1 (from: KWALLEK, 2005, pag. 4)



Img. 124 – Bright red with medium blue-green as office color scheme 2 (from: Ibid, pag. 4)



Img. 125 – Light pastel as office color scheme 3 (from: Ibid, pag. 4)



4.6. Design actions

The design of an office is influenced by organizational changes, technological advancements and organizational goals (such as increasing visibility for employees, cutting facility cost and rebranding the organization). These factors influence not only the architectural features (layout and design) but the functional features as well (use of workspaces) in determining an office layout that supports both employee satisfaction and productivity.

The correct assessment of the type of work to be conducted is also important, as well as the style of work the employees in the office engage in, which can lead to the creation of a more cohesive and supportive workplace. The ability to work alone without distractions and the possibility to informally interact with coworkers are the top two workplace qualities for office workers (DE BEEN & BEIJER, 2014). Being so, it is crucial to match and provide flexible office layout to office employees' work patterns in order to maximize productivity.

A flexible and adaptive work environment allows employees a heightened sense of autonomy

Img. 126 – Yelp Headquarters in San Francisco, USA – an example of flexible office (from: www.archdaily.com/517354)

since they can adjust or move to a workspace that suits their need and work styles. An increased amount of productivity and a reduction in expenses can be achieved by improving the employees' sense of comfort and satisfaction. Greater flexibility of furniture can be an economical advantage for an organization since less time and expenses are spent on reconfiguring and maintaining office space to suit the needs of any department. It can also allow for greater space utilization, meaning less money being spent on rental costs for office space.

To ensure privacy, enclosed spaces are highly important. They allow quiet space to work and represent the employee's desire to control the amount of exposure they would like in their social environment, besides to protect against audio or visual distractions. It's important to highlight that private enclosures should be provided on a need-basis, rather than a hierarchical basis. This would ensure a sense of equality amongst all employees, while allowing people to accomplish tasks based on requirements, rather than position. Investing in privacy ensures workers that they have the environmental and behavioral measures put into place that will allow them to control how and when they are approached by coworkers.

The practice of desk-sharing and other non-territorial working methods can also be implemented. Since desks are not always occupied for an entire workday, this method allows for a more efficient use of desk space to let people use it when they need it, besides it allows the workplace to become more flexible to changes, such as expansion or downsizing. This alternative can increase a sense of autonomy and control for employees since they can choose a location to complete their work as they see fit. It can also increase the chance of collaboration with coworkers since different people from different departments can move freely, which facilitates interactions between them.

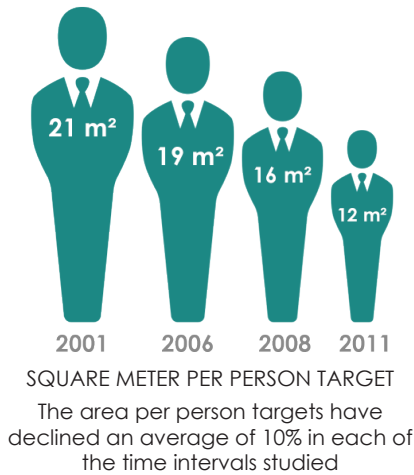


Img. 127 – Cisco Offices in San Francisco, USA – Privacy enclaves (from: www.archdaily.com/469722)

Regarding negative concerns surrounding desk-sharing work arrangements, it's important to highlight, as mentioned before, the importance of strategic space planning. Two different planning approaches have been identified, the distributed model and the zone model, and its implementation will depend on the organization culture, workforce mobility strategy, processes, protocols and real state holdings (STEELCASE, 2014). The distributed model looks at creating blended areas which allow for both individual and group work, where people can easily shift between the two styles of work. The zone model, on the other hand, looks at designating certain locations within the larger workplace as private, quiet places, where these private areas are physically separated from open areas. A combination of the two models provides the best of both approaches – convenient access to on-demand privacy and the ability to plan ahead for guaranteed privacy as needed.

Finally, a successful workplace transformation is not solely reliant on the physical space but requires a cultural transformation as well. People need to be open to new ways of operating, have an open culture and proactive manager who trust employees, and re-iterate clear links between staff, functions, and divisions of time, as well as invest in training, techniques and tools to make a smooth transition to innovative spaces (APGAR, 1998). Therefore, innovative office design is possible, beneficial and can be absolutely transformative and facilitated through the power of feedback and design (CHUI & VARGA, 2016, p. 39).

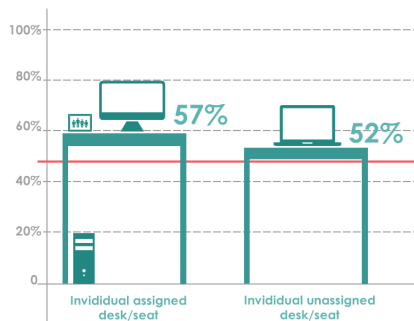
To help to demonstrate how the workplace been changing to accommodate new work styles, a study been made by Koll Inc. (2011), which analyzed forty organizations across eleven industries, in different locations. They identified the design attributes of distributed work programs – the new work style, a combination of heads down “focus” work, formal and informal collaboration of varying duration, and social interaction that occurs in a wide variety of settings within the building or other locations.



2.3 employees per desk



The average ratio for study participants using distributed work strategies is 2.3 to 1



WORKSPACE UTILIZATION AT PEAK PERIODS

While individual workspaces within a conventional model average about 45% peak utilization (pink horizontal bar), within distributed work programs individual spaces generally enjoy 7 to 12 percentage points higher utilization.

They recognized that distributed work environments are characterized by a wide variety of smaller individual and groups spaces with higher sharing ratios:

- Smaller, higher density individual spaces;
- A wider variety of individual and group setting types
- Increased allocation of seats for collaborative spaces
- Reduced emphasis on large formal meeting spaces.

Also, organizations employing distributed work programs enjoy a number of important financial and employee satisfaction benefits:

- Substantive cost savings – an average 33% first-year cost avoidance over conventional workspaces, with consistent saving thereafter.
- Greater space utilization – 7 to 12 percentage points greater than conventional spaces
- Higher level of employee satisfaction – about two-thirds of employees are satisfied with the impact of distributed work programs on their individual performance and 80% feel this way about their team performance.

This study was useful to demonstrate how beneficial this new workplace strategy is as compared to conventional workspaces. Flexibility – choices about where to work and access to a satisfying variety of settings – was the top benefit identified by the participants. This results in a perception of more personal control and empowerment contributing to improved work/life balance. It is with researches like this that can prove how successful working environments can be, allowing more workers to experience greater freedom and job satisfaction while helping their organizations increase business productivity and reduce expensive real estate portfolio costs.

5. CONCLUSION - WORKPLACE MATTERS

Long have been the search of mankind for understanding the human mind. Since ancient times, philosophers and scientists been postulating hypothesis to answer “who or what is the self?”, and with this, to be closer to create a theory of personality that explains the differences that define an individual. Although a universal and definitive theory has not yet been created, there are those more accepted than others, such as psychological types and psychological traits perspectives. Each one has its characteristics and parameters, but both deal with the concepts of introversion and extroversion in one way or another, whether by classifying as “attitudes”, “super-factors”, “traits” or “dimensions”.

The distinction between introversion and extroversion is considered a determining factor to define personality. According to many theories, everyone has some degree of both, although people tend to lean one way or the other. The general notion is that introverts expend energy in social situations, while extroverts gain energy from these events. Introverts present a set of characteristics that usually are related to sociability and inward turning. However, their needs have been neglected since the arrival of the twentieth century, with the shift from the Cult of Character to Cult of Personality, that valued those who spoke more, with security, dominance, and project trust – it’s the extroversion ideal.

This new cultural paradigm affected many aspects, especially school and workplaces, that valued more and more a collective approach, like group activities and teamwork. Eventually, this is reflected in a spatial change, with classroom organized with grouped desks, and offices with an open-plan concept.

By analyzing the evolution on the office towers, and the evolution of their workspace, it’s possible to

perceive how, for a long time, the office design was linked with work productivity and efficiency, while seeking cost reduction and time-saving. Although concerns regarding employee wellness existed, they were focused more on the physical aspect, rather than the mental aspect. It's in the last few decades that office design been introducing new spaces and methods of work, due to a great number of studies and researches that proof that employee satisfaction with the work environment has a considerable impact on their productivity, thus creating a need for innovative workplaces.

For introverted employees, this need is even more accentuated, since they are more sensitive to external stimuli, demanding quiet, calm and distraction-free environments to be truly productive. Designing an office space requires investigation. To know the company type of work developed and its staff – this combination reveals the adequate working environment, where can lead to employee satisfaction and enhanced productivity.

Taking into consideration the main characteristics for an innovative workplace, the sustainable aspects, the importance of privacy, the benefits of quality outside view, the impact of colors in the space and the recommended design actions, one should have the tools to create an office space adequate not only for introverts, but for all its users. After all, the cost of people in a building is typically 10 to 12 times the cost of the building's infrastructure. The emphasis of workplace design should be on the people and the work they accomplish. Therefore, workplace matters.



PART II

PRACTICAL APPLICATION



NEW YORK VERTICAL CITY

**ARCHITECTURE COMPETITION
STUDENTS & YOUNG GRADUATES**

PRIZES

5000€ + PUBLICATION IN
ARCHITECTURE MAGAZINES
+ ANNUAL SUBSCRIPTIONS
+ REVIEWS IN ARCHITECTURE
WEBSITES

JURY

RAAD STUDIO /
STUDIO CADENA / MOS
ARCHITECTS

WWW.ARCHMEDIUM.COM

1. INTRODUCTION: CHOOSING AN INTERVENTION

After a theoretical investigation about how the workplace influences its employees, and how understanding their needs and preferences can create a work environment that benefits the company as well as its staff, some design approaches were identified in order to create an “ideal” office space, taking in consideration specially the introverts, a group of people whose needs for a long time have been neglected.

The proposal is, then, to design an office building, taking into account all the considerations made in the previous section, aiming to create a project which can reflect the design approaches proposed for office interiors, combined with the architectural challenges of developing an office tower.

The first step would be to determine the intervention program. While searching for references, I came across a call for an architectural competition organized by Archmedium. They proposed the creation of a “large hybrid building that generates quality work spaces, temporary housing, cultural and leisure spaces in New York City”. Since they had an interesting argument about the reason why to develop such project in a place like Manhattan, in addition to my personal interest in the city, I decided to follow their program and site choice, with some adaptations.

2. THE COMPETITION AND PROGRAM MODIFICATIONS

Archmedium is an organization that coordinate architectural competitions for students and young architects since 2009. In January 2018 they opened the calls for “NYVC – New York Vertical City” .

In the Introduction of the Competition Rules (ARCHMEDIUM, 2017), there is an overview of the greatness of New York City. They make a reference about how it is the densest city in the United States, a paradigm of a compact, dense and functional city, where the extreme density of the plot allows an exemplary urban development in terms of mix of uses and development of public transport. Its neighborhoods have character and the people are heterogeneous, providing a rich cultural diversity where the cultural legacy, customs, and leisure are intermingled. Regarding cultural matters, it is highlighted how the city is one of the world’s benchmarks in terms of architecture, mentioning buildings such as the Guggenheim Museum by Frank Lloyd Wright, the Whitney Museum by Marcel Breuer, and the acclaimed Empire State Building and Chrysler Building.

It is also mentioned how New York is the city of professional progress, great ambitions and large corporations, and how the pursuit of success is usually accompanied by long working hours and difficulty of combining with personal life. Many offices were designed with the objective of making employees as productive as possible regardless of the spatial quality or their well-being. However, New York is more than just offices. It is the city of artists, tourists, theaters, stock exchange, restaurant and much more. The final idea and question launched is “does it make sense to continue making buildings that serve only one use? Can a mix use building generate productive and collective spaces for the enjoyment of all the community?”

The competition proposal is then the creation of a new vertical space that shelters mixed uses:

“The NYVC aims to create quality work spaces where people can relax and have fun but also be productive. A new place where it is possible to combine working life with personal life, through day care centers, cafeterias and leisure areas. In addition to traditional

offices, the building will contain coworking spaces and a start-up incubator. The tower will have a hotel space for visitors, exhibition areas, meeting places and a restaurant and bar open to the city. We propose a tower for the city of the 21st century where urban life is condensed and integrated into the plot of public spaces in New York. A small vertical city inside the city that never sleeps.”

(ARCHMEDIUM, 2017, p. 7)

Regarding its location, the site chosen is placed in the neighborhood of Hell's Kitchen, a district famous for its culinary activity and where a vast majority of new real estate developments are being built. A few blocks away, we can see projects of the most prestigious architecture studios in the world, such as the Hearst Tower by Norman Foster and Via 57 West, by the Danish studio BIG. The plot is located in a corner, in the intersection of 9th Avenue and W54th Street, close to Times Square, Penn Station and Central Park. It is well connected with the subway station, public transport and citi bikes, besides its proximity to the tunnel that connects Manhattan with New Jersey and to the New York Passenger Ship Terminal.

The Competition rules continue with the program specifications, detailing uses and areas, separated into three categories:

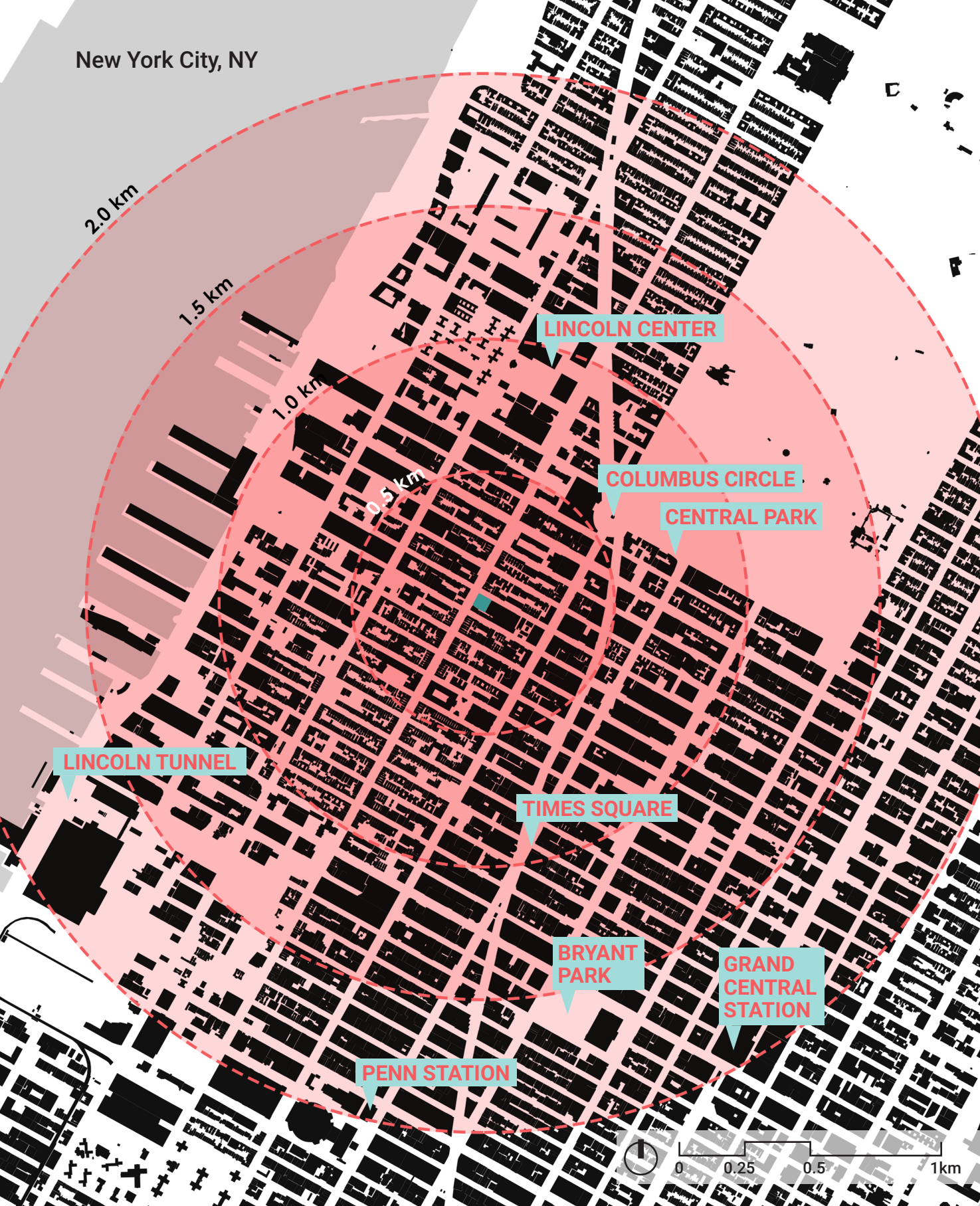
a. Public: cultural spaces, cafeteria, restaurant, hall (total of 3,000 sqm)

b. Work & Life: offices, coworking, start-up incubators, children's daycare, leisure center (total of 22,500 sqm)

c. Mixed Use: hotel and restaurant (total of 13,500 sqm)

Since the focus of this thesis is linked with workspaces, I decided to make an alteration in the competition program, removing the category of “mixed use”, which includes a complex typology – hotel. The development of this use in the project would involve research and studies about the topic, which is not the goal of this work. The removal of this category does not impact negatively on the general proposal of the competition, that is the creation of a hybrid building that combines work with personal life. combines work with personal life.

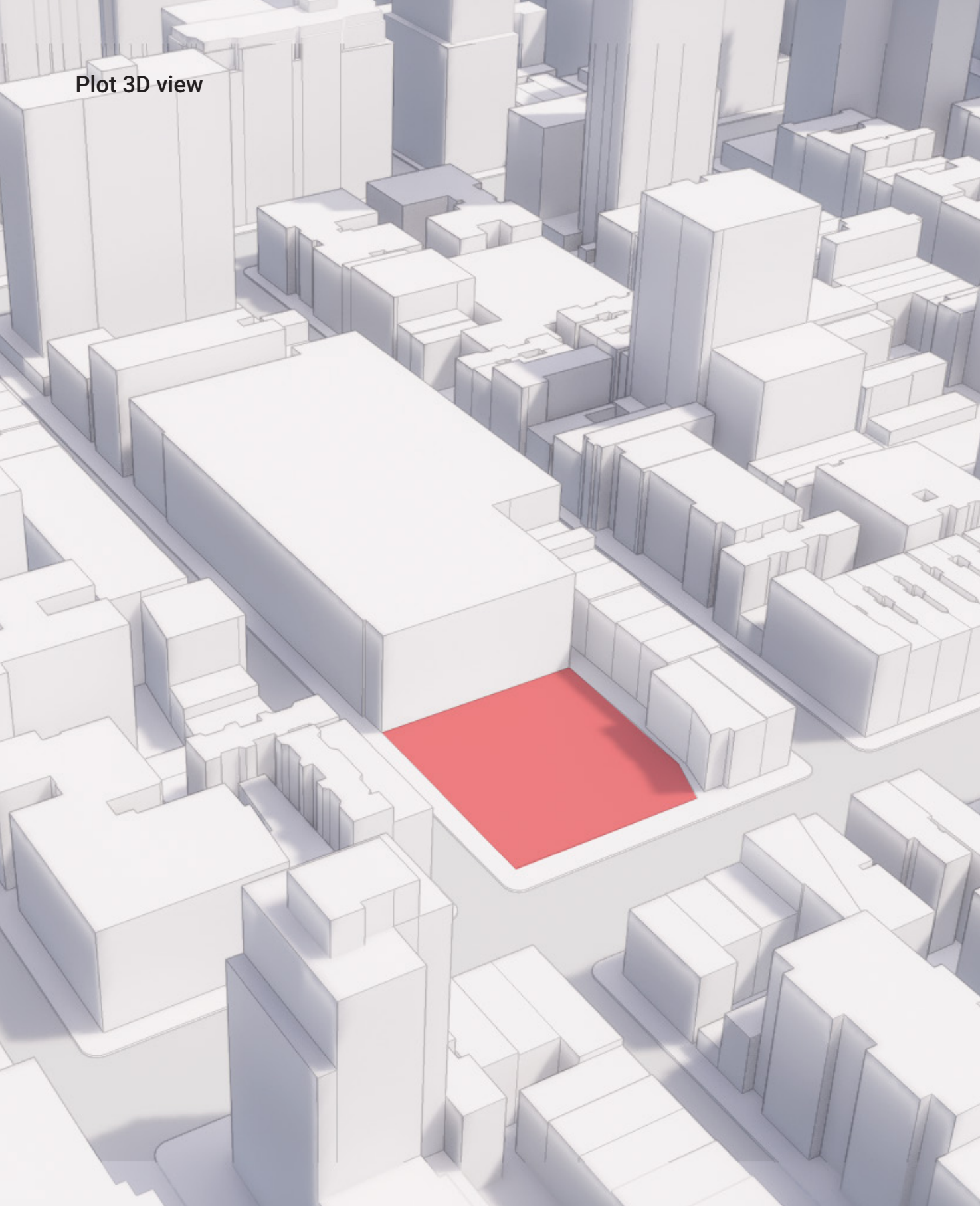
New York City, NY



Plot location



Plot 3D view



3. THE SITE

The plot is located in the intersection of 9th Avenue and W54th Street, with 42 m long and 45 m wide, totalizing 2.053 sqm of area.

It is located in a zone called “Special Clinton District”, which was created to preserve and strengthen the residential character of a community bordering Midtown, maintain a broad mix of incomes and ensure that the community is not adversely affected by new development. This means special regulations for new constructions.

After reading the zoning resolution of the city of New York that concerns the plot location (DEPARTMENT OF CITY PLANNING OF NEW YORK, 2016; 2018), it was discovered that the plot does not hold the requirements to the construction of a tower as big as the one suggested by the competition, since the Floor Area Ratio (FAR) for that plot is at the most 6.0, and it would be necessary at least 12.0 to fulfill the area provided by the program. However, since in New York City concessions can be made (such as bonus area if a public plaza is constructed), I decided to keep the plot suggested by the competition and to consider basic constraints such as height limits, sky exposure plane, and setbacks.

Img. 129 – Plot view 1 (Photo by author)

Img. 130 – Plot view 2 (from: <http://student.archmedium.com/competition/nyc/>)

Img. 130 – Plot view 3 (from: <http://student.archmedium.com/competition/nyc/>)



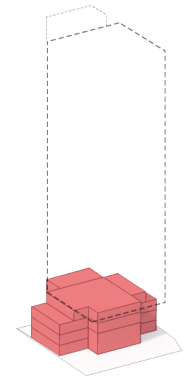
4. THE PROJECT

"The NYVC tower presumes to be a new vertical icon in the city of New York therefore it should respond to the skyline of New York City. At the same time, it should be a natural continuity of the street, accordingly, a great hall should welcome the visitors as a continuity of the public spaces of the city. Through its cultural program, the tower is established as a point of access to culture and invites citizens to use it."

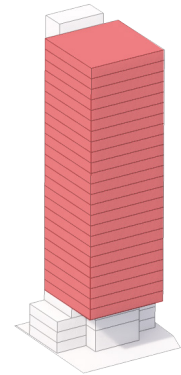
(ARCHMEDIUM, 2017, p. 10)

The competition rules suggest the sizes of the basic spaces divided by their uses, explaining that they can be modified depending on the will of the project, besides, the surfaces of the rooms can be used in complete or subdivided into as many rooms as considered appropriate.

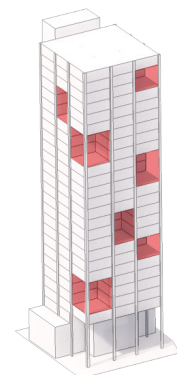
During the first stages of the project design, I developed a flowchart in order to understand the different levels of circulations that would take place inside the building. The most public ones (hall, daycare and leisure center) were disposed in the building's base, with easy access. Semi-public ones were divided into two parts. The cultural center and the cafeteria are located in the first levels, while the restaurant and the roof-top deck are in the last ones, accessed through an elevator dedicated for public use. The working zone (offices, coworking, and start-up incubator) compose most of the building's tower, with varied floor types for open-air decks, which create an unusual building facade.



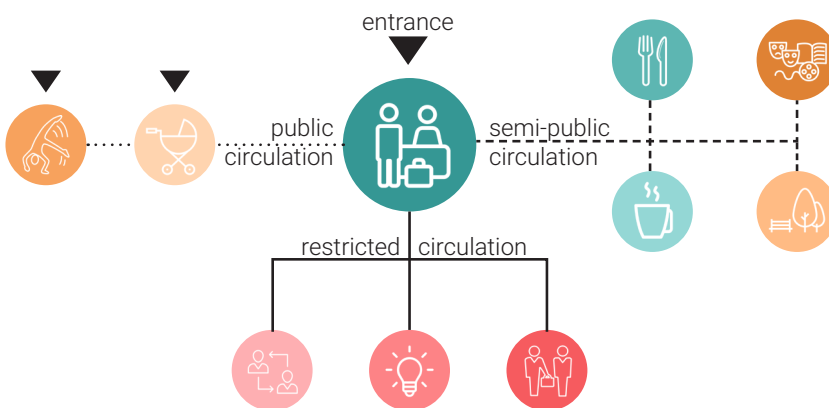
1st step - the base



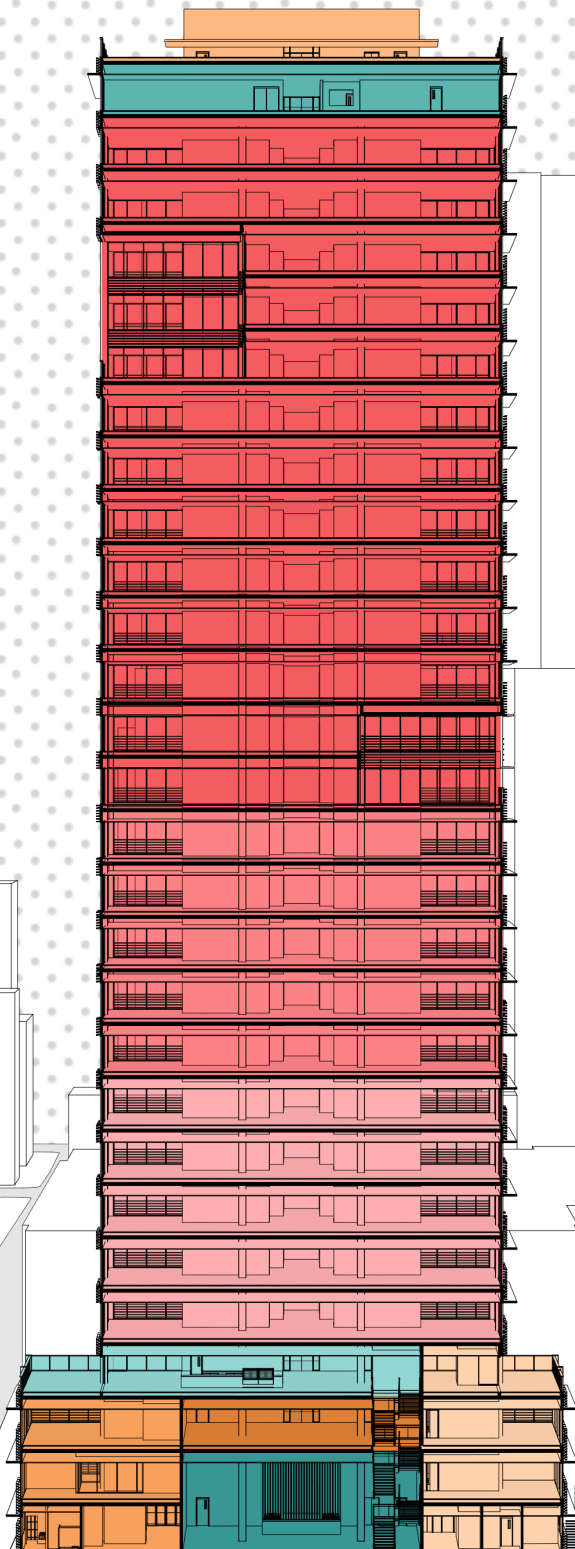
2nd step - the tower



3rd step - the facade



Building's program



Roof-top deck

882 m², 1 level



Restaurant

882 m², 1 level



Offices

10,638 m², 13 levels



Start-up incubator

4,115 m², 5 levels



Coworking

4,200 m², 5 levels



Cafeteria

569 m², 1 level



Cultural space

420 m², 1 level



Children's day care

925 m², 4 levels



Leisure center

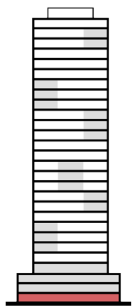
767 m², 3 levels



Hall NYVC

444 m², 1 level

Floor plan



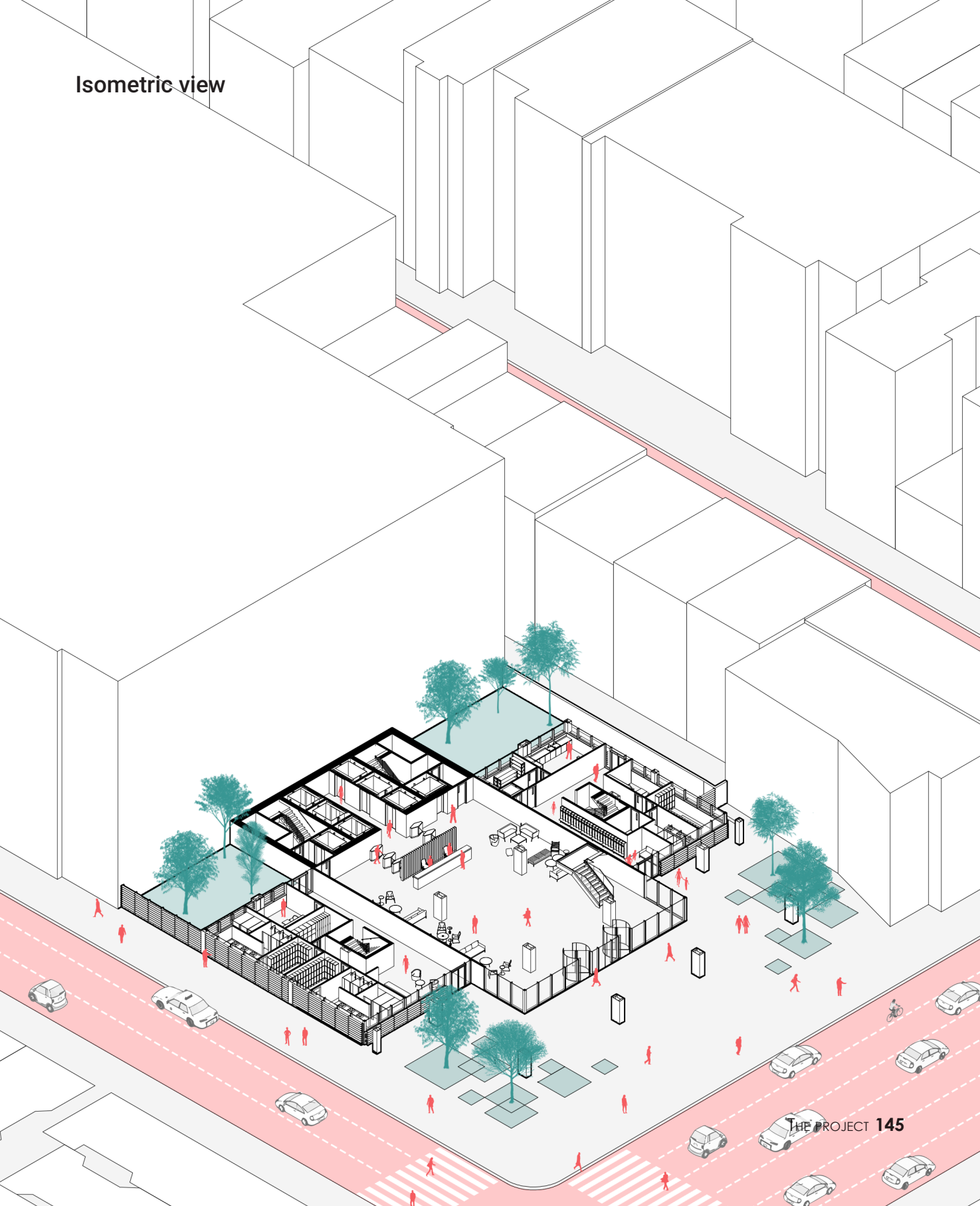
Level **0**



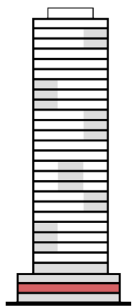
1. Lobby/reception
2. Elevator lobby
3. Service elevator
4. Public elevator
5. Leisure center reception
6. Male dressing room
7. Female dressing room
8. Storage

9. Office
10. Leisure center's garden
11. Daycare entrance
12. ADE restroom
13. Restroom
14. Locker room
15. Kitchen
16. Daycare garden

Isometric view



Floor plan

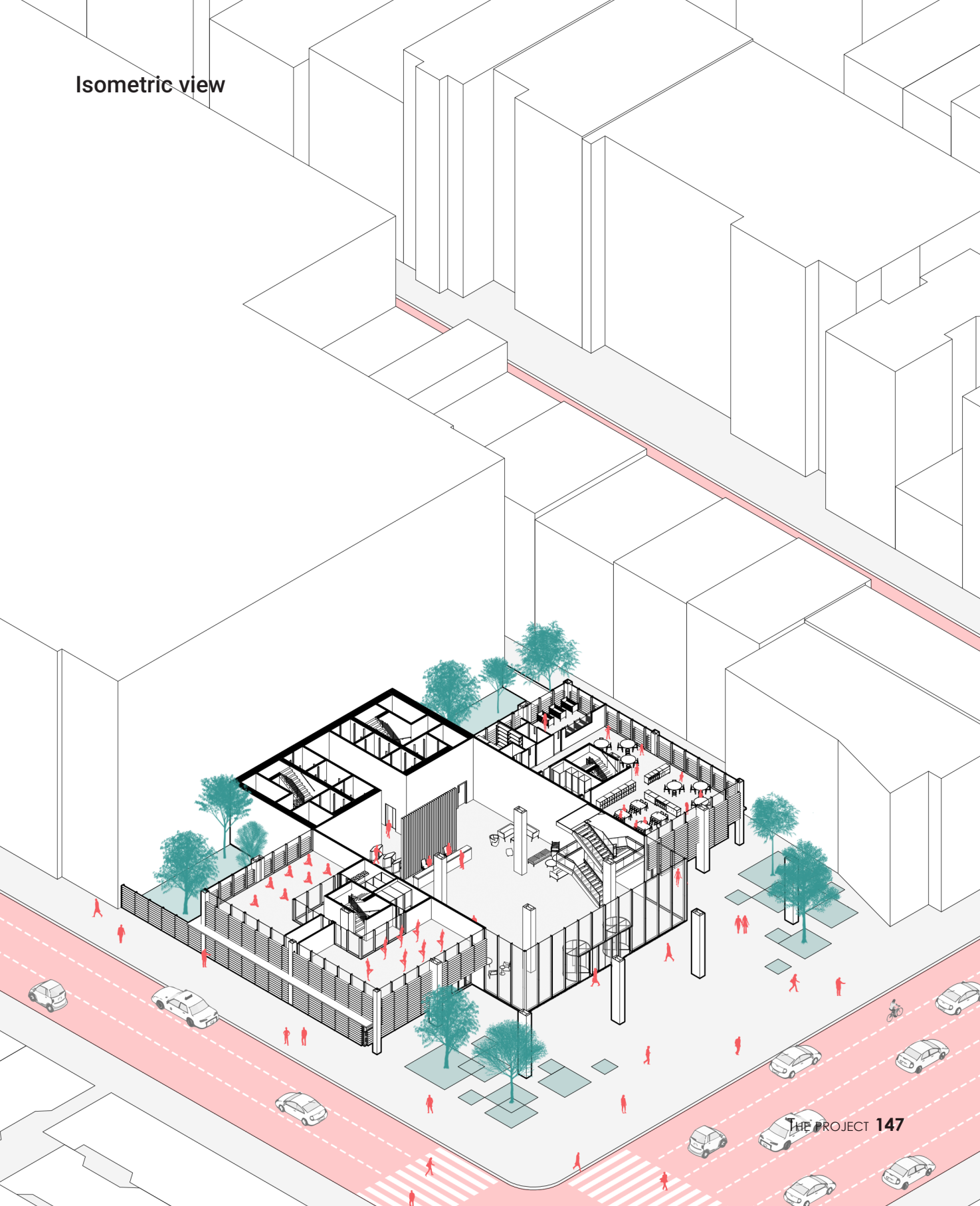


Level **1**



- 1. Room age 1-2
- 2. Room age 0
- 3. Changing room
- 4. Mini kitchen
- 5. Storage
- 6. Restroom
- 7. Activity room

Isometric view



Floor plan



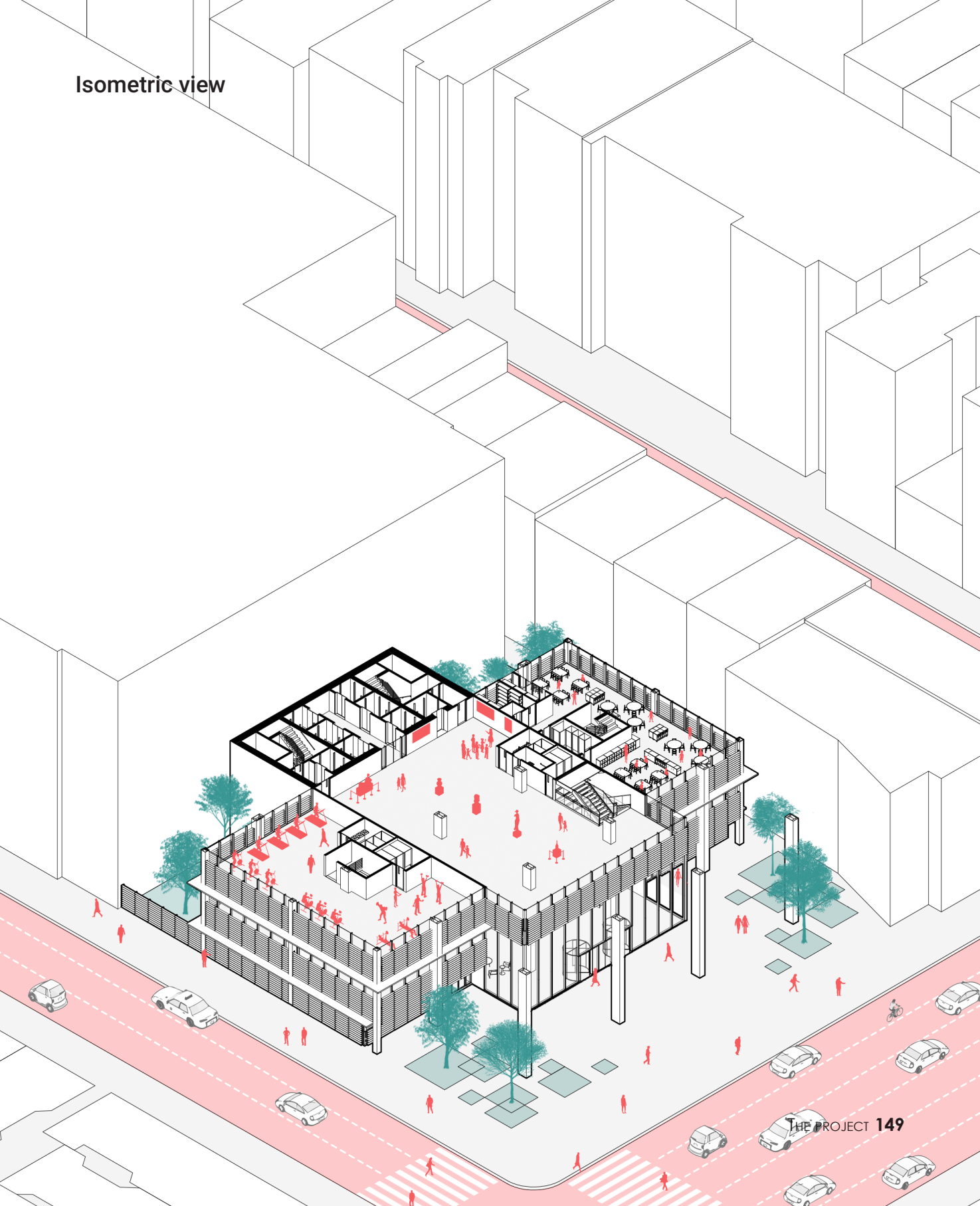
Level 2



1. Room age 3-5
2. Storage
3. Restroom
4. ADA restroom
5. Exhibition room

6. Elevator lobby
7. Service elevator
8. Public elevator
9. Activity room

Isometric view



Floor plan

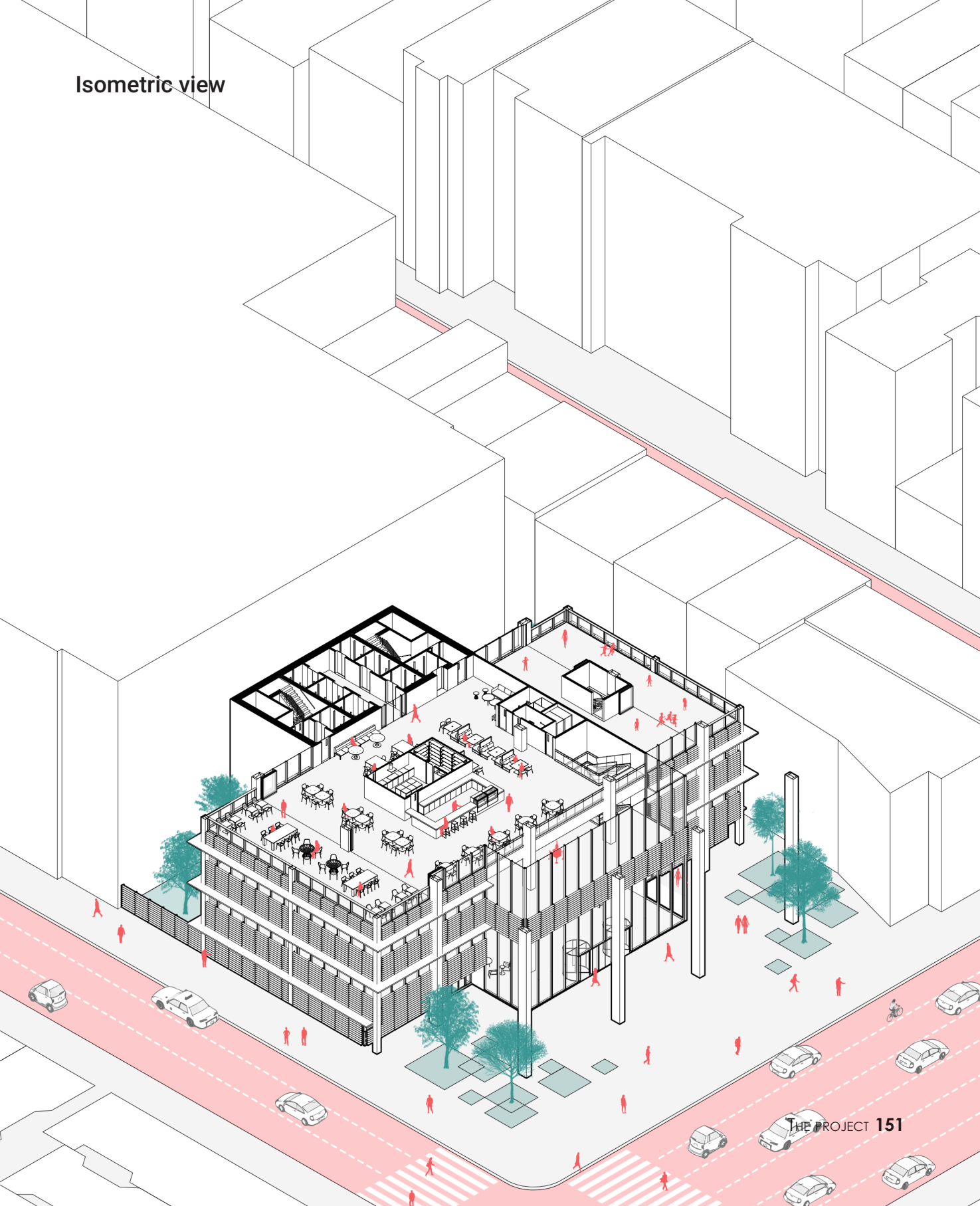


Level 3

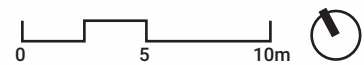


- 1. Playground
- 2. Restroom
- 3. ADA restroom
- 4. Coffee shop
- 5. Storage
- 6. Kitchen
- 7. Elevator lobby
- 8. Service elevator
- 9. Public elevator
- 10. Exterior terrace

Isometric view



Floor plan

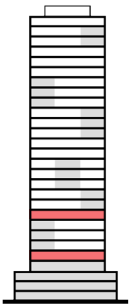


Level **4** (type A)
also floor: **8**

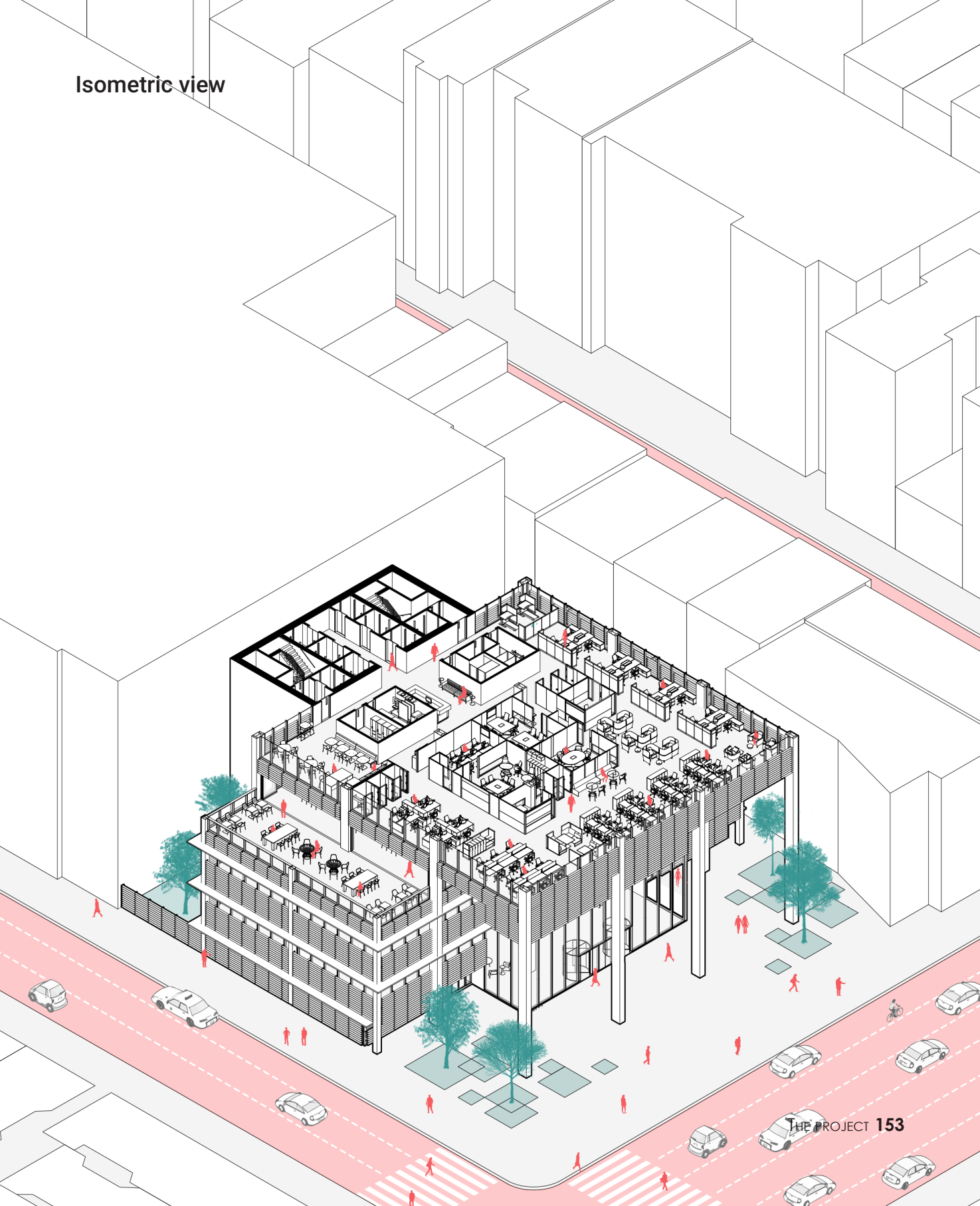


1. Elevator lobby
2. Service elevator
3. Reception
4. Male restroom
5. Female restroom

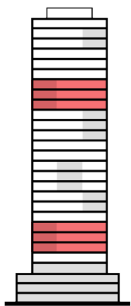
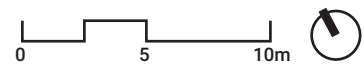
6. ADA restroom
7. Storage
8. Kitchen
9. Office area



Isometric view



Floor plan



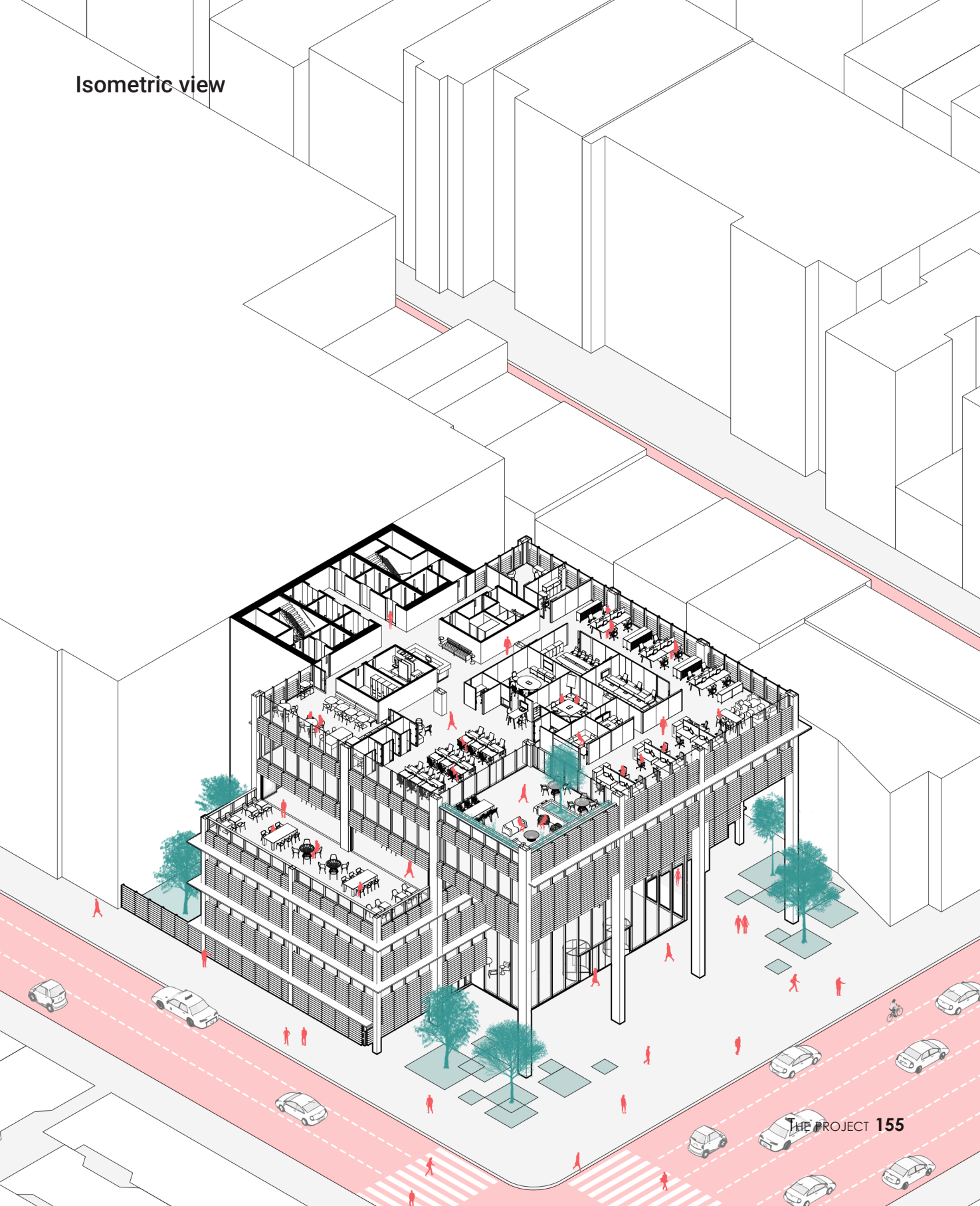
Level **5** (type B1)
also floors: **6***, **7***,
19, 20*, **21***



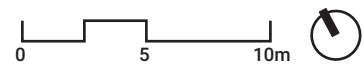
*without deck

- | | |
|---------------------|-------------------|
| 1. Elevator lobby | 6. ADA restroom |
| 2. Service elevator | 7. Storage |
| 3. Reception | 8. Kitchen |
| 4. Male restroom | 9. Office area |
| 5. Female restroom | 10. Open-air deck |

Isometric view



Floor plan



Level **9** (type B2)
also floors: **10***, **16**,
17*, **18***, **25**, **26***

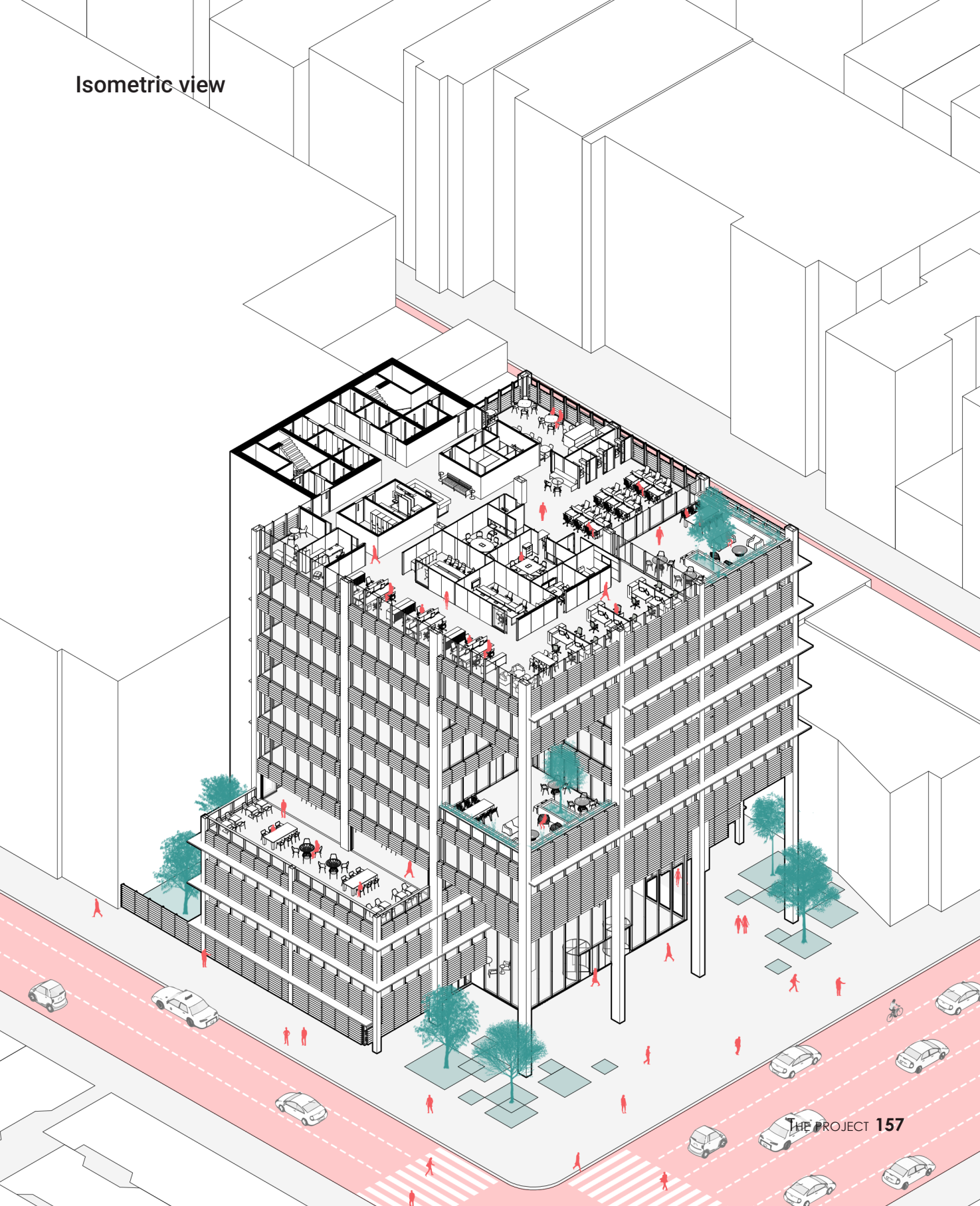


*without deck

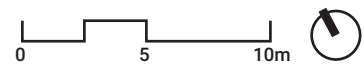
1. Elevator lobby
2. Service elevator
3. Reception
4. Male restroom
5. Female restroom

6. ADA restroom
7. Storage
8. Kitchen
9. Office area
10. Open-air deck

Isometric view



Floor plan

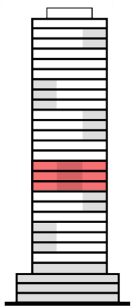


Level **11** (type D)
also floors: **12***, **13***

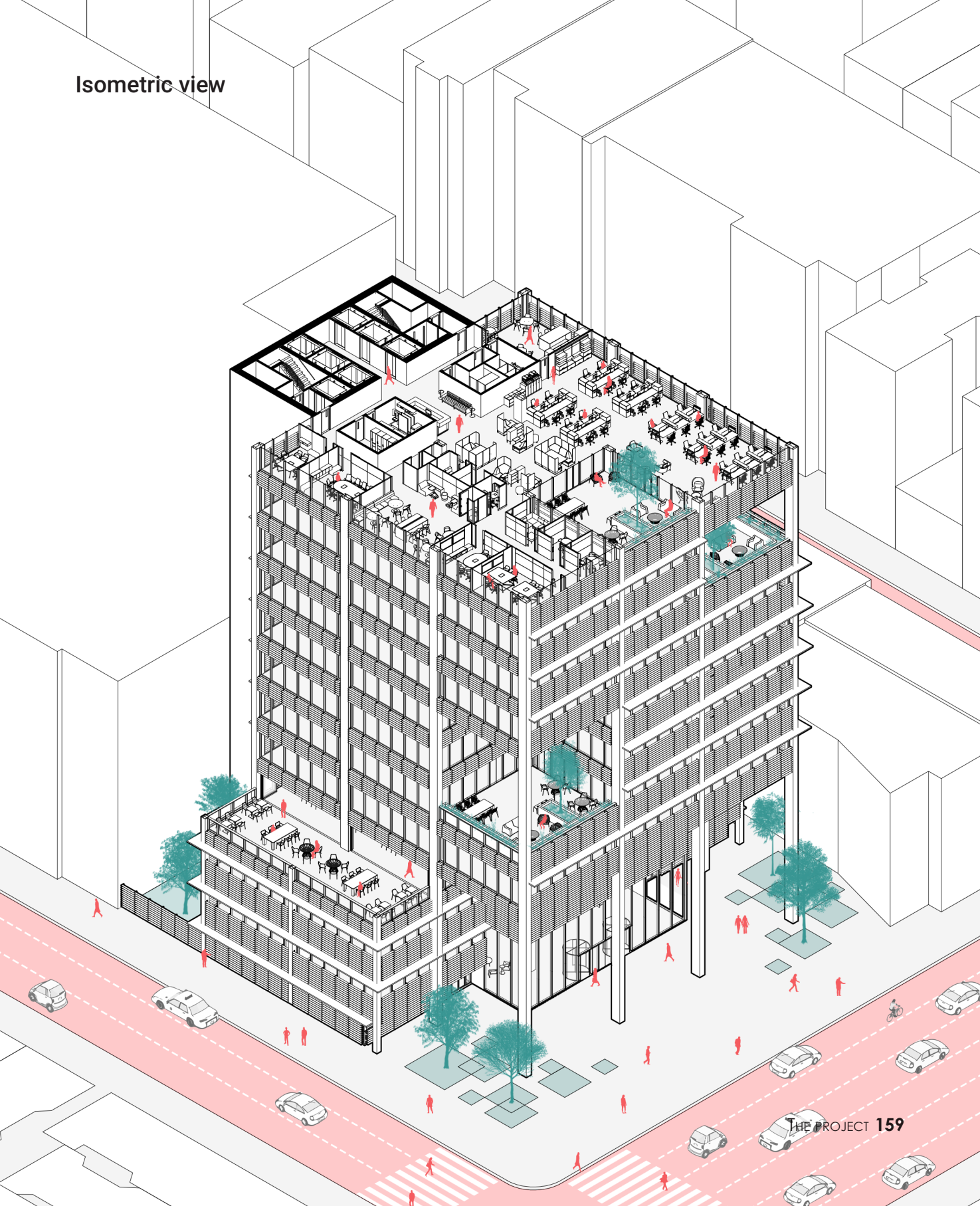


*without deck

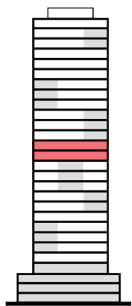
- | | |
|---------------------|-------------------|
| 1. Elevator lobby | 6. ADA restroom |
| 2. Service elevator | 7. Storage |
| 3. Reception | 8. Kitchen |
| 4. Male restroom | 9. Office area |
| 5. Female restroom | 10. Open-air deck |



Isometric view



Floor plan



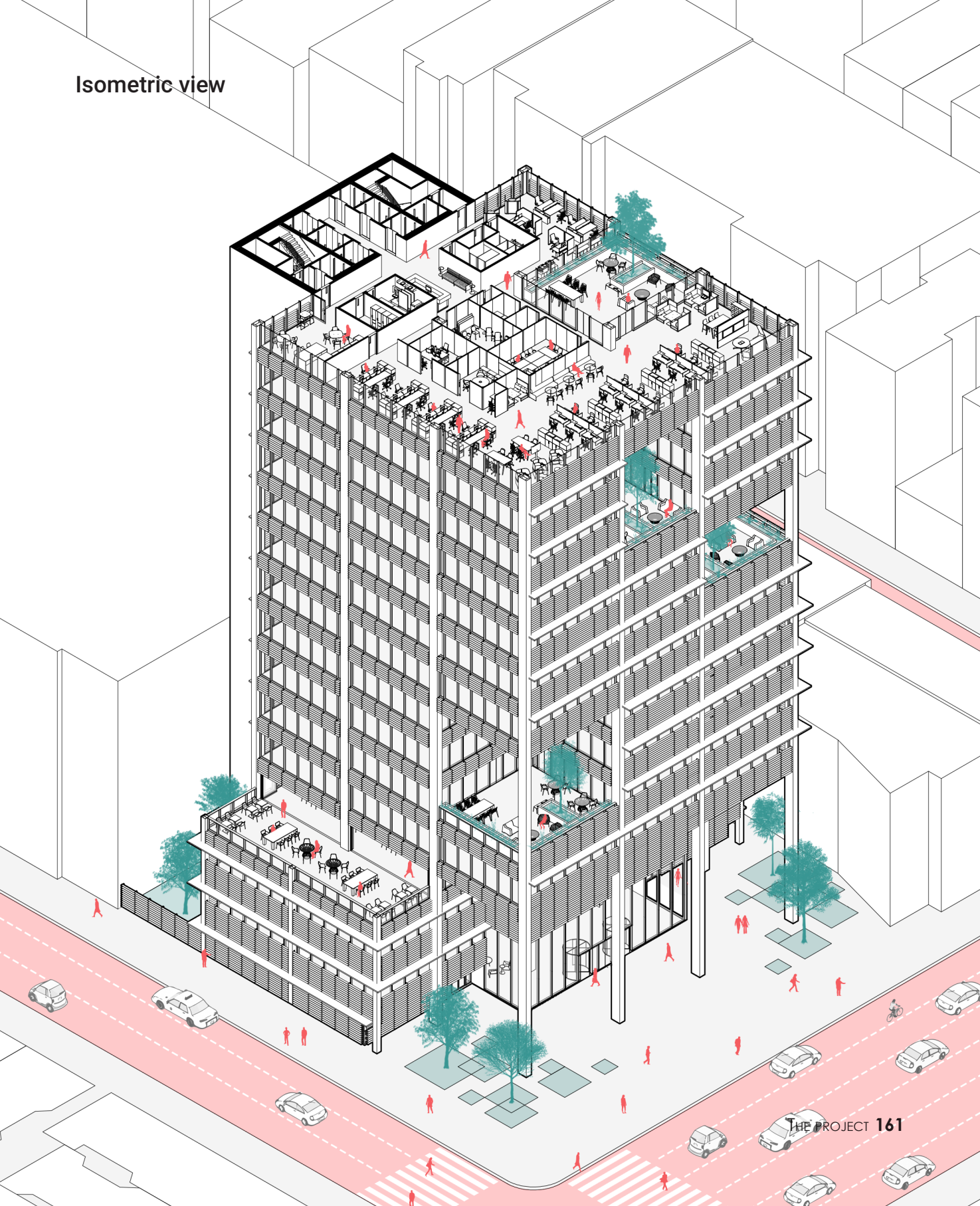
Level **14** (type C2)
also floor: **15***



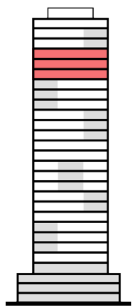
*without deck

1. Elevator lobby
2. Service elevator
3. Reception
4. Male restroom
5. Female restroom
6. ADA restroom
7. Storage
8. Kitchen
9. Office area
10. Open-air deck

Isometric view



Floor plan



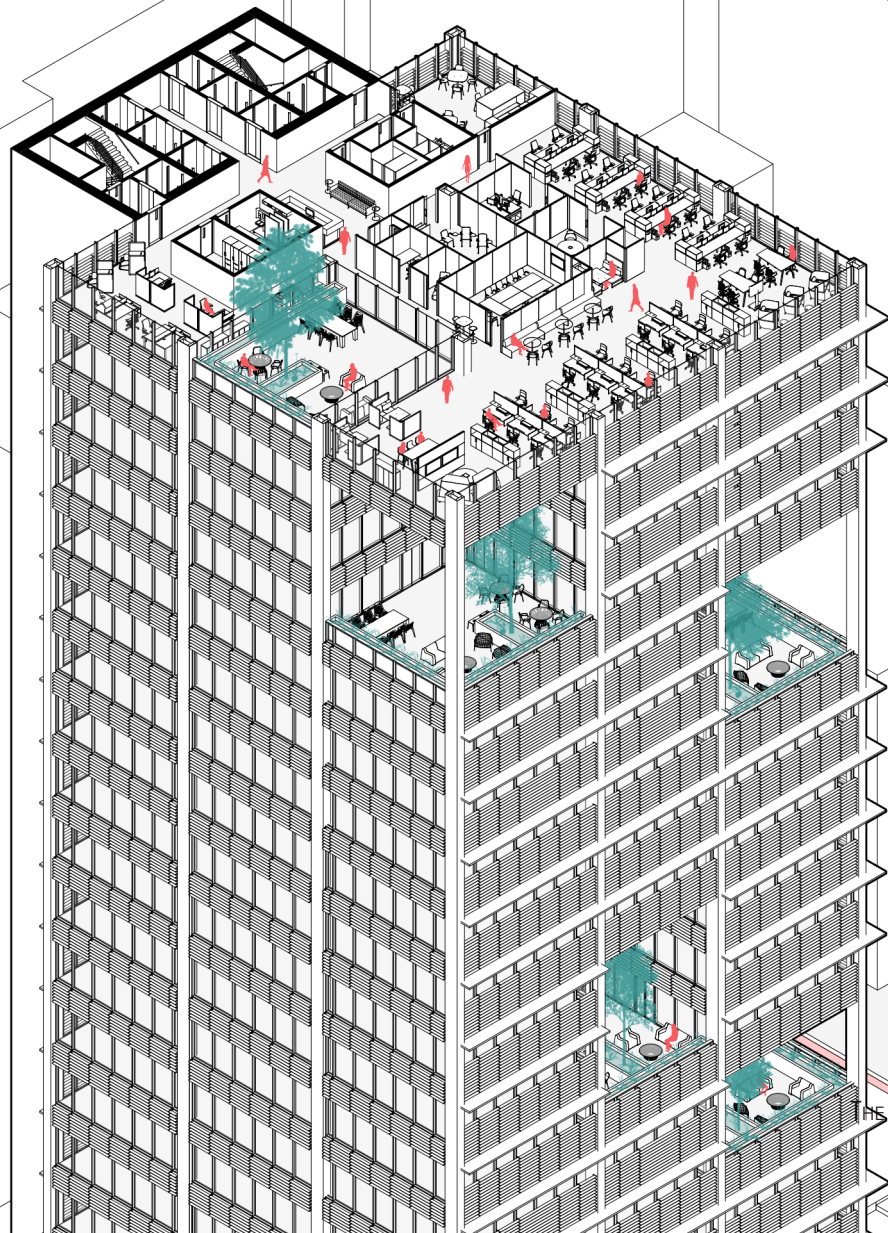
Level **22** (type C1)
also floors: **23***, **24***



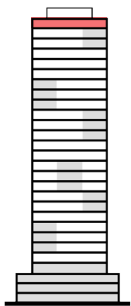
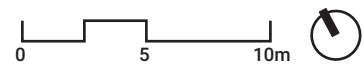
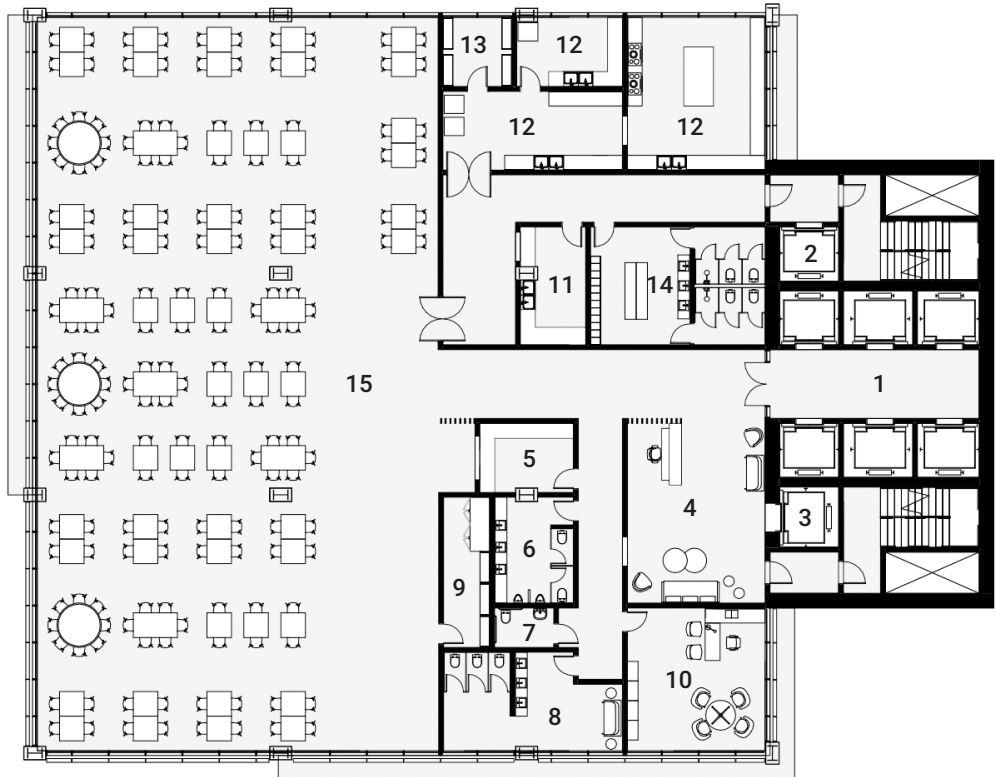
*without deck

- | | |
|---------------------|-------------------|
| 1. Elevator lobby | 6. ADA restroom |
| 2. Service elevator | 7. Storage |
| 3. Reception | 8. Kitchen |
| 4. Male restroom | 9. Office area |
| 5. Female restroom | 10. Open-air deck |

Isometric view



Floor plan

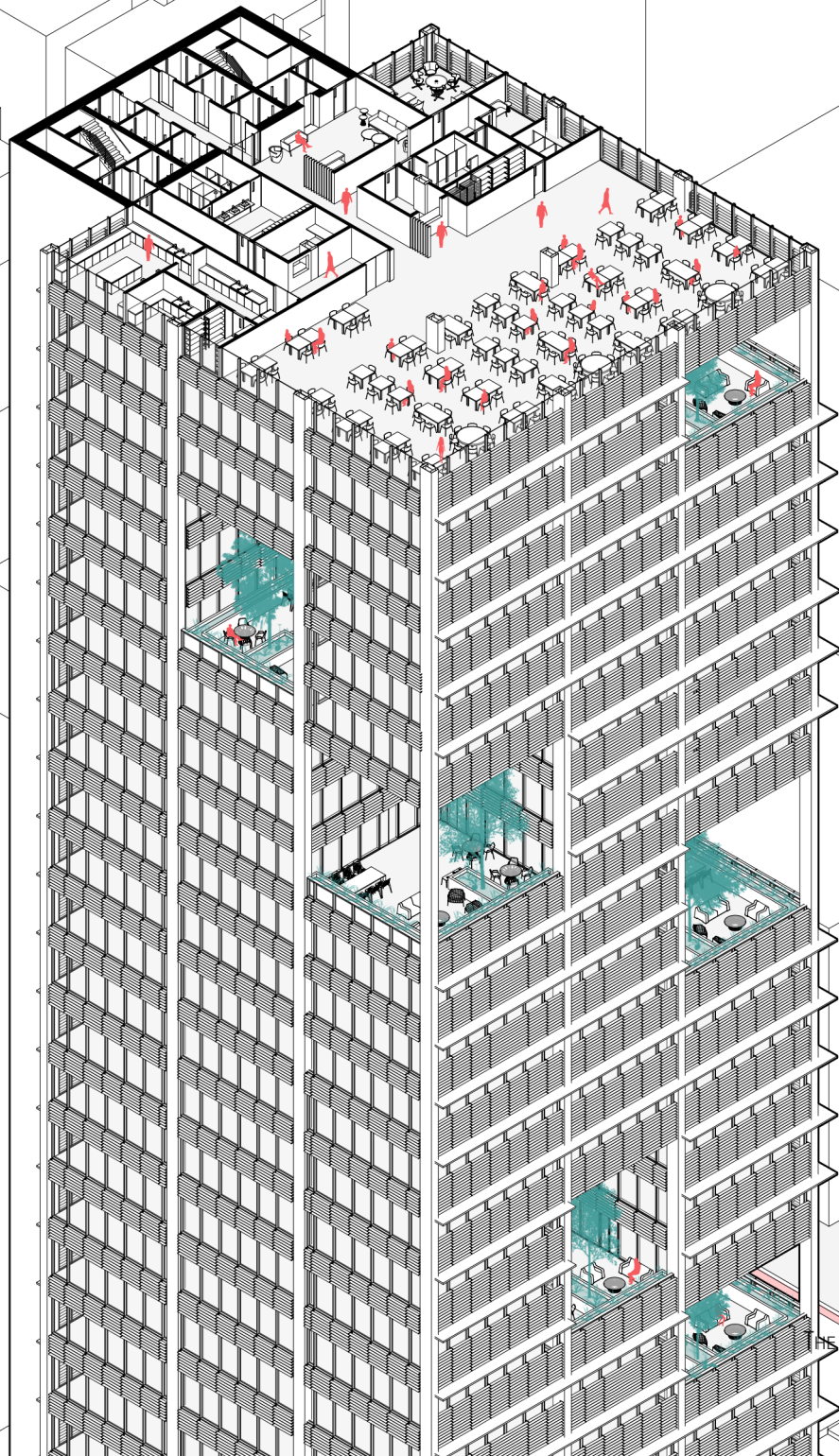


Level **27**

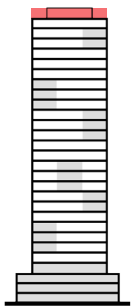
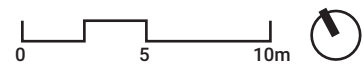
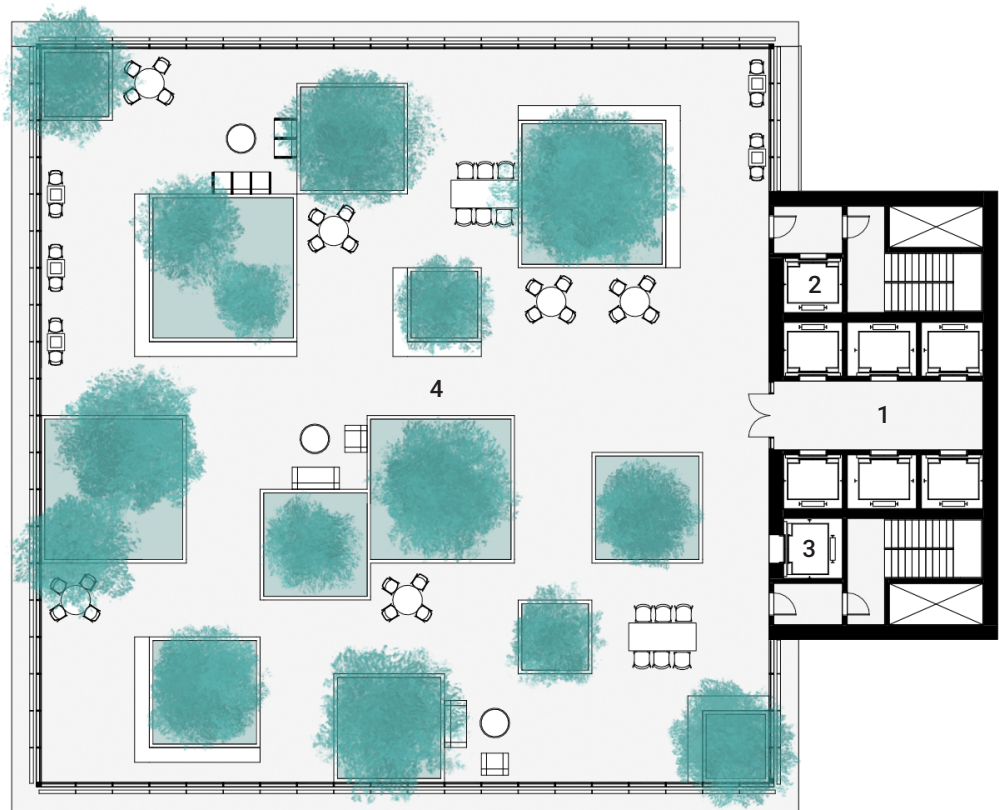


- | | |
|-------------------------|-------------------------|
| 1. Elevator lobby | 9. Wine cellar |
| 2. Service elevator | 10. Office |
| 3. Public elevator | 11. Dish washing |
| 4. Restaurant reception | 12. Kitchen |
| 5. Cashier | 13. Storage |
| 6. Male restroom | 14. Staff changing room |
| 7. ADA restroom | 15. Restaurant |
| 8. Female restroom | |

Isometric view



Floor plan

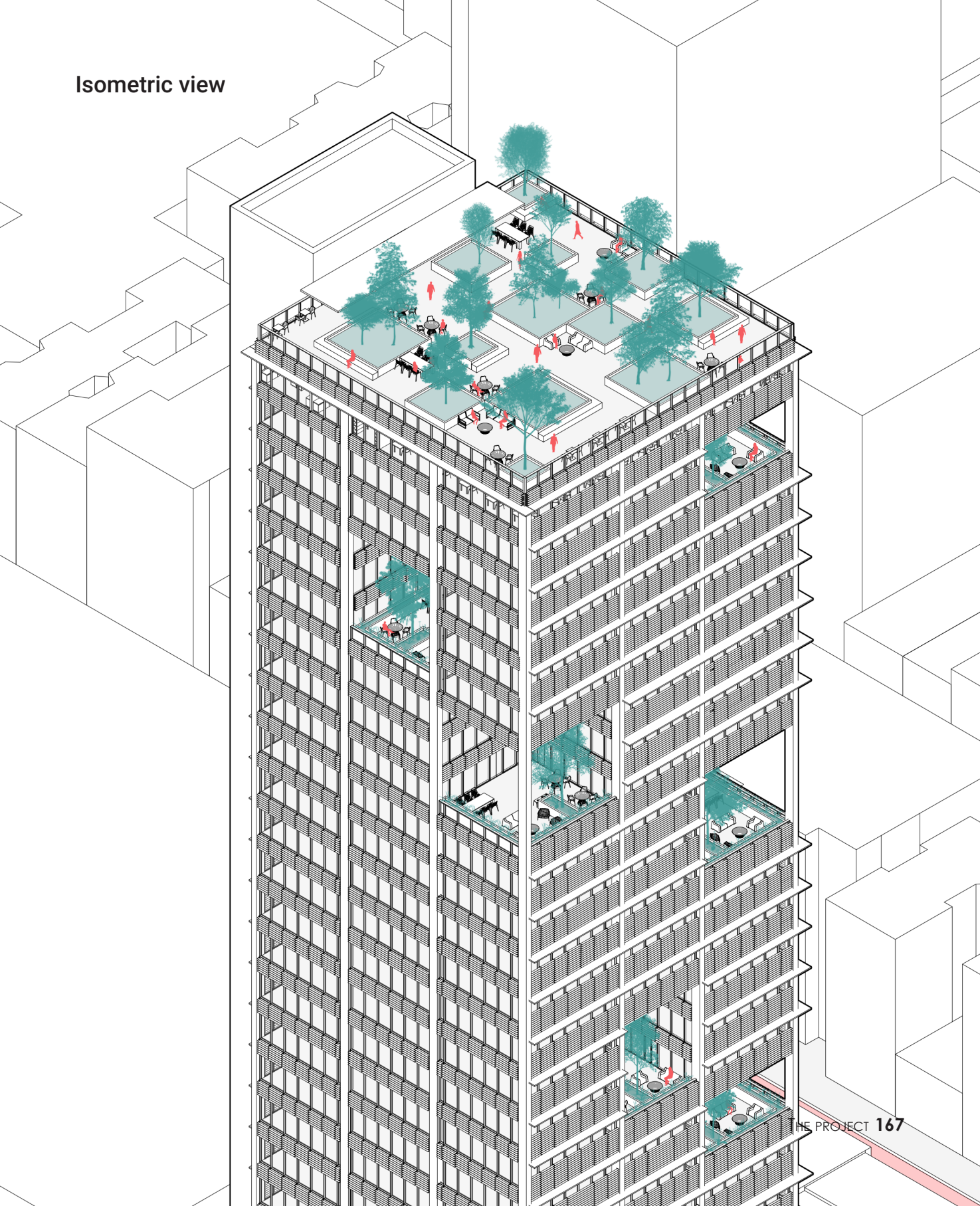


Level **28**



1. Elevator lobby
2. Service elevator
3. Public elevator
4. Rooftop terrace

Isometric view

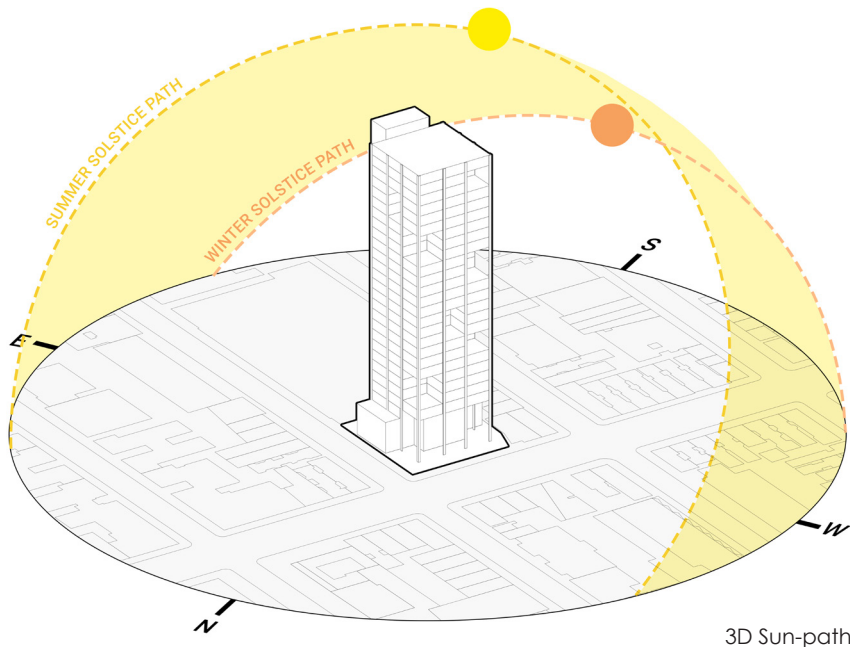
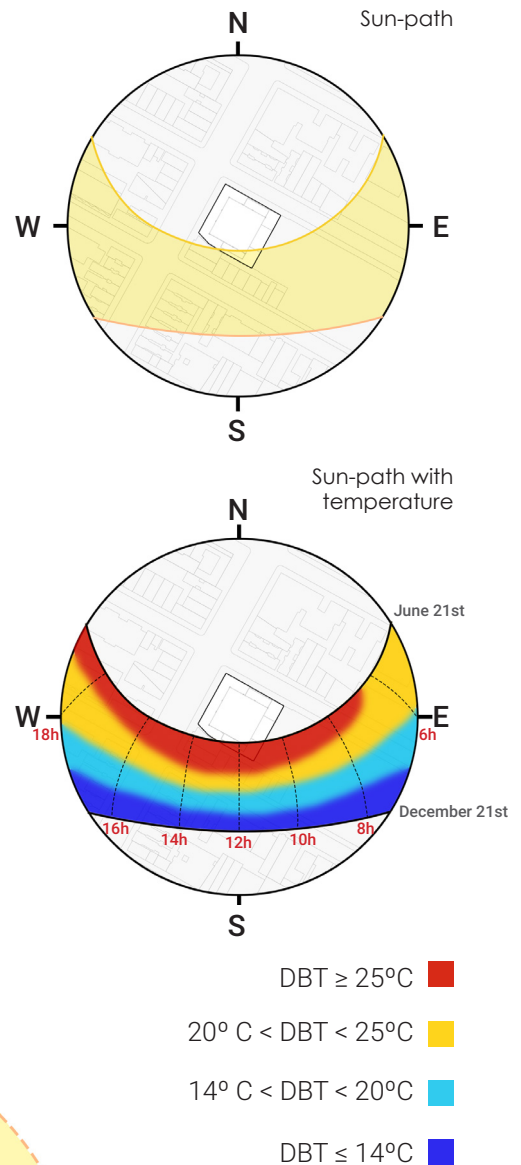


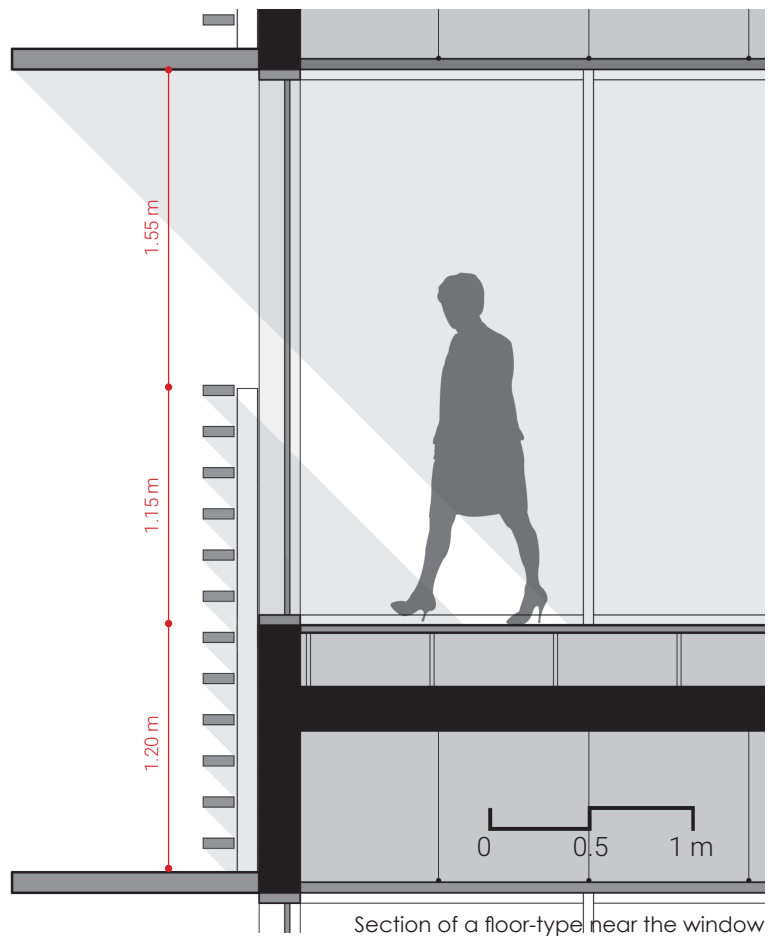
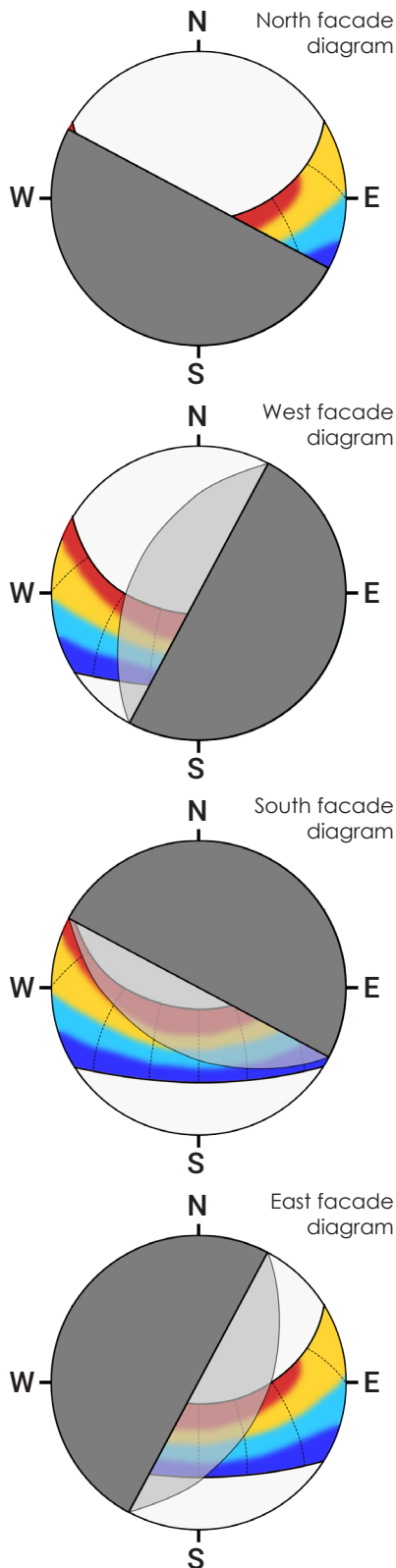
5. SOLAR STUDY

In order to ensure a better environmental performance in the building, solar studies were conducted to identify the best solution to protect it. Since the building has a curtain-wall that envelopes it, it would be extremally exposed to the sun. To reduce the use of active methods to protect it, such as air conditioning, a passive way was researched. Besides its use as protector, it would as well serve as a part of the building's aesthetic.

Studying the solar chart of the project's location in New York, it is possible to understand and visualize the sun-path during the year. With a software called Sol-AR, it was possible to combine this information with a graphic that shows the average temperature (DBT) during the year, which is helpful to understand when the solar protection in each facade is most needed.

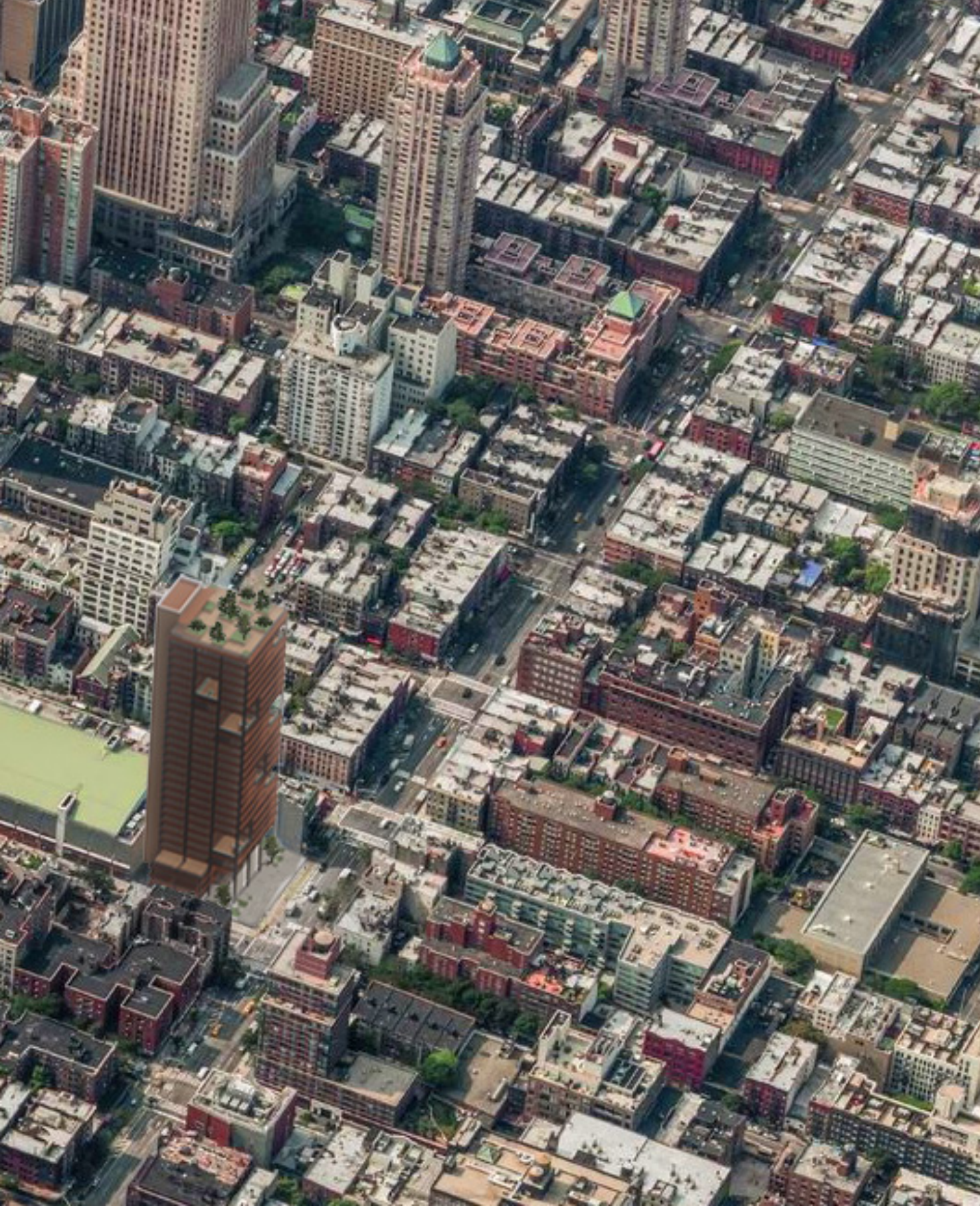
With this information, the best solution was the use of a combination of brise-soleil (sunshades).





Using the diagrams created, it is possible to manage different solutions to each of the building's facade. The North facade does not receive much direct solar rays, therefore, no protection was design for it. The East, West and South facades receive direct sunlight, either by part-time or full day-length. The best solution found to protect them was the combination of two horizontal sun shading, with a 45° internal angle. One (like a canopy) would be placed along and above the window line, with 1 m depth. The other is located 1.15 m above the floor level and goes until it meets the canopy of the floor below. It is made of elements 15 cm deep and 5 cm high, far 15 cm from each other. The gap of 1.55 m between them allows a free view for the user, with a small area that would not be shaded by the brises.











What's Going On Here?

This project is being brought to you by NYC Department of Design and Construction

Work on this project is scheduled to be completed by Spring 2011. Thank you for your patience.

Infrastructure Upgrades Along 9th Avenue

For more information on this project, visit www.nyc.gov/infrastructure or call (646) 726-4894.

CUBA CAN



MEXICANA

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ONE WAY

ONE WAY





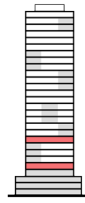
6. OFFICE DESIGN

Following the design suggestion to create an innovative office space (discussed in chapter 4 of the previous part), the workplace design of this project was given extensive attention. Trying to ensure all the qualities previously discussed, special consideration was given to the concepts of flexibility and privacy.

One of the approaches that best includes such concepts is the creation of an ecosystem of zones - a combination of different spatial typologies designed to accommodate and anticipate changing organizational and employee needs (STEELCASE, 2018):

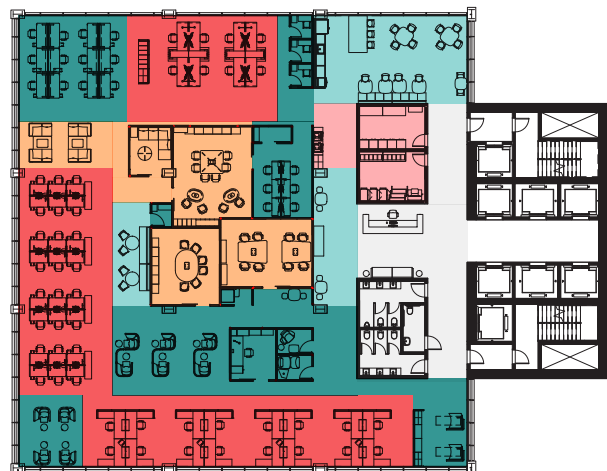
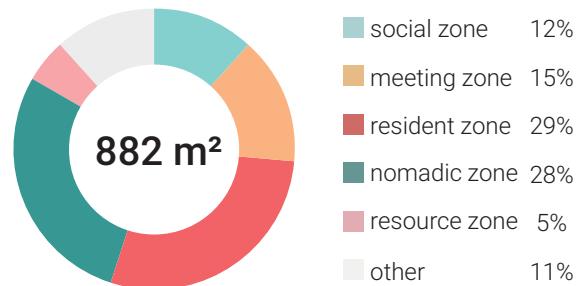
- **Social zone** - This inviting space promotes both intentional and chance encounters with co-workers. It supports social behaviors around connecting with others to help foster a community of innovation.
- **Meeting zone** - This space is designed for deep collaboration, supporting the cycle between individual and collaborative modes throughout the duration of a project.
- **Resident zone** - Designed to grow expertise and community within their discipline, this zone supports workers who are tethered to technology and have assigned spaces.
- **Nomadic zone** - It invites individuals who are transitioning throughout the day between projects and tasks. With easy access to work tools that help workers manage their day, the space gives individuals everything they need to be productive.
- **Resource zone** - This space houses the work tools and shared materials that support the employees.





Office floor **type A**

This office type occupies the entire floor plate of the tower and it composes part of the Coworking floors. The zoning system was organized in a way that the meeting space, made mostly of enclosed rooms, is in the center, surrounded by the other zones, which are predominantly defined by office furniture, with an occasional wall partition that allows private spaces. The resident and nomadic zones, in this case, are similar in area, and intercalated, which grant the employee the possibility of a diverse choice of spaces to work.

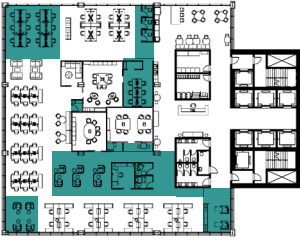




Social zone

This space comprises the kitchen area, which provides access to food and beverages throughout the workday; and seating area where workers can socialize with other colleagues, or just relax to recharge and rejuvenate.





Nomadic zone

This zone supports users' work modes, personal preferences, and wellbeing needs by providing a variety of settings. Open and enclosed areas create a mix of spaces for planned and impromptu needs.





Resident zone

Provide customizable assigned work settings for individuals, while supporting different work behaviors. The proximity to other zones, such as the nomadic one, allows a fast transitioning between work modes. The windows nearby provide a view of the city.



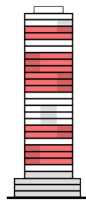


Meeting zone

Mostly composed of enclosed rooms, the meeting zone provides a mix of areas where various group work needs can be developed, considering different tools, technologies and levels of formality.

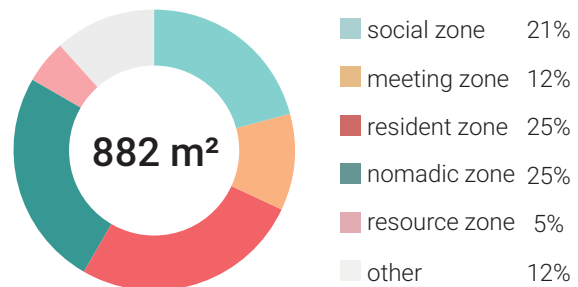


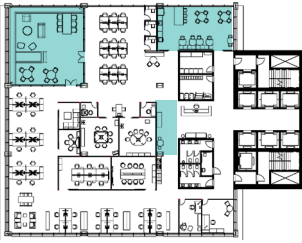




Office floor **type B**

This office floor type is the most common throughout the building. It occurs in 13 different levels, 5 of them with open-air deck on its corner. It comprises the types B1 and B2, which are mirrored. The activities that there takes place are co-working, start-up incubator, and regular offices. The open-air deck creates a rejuvenation space where employees can refresh, socialize, look at the city or even work outdoors. The resident and nomadic zones make half of the floor plan area and allow great work flexibility.





Social zone

This space comprises the kitchen area, which provides access to food and beverages throughout the workday; and an open-air deck with a small garden and outdoor furniture, which creates a pleasant space to promote social behavior.





Nomadic zone

This zone supports users' work modes, personal preferences, and wellbeing needs by providing a variety of settings. Sharing desks, enclosed privacy booths and community spaces compose this zone.





Resident zone

Provide customizable assigned work settings for individuals, while supporting different work behaviors. It includes work tools and seating privacy for focused work, and height adjustable worksurfaces that encourage posture changes.



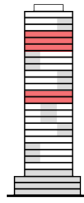


Meeting zone

Mostly composed by enclosed rooms, the meeting zone provides a mix of areas for a diverse number of people reuniting, incorporating video conferencing and technology to enable distributed collaboration for remote users.

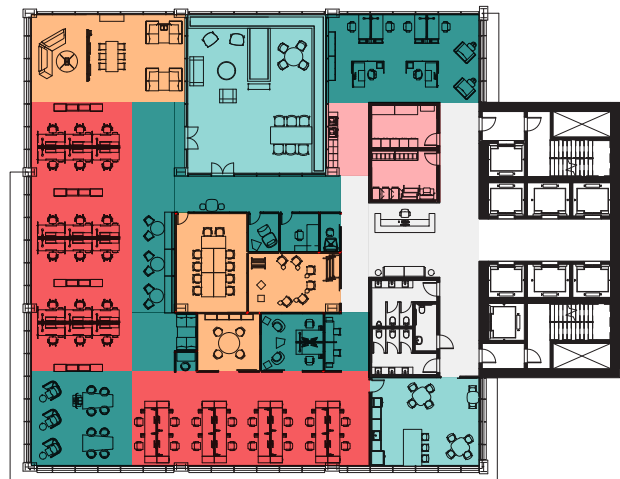
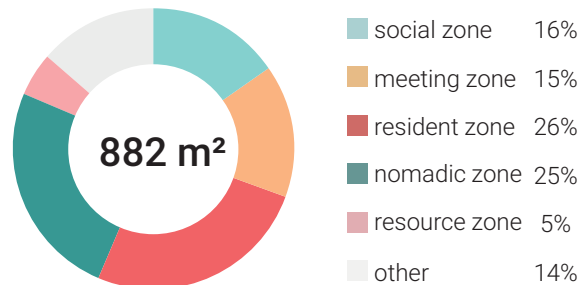






Office floor **type C**

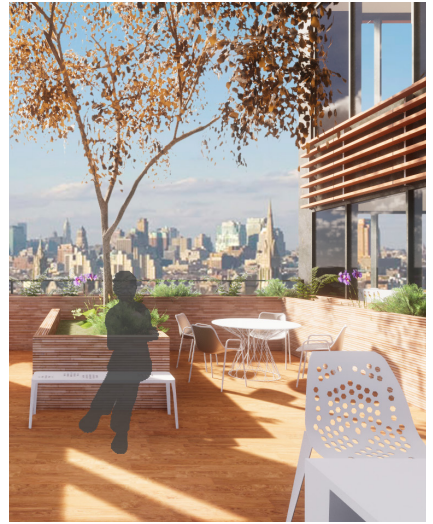
This office floor type occurs in 5 different levels, 2 of them with open air-deck. It comprises the types C1 and C2, which are mirrored; and it composes part of the regular offices' floors of the building. The open-air deck creates a rejuvenation space where employees can refresh, socialize, look at the city or even work outdoors. The resident and nomadic zones make half of the floor plan area and allow great work flexibility.





Social zone

This space comprises the kitchen area, which provides access to food and beverages throughout the workday; and an open-air deck with a small garden and outdoor furniture, which creates a pleasant space to promote social behavior.





Nomadic zone

This zone supports users' work modes, personal preferences, and wellbeing needs by providing a variety of settings. Private enclosed enclaves, a recluse area next to the garden and collaborative spaces are some of them.





Resident zone

Provide customizable assigned work settings for individuals, while supporting different work behaviors. It includes work tools and seating privacy for focused work, and height adjustable worksurfaces that encourage posture changes.



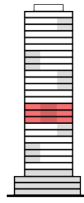


Meeting zone

The meeting zone provides a mix of areas for a diverse number of people reuniting: shielded collaborative spaces, semi-enclosed space for short-term group sessions and rooms that can assume a classroom layout are some of them.

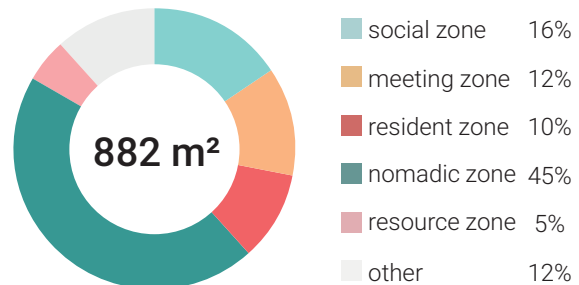






Office floor **type D**

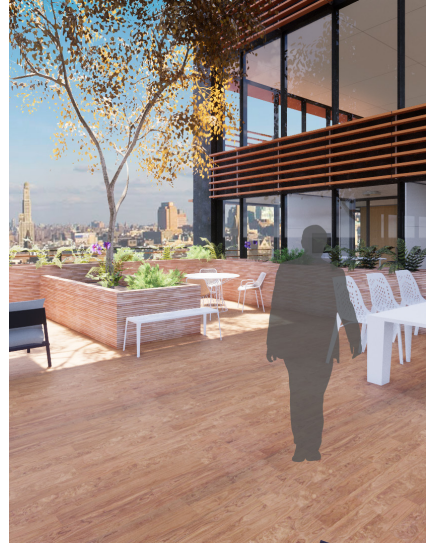
This office floor type occurs in 3 different levels, 1 of them with open air-deck, and it composes most of the start-up incubator floors. The open-air deck creates a rejuvenation space where employees can refresh, socialize, look at the city or even work outdoors. The nomadic zone makes almost half of the floor plan area, which means a great diversity of places to support different employees needs, which is required in a creative place like a start-up incubator.





Social zone

This space comprises the kitchen area, which provides access to food and beverages throughout the workday; and an open-air deck with a small garden and outdoor furniture, which creates a pleasant space to promote social behavior.





Nomadic zone

This zone supports users' work modes, personal preferences and wellbeing needs by providing a variety of settings. Enclosed enclaves to focused work, shielded spaces for privacy, large collaborative areas, shared desks are some of them.





Resident zone

Provide customizable assigned work settings for individuals, while supporting different work behaviours. Although it composes a small area, its strategic location allows fast transitioning from different work modes.





Meeting zone

The meeting zone provides a mix of areas for a diverse number of people reuniting. Made of enclosed rooms next to the windows, it incorporates video conferencing and technology to enable distributed collaboration for remote users.







7. FINAL CONSIDERATIONS

To design an office building in a city like New York is a challenge. It is a global city, compact, dense, functional. The neighborhoods have character, with a mix of people that provides cultural diversity. It is the city of large corporations, where many important firms have offices located at. Therefore, many office buildings can be found, with a variety of types, architecture styles, and heights.

Despite a large number of examples, many of them, for a long time, was designed with the objective of making employees as productive as possible, regardless of their well-being or the spatial quality.

By studying the history of office buildings and their workspace, combined with the research made about personality theories to better understand the needs of different types of people, the project developed sought to create a workplace that would be adequate for any employee type. Flexibility and diversity were key concepts to achieve such demand, creating a mix of spaces that could fulfill individual need and desires, which can lead to a better work performance, pleasing both employee and company.

Introverted people should no longer be submitted to work conditions that make them feel uncomfortable like it happens in the typical open-plan office. And despite appearances, even extroverted people can feel overwhelmed in such places. By providing a range of options, and the possibility of choosing where to work, an inspiring environment can be created.

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Img. 110 – Headphones at work – one way to signalize the need of privacy (from: <https://www.steelcase.com/research/articles/topics/privacy/privacy-crisis/>)

Img. 111 – Protocols (from: <https://www.entrepreneur.com/article/276238>)

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Img. 113 – Distributed model (from: Ibid)

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Img. 115 – Example of how office furniture can create different spaces where people can connect, collaborate and concentrate (from: www.steelcase.com/eu-en/revit/b-free/)

Img. 116 – Preference of workers for places with outside view (from: FERNANDES, 2016, pag. 77)

Img. 117 – Example of an office with wide outside view (from: <http://safest2015.info/the-bright-open-multi-level-offices-of-c-media/office-ideas-for-small-spaces-workplace-strategies-that-enhance-performance-health-and-wellness>)

Img. 118 – Hellinga's Scale Model study – Window Design Type 1, view 2 (from: HELLINGA, 2013, pag. 366)

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Img. 120 – Hellinga's Scale Model study – Window Design Type 3, view 1 (from: Ibid, pag. 367)

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Img. 122 – BigBek Office in Armenia – Use of bright colors, geometry and brutal concrete ceiling to create a dynamic, playful and creative atmosphere for work (from: www.archdaily.com/802291)

Img. 123 – Monocromatic white as office color scheme 1 (from: KWALLEK, 2005, pag. 4)

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Img. 126 – Yelp Headquarters in San Francisco, USA – an example of flexible office (from: www.archdaily.com/517354)

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Icons by *thenounproject.com* and *flaticon.com*.

APPENDIX 1 | QUESTIONNAIRE - ASSESSMENT OF SATISFACTION WITH THE WORKING ENVIRONMENT

Personal data:

Gender:	<input type="checkbox"/> M <input type="checkbox"/> F	Age:		Job role:	
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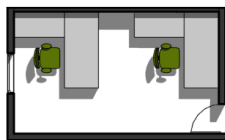
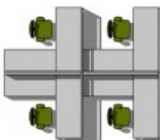
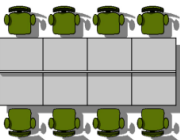

Personality:

Check the statements with which you agree:

1	I prefer individual conversations over group activities	
2	I usually prefer to express myself in writing	
3	I work better alone	
4	People say I'm a good listener.	
5	I like jobs that allow me to "dive" with few interruptions	
6	I do not like doing many things at once	
7	I can focus easily.	
8	I do not like conflicts	
9	I tend to think before speaking	
10	I'd rather not show my work or discuss it with others until I've finished.	

Work environment

Select your type of workspace:

Private enclosed	Private shared	Open individual	Open shared	Open grouped
				

Indicate the degree of satisfaction with the work environment according to the categories below:

Legend:
TA – Totally Agree PA – Partly agree U – Undecided PD- Partly disagree TD-Totally disagree

A. Professional performance:

		TA	PA	U	PD	TD
1	The overall layout of the office facilitates teamwork					
2	I can stay focused on work					
3	There are places where I can go to have more privacy					
4	I am able to be productive in my current workspace					
5	I am easily distracted by the conversation of other employees					
6	I have access to the equipment I need for the job					
7	It's easy to have private conversations in my workspace					
8	I am located near people who need to talk about work					
9	My group / team works cohesively					
10	I feel stressed at work					

B. Relationship with co-workers:

		TA	PA	U	PD	TD
1	I really feel like I'm part of the team					
2	It's easy to ask someone for advice					
3	There are separate spaces for teamwork					
4	I like to have supervisors located close to the rest of the team					
5	I feel that sometimes I am interrupted unnecessarily					

C. Relation to the physical environment:

		TA	PA	U	PD	TD
1	I have enough storage space					
2	Personnel traffic corridors are well defined					
3	I have enough work surface					
4	I am able to take a break away from the office (e.g. at lunch)					
5	Confidential and/or sensitive information is handled appropriately with the current office layout					
6	I usually get distracted by the environment around me					
7	There are protocols to regulate behavior in the workplace (e.g. personal conversations, respect for privacy, listening to loud music)					
8	It is possible to decorate my workspace (e.g. photos, plants)					

D. Relationship to physical stress producers:

		TA	PA	U	PD	TD
1	The lighting is adequate					
2	Noises (e.g. phones, people talking, background noise) are frequent and bother me					
3	Air quality (ventilation) is adequate					
4	Air temperature is appropriate					
5	There is enough natural light in my workspace					
6	The furniture (e.g. table, chair) is suitable and/or comfortable					

E. Distractions

		TA	PA	U	PD	TD
1	There are visual disturbances (e.g. strong colors, mess)					
2	There are auditory disturbances (e.g. music, conversations, TV)					
3	The physical organization of the office is uncomfortable					
4	I feel like I'm being watched in my workspace					

F. Your suggestion for change

What would you like to change in your work environment?