The Balance Between Cultural Historical Values and Sustainable Adaptations in Monumental Canal Houses in Amsterdam

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Abstract

The slogan of the Groene Grachten (2018) for the flagship project at Oudezijds Voorburgwal 136 is 'If it can happen here, it can happen anywhere!' The renovation of the building in 2021 serves as a model for other canal houses to demonstrate that even these monumental buildings can be made sustainable. The aim of this paper is to investigate in what extent the integration of sustainability does align with the authenticity of heritage in the renovation of Amsterdam's canal houses. This will contribute to gaining insight into how sustainable renovation of monumental buildings can be approached. A comprehensive literature review was conducted to explore fundamental aspects of authenticity. Subsequently, historical research was undertaken focusing on the city of Amsterdam. Oudezijds Voorburgwal 136 was identified as a case study to investigate authentic values and sustainable innovations within a canal house setting. The research underscores the challenges and compromises involved in preserving authentic appearances while implementing sustainable measures, especially focusing on the facade where authenticity is most pronounced. Overall, the study highlights the complex interplay between authenticity and sustainability across building layers, emphasizing the need for strategic compromises and innovative solutions to effectively achieve preservation goals.

Keywords: sustainability, authenticity, canal houses, Amsterdam

Table of Contents

00 - Introduction

The slogan of the Groene Grachten (2018) for the flagship project at Oudezijds Voorburgwal 136 is 'If it can happen here, it can happen anywhere!' The renovation of the building in 2021 serves as a model for other canal houses to demonstrate that even these monumental buildings can be made sustainable. Most of the canal houses were constructed in the 17th and 18th century and hold significance for the iconic image of Amsterdam. Progress in sustainable renovation of canal houses has long been limited due to the complexity of preserving their cultural and monumental character and the limited scope for significant alterations in this characteristic area.

Ten years ago, Wubbo Ockels introduced the 'De Groene Grachten' initiative to make the canal houses in Amsterdam more sustainable. In addition to being a physicist, astronaut and pilot, Wubbo Ockels was an avid advocate of sustainability. He aimed at reconsidering and approaching the sustainable renovation of the canal houses from a fresh perspective. In 2018, 'De Green Deal' (De Groene Grachten, 2018) was established between the Dutch government and De Groene Grachten to promote sustainability in the Amsterdam canal region. The balance between preserving cultural authenticity and applying sustainability in the canal houses of Amsterdam is one of the main topics in 'De Green deal'.

In 2018, De Groen Grachten initiative commenced its sustainability efforts in this region, with the property located at Oudezijds Voorburgwal 136 (*Figure 1*) being one of its inaugural projects and serving as a model endeavor. Architectural firm Van Stigt, client NV Zeedijk, and De Groene Grachten collaborated to facilitate this sustainability initiative. Understanding the sustainable renovations of Oudezijds Voorburgwal 136, while considering the authentic values of the building, contributes to gaining insight into how sustainable renovation of monumental buildings can be approached.

According to Van Cappelleveen (2022), substantial renovations were required to enable this sustainability endeavor. The property, with its rich history, stands as an iconic and authentic canal house in Amsterdam. To gain a thorough understanding of the background and history of the building, a historical investigation is conducted in this paper. Subsequently, the authentic values of the building can be determined. To do this, it is essential to first examine how authentic characteristics of a building can be identified. This will ultimately allow answer to the main question of this paper:

"To what extent does the integration of sustainability align with the authenticity of heritage in the renovation of Amsterdam's canal houses?"

To answer this research question, a literature review was conducted, historical research on the building at Oudezijds Voorburgwal 136 was performed, and this building was used as a case study to research the sustainable innovations in a canal house. The following chapter presents the findings of the literature review, focusing on the first sub-question: *What characteristic does authenticity possess, and how can we identify and evaluate them in heritage?* This chapter addresses the concept of authenticity, its contribution to architec-

ture and cultural heritage, the core attributes and indicators of authenticity, and the framework within which these can be analyzed. Farrelly et al. (2019) contend that the concept of authenticity contains three core and overlapping attributes: physical form (Form), links to what is culturally and historically significant (Links), and vitality to actively convey meaning (Vitality). Using this three-part conceptualization, the authenticity of heritage production can be approached in terms of the object's indexic cues and iconic cues. Peirce (1998) noted that the "index" refers to cues that, like handprints, are considered to have a factual and spatio-temporal link to an experience or fact. Iconic clues indicate how a cultural heritage object bears a strong physical resemblance to its original form.

In Chapter 2, the sub-question is addressed: *What is the historical background and context of the Oudezijds Voorburgwal 136?* This chapter provides a historical investigation into the building at Oudezijds Voorburgwal 136.

In Chapter 3, the focus is on the sub-question: *What authentic characteristics does the Oudezijds Voorburgwal 136 possess and what adjustments have been made to the building to improve its sustainability?* In this chapter, the building is analyzed through a case study focusing on its authentic values and the sustainable modifications made through the collaboration of 'De Groene Grachten' and architectural firm 'Buro Van Stigt' in 2021. Van Capelleveen (2022) conducted a study on the sustainable renovation of the Oudezijds Voorburg 136 case study, which can be utilized to assess the extent to which these sustainability measures align with preserving the authentic values of the building.

Figure 1: Oudezijds Voorburgwal 136 (Buro van Stigt, 2024)

01 - Authenticity

To grasp what makes a canal house authentic, it is necessary to first investigate the actual meaning, content, and recognition of authenticity. According to Van Leeuwen (2001) authenticity is an evaluative concept. Something can be called 'authentic' because it is thought to be true to the essence of something, to a revealed truth, a deeply felt sentiment, or the way these are worded or otherwise expressed. One such essence is the 'self', construed as a constant and unified 'character', which at best slowly 'evolves' or 'matures'. Another is an internalized conscience or life goal which, again, is never altered or compromised. Yet another is the style of the artist or the voice of the singer. Most artists and singers can credibly perform in many different styles, but if they seek distinction and are to be regarded as having their own authentic style or voice, they must adopt just one style and abandon the others. This chapter clarifies how these understandings of authenticity can be observed in heritage. By better understanding and recognizing of authenticity, the authentic values of the canal houses in Amsterdam can be more efficiently examined.

1.1 Authenticity in Heritage

Authenticity is a multifaceted concept often characterized by qualities such as originality, sincerity, genuineness, and authority (Jokilehto, 2007; Sekler, 2008). In 2008, English Heritage articulated authenticity as encompassing those attributes that reflect and embody the cultural heritage values inherent to a specific location (Nezhad et al., 2015). However, despite efforts to define authenticity, its interpretation remains susceptible to variation due to the diverse ideas and concepts associated with it (Del Rio Carrasco, 2008; Jokilehto, 2008; Labadi, 2010), spanning considerations of design, form, materials, context, techniques, tangible and intangible values, as well as craftsmanship. Karsten (2017) identifies form, substance, and temporal aspects as pivotal in preserving authenticity. Consequently, maintaining authenticity poses challenges, particularly when undertaking adaptive reuse projects on heritage buildings. Bridgwood and Lennie (2013) contended that defining authenticity is complex, as a component may lack originality yet still possess authenticity owing to its period-appropriate introduction during construction. This assertion underscores the significance of a heritage building's original construction period in shaping its authenticity. Conversely, Jokilehto (2007) argued that a conservation approach that prioritizes documentary evidence of initial construction while disregarding the effects of time and subsequent alterations risks compromising authenticity. Thus, it can be inferred that all historical interventions on a heritage building contribute to its authenticity (Mehr & Wilkinson, 2020).

Recently, UNESCO World Heritage (2017) defined eight features which contribute to the authenticity of a heritage place, including (1) form and design, (2) use and function, (3) location and setting, (4) These characteristics indicate that authenticity encompasses both tangible and intangible values inherent in a heritage building. Consequently, authenticity does not singularly manifest as a static value within a heritage building; rather, various features and values of the structure must possess authenticity to collectively convey its authenticity. Several scholars have noted that, predicated upon these attributes, authenticity can manifest in diverse forms, each of which necessitates distinct approaches by specialists (Del Rio Carrasco, 2008; Dezzi Bardeschi, 2008; Macchi, 2008; Sekler, 2008). Jokilehto (2007) posited that the UNESCO cat-

alog of authentic features encompasses historical, aesthetic, social, and physical facets of a heritage site. Hence, the authenticity of a heritage site can be assessed based on multiple factors, with each factor representing a unique dimension of authenticity.

1.2 Core attributes and cues

To understand authenticity, it is important to explain how a monument relates to its image. Peirce (1998) identifies iconic and indexical signals as two modes of signification to explain how authenticity arises from the experience of an object. Peirce noted that the "index" refers to cues that, like handprints, are thought to have a factual and spatial-temporal connection with something else, and in this respect, these cues and what they represent are associated with a phenomenological experience of fact. The indexical cues of a cultural heritage object contain multiple connections to what is culturally and historically significant. For instance, the Sagrada Familia (*Figure 2.1*) possesses various factual, spatial-temporal connections, particularly (but not exclusively) with Antoni Gaudi, his inventive architecture, Spanish architecture, Spanish culture, Barcelona, and Catalan identity. There are numerous examples in the literature of cultural heritage objects with factual spatial-temporal connections to a wide range of historically and culturally significant properties such as values, ideologies, places, structures, identities, practices, folk heroes, landmarks, and historical events (Bruner, 1994a, 1994b; Chronis, 2005; Sahlins, 1999; Watson & Waterton, 2010). The strength of indexical cues is also evident from the weight of meaning attributed to them. For example, the original painting 'De Nachtwacht' by Rembrandt (*Figure 2.2*) carries vitality because it was painted by the master's hand and because it carries an aura that extends far beyond his life (Benjamin, 1973). To explain how indexical cues denote authenticity, Grayson and Martinec (2004) refer to the handprints on Hollywood Boulevard (*Figure 2.3*). These handprints are indexically authentic because they have a factual, spatial-temporal connection with the actor. Examples of indexical cues on cultural heritage objects include the hundreds of markings at the Gettysburg site (*Figure 2.4*), such as specific features of the landscape or artifacts (like topography and cannonballs) indicating crucial aspects of the battle (Chronis, 2005). The 1,300 monuments, memorials, and plaques narrate the three-day battle, while the hundreds of cannons surrounding the battlefield serve as reminders of the power of war.

Iconic cues indicate how a cultural heritage object bears a strong physical resemblance to its original form. Peirce (1998) explains that to make an assessment based on the iconic cues of objects, the observer must have some prior knowledge of the object that helps in creating a composite image that serves as a reference point. However, it is also emphasized in the literature that iconic cues can refer to original objects. For example, considering the distinctive form of the Eiffel Tower (*Figure 2.5*), Buckingham Palace (*Figure 2.6*), the Mona Lisa (*Figure 2.7*), or the Great Wall of China (*Figure 2.8*), it is clear that an original object can be considered for its iconic authenticity due to the uniqueness of its physical form, as that form is indelibly embedded in global culture (Weidenfeld, 2010), or due to its recognition as a category specimen (Cornfield & Edwards, 2000), for example, the Galle Face Hotel in Sri Lanka (*Figure 2.9*) is considered a typical example of a heritage hotel from the Raj era. It is also the case that iconic cues are numerous within a single object, and while primarily associated with the visual, they can also take on other sensory forms, such as auditory or tactile.

Farrelly et al. (2019) concludes out of Peirce research that authenticity contains three core and overlapping attributes: links to what is culturally and historically significant (Links), vitality to actively transmit meaning (Vitality), and physical form (Form). Grayson and Martinec (2004) demonstrate the centrality of indexical and iconic signals in tourists' interpretation of heritage object authenticity. Similarly, Ram, Björk, and Weidenfeld (2016) show that tourists' perceptions of authenticity are mod-

ulated by iconic and indexical signals, while Hede and Thyne (2010) demonstrate the use of iconic and indexical signals in determining authenticity. The critical point of the assumed approach to cultural heritage objects and authenticity is that these cues and their deeper meanings, indicated in the physical form and contexts of the objects, form the basis for understanding, unraveling, and reconstructing heritage authenticity (Farrely et al., 2019). It is also important to note that iconic and indexical signals do not exclude each other. Cultural heritage objects can be seen as both iconically and indexically authentic.

Figure 2: Indexical and Iconic Cues

1: Indexically authentic handprints on Hollywood Boulevard that have a spatial-temporal link to the actor[HS1] .
2: Hundreds of indexical markings on the Gettysburg site linking to crucial aspects of the battle.
3: The Sagrada Familia with multiple indexical references particularly (but not exclusively) to Antoni Gaudi, his inventive and flamboyant archi-tecture, Spanish architecture, Spanish culture, Barcelona and Catalan identity (photo: Wikipedia, 2024a).
4: 'De Nachtwacht'. The original painting of 'De Nachtwacht' painted by Rembrandt carries vitality because it was painted by the master's hand and because it carries an aura far beyond his lifetime (photo: NOS, 2023).
5: Iconic Eiffel Tower (photo: RTL News, 2023)
6: Iconic Buckingham Palace (photo: Wikipedia, 2023a).
7: 'Mona Lisa', iconic in art (photo: Wikipedia, 2024b).
8: The iconic chineze wall (photo: Wikipedia, 2023b).
9: Iconic Galle Face Hotel as a typical example of a heritage hotel of the Raj era (Galle Face Hotel, 2023)

1.3 Shearing Layers Concept

To properly analyze and report the changes in a building, architect Brand (1994) came up with the shearing layers concept (*Figure 3*). The framework views buildings as a collection of components that evolve in different time scales; Brand summarized this view in his sentence, “Our basic argument is that there is no such thing as a building. A building consists of different layers with a long lifetime of built components” (quoted in Brand, 1994). Used to analyze a building, the shearing layers concept emphasizes the integral physical cohesion of a building and the varying rate of change that different layers undergo. Understanding the shared layers gives us insight into a building’s circularity potential. The layers examined are location, structure, skin, services, space plan and stuff, each of which contributes uniquely to the building’s overall condition, authenticity and historical significance. It also links to the lifespan of each layer. This model helps organize and explore authenticity in the building.

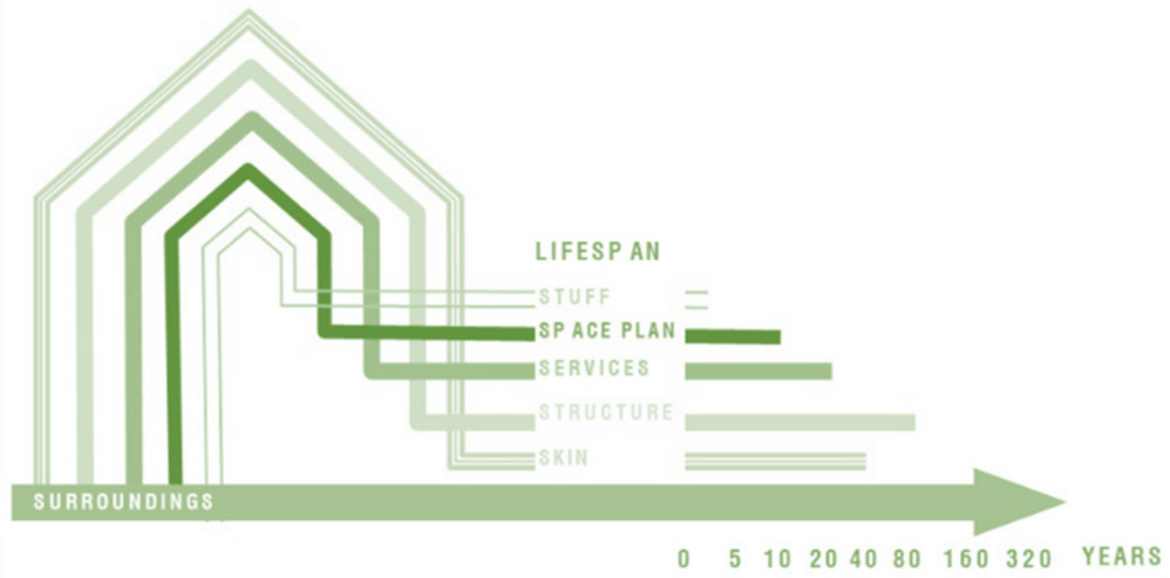

Figure 3: A Building’s Shearing Layers (Brand, 1994)

02 - History and Context of the Canal houses in Amsterdam

Bronsvoort (2012) noted that the function of a canal house have changed countless times during their existence with no apparent effect on their outward appearance. Amsterdam has been a live/work city for 350 years where both dwelling and working are continually changing character and location, while the outward appearance, the facades and entrances, remain the same. To address what makes canal houses authentic, this research utilizes a case study of the building located at Oudezijds Voorburgwal 136. In order to uncover the authentic characteristics of the property, an investigation into its context and history is necessary. This chapter explores the history and context of the Amsterdam canals, the canal houses, and specifically, the property at Oudezijds Voorburgwal. By doing so, the authentic values can be established, and an assessment can be made regarding their preservation during the recent sustainable renovation.

2.1 The Growth of the Amsterdam Canals

In 1538, Cornelis Anthonisz (*Figure 4*) produced a map of Amsterdam, which is regarded as one of the earliest maps of the city, according to the City of Amsterdam (Gemeente Amsterdam, 2023). This bird's-eye view offers a perspective of the city from above the IJ River. The eastern inner city is discernible in the antique map depicted on the left. Notably, the Oudezijds Voorburgwal (*Figure 5*) is already recognizable in this early representation. Additionally, the Kloveniersburgwal is depicted as the broad waterway on the right, while Central Station is situated on an island within the former harbor.

Figure 4: One of the earliest maps of Amsterdam (Gemeente Amsterdam, 2023)

Figure 5: Oudezijds Voorburgwal already recognizable (Gemeente Amsterdam, 2023)

In prosperous Amsterdam from the late sixteenth century onwards, the city faced a surge of newcomers, housing shortages, and spatial constraints. An expansion of urban space was inevitable. Amsterdam had originated around the Amstel River in the Middle Ages, and these necessary expansions of the city were accompanied by the construction of canals. Moreover, due to the marshy land, there was a need to construct canals. *Figure*

6 shows the phases of the city expansions up to the seventeenth centuries. The expansions ultimately resulted in the iconic fan-shaped layout of the canals in Amsterdam.

Since the seventeenth century, the primary and intersecting canals have been adorned with evenly spaced rows of trees. Original bridges still remain at the locations designated during the seventeenth-century urban expansions. The layout of streets and alleys within the canal ring area remains entirely unaltered, except for the addition of a more recent radial street, Raadhuisstraat, which necessitated some demolition and occasional (minor) widening of radial roads connecting the canals. The waterways and canals not only constitute a distinctive aspect of the city's historic urban plan but also maintain their traditional functions in water management and transportation. Seventeenth-century locks situated in Korte Prinsengracht, Singel, and Nieuwe Herengracht persist in operation to the present day.

2.2 The general development of the Amsterdam canal house.

A group of students from the University of Amsterdam (2008) investigated the construction of Amsterdam's canal houses. Amsterdam is situated on a bog, which has had a significant impact on the foundation and structure of the canal houses. Houses are built on a typical foundation of wooden poles. Schlatmann (2010) observed that in the eighteenth century, the use of materials and colors influenced the cityscape. Various types of materials were available for constructing residential houses, civil works, churches, and other buildings, with stone types, along with

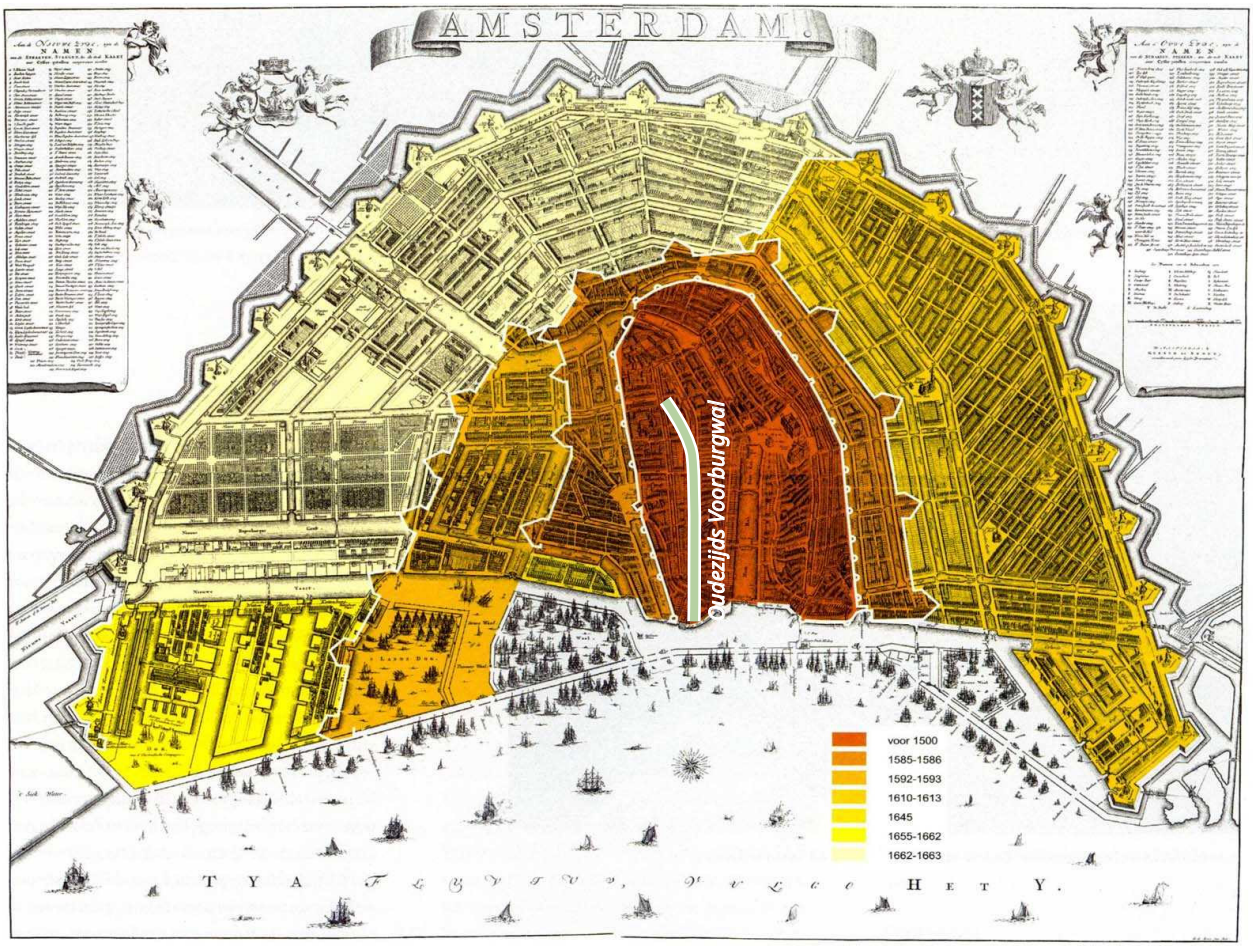

Figure 6: The phases of the city expansions in the 16th and 17th centuries led to the iconic fan-shaped layout of the canals in Amsterdam (Stadsarchief Amsterdam, 1989)

wood, being the most prominent. In general, it can be stated that the majority of the city-scape was dominated by red-orange facades with white accents, topped by blue-gray or orange roof tiles.

Most of the earliest canal houses in the Netherlands were constructed of wood and were of simple design. Gijsen (2011) conducted historical research and observed that these earliest canal houses often consisted of only one room, known as the "zaal," which housed the hearth (*Figure 8.1*). All activities such as cooking, eating, and sleeping revolved around this central spot, forming the heart of the house. The room was tall, allowing smoke to rise and linger in the peak of the roof. With the introduction of the chimney, this smoke could be directly vented outside, enabling the utilization of vertical space within the room. Often, an additional floor was inserted into the house, referred to as a "hangkamer" or "insteek" (*Figure 7 & Figure 8.2*) (Meischke, 1969). Since this space was directly above the hearth, it was also heated and often served as a living room (Levie et al., 1980). The lower space was used as a kitchen. However, the chimney also had a drawback. The draft not only carried the smoke outside but also caused air movement within the house. This draft issue was addressed by constructing walls around the fireplace, creating a room known as the "binnenhaard" (*Figure 8.3*) (Levie et al., 1980).

The space that remained at the front of the building, known as the "voorhuis," was unheated. This area was used as a workshop or shop and had a direct connection to the street, as in summer, the front door and shutters were often left open. In winter, it was too cold to keep everything open, making this space dark and chilly. Soon, there was a desire to have a heated area in the front house as well, allowing for year-round use. Consequently, a narrow side room with a second fireplace was added to the front part of the house. Sometimes this room was used as an office, known as the "comptoir" (*Figure 8.4*) (Spies, 1991), where the head of the household managed financial matters and kept records.

Figure 7: Additional floor was inserted, known as a "hangkamer" or "insteek" (Oudzijds Voorburgwal 136) (Veldt, 2022)

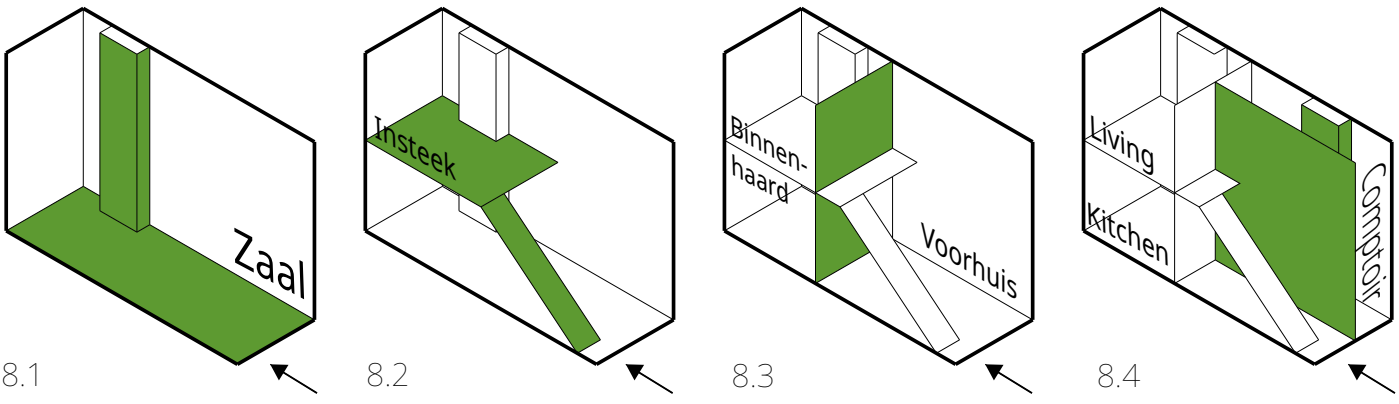

Figure 8: A schematic axonometry of the development of the Amsterdam canal house (Own work)

2.3 History and context of the building at the Oudezijds Voorburgwal 136

Before the building at 136 Oudezijds Voorburgwal was built, there was a beer merchant on this site. In 1733, the building was built with a bell gable in Louis XIV style. In the municipal archives of the City of Amsterdam (Gemeente Amsterdam, 1928), records indicate that during the 1930s, the printing press 'De Hoop' was housed in the premises (*Figure 9*). This printing press occupied the ground floor with storage space in the attic and basement. Adjacent to the door on the left was an entrance to the guesthouse, which was situated on the first, second, and third floors of the building. At that time, the rear part of the house was still connected to the front, allowing guests to exit the building through the additional entrance on Blauwlakensteeg.

During the repainting of the building in 1941, the door lintel was restored (Boers, 2007). The Dutch admiral Cornelis Tromp (1629-1671) is painted above the central door on Oudezijds Voorburgwal 136 (*Figure 10*). During the Golden Age, Tromp had a residence on Oudezijds Voorburgwal in Amsterdam, where he resided during the winter months when not at sea. The ship depicted on the right is "de Gouden Leeuw", the flagship of the Admiralty of Amsterdam, on which Tromp celebrated triumphs in various naval battles, including the Battle of Kijkduin in 1673. Although the ship appears to be listing heavily, the woodcarver had no choice but to 'translate' the rectangular engraving into the semicircular relief. The African servant boy wearing his master's plumed helmet also appears in a portrait by Jan Mijtens of Margaretha van Raephorst, Tromp's wife (*Figure 11*). Since both servants are identically dressed, it is plausible that the Tromp couple indeed had a young African boy as a servant, a practice not uncommon at that time.

Figure 9: Printing Shop 'De Hoop' (Stadsarchief Amsterdam, 1928)

Figure 10: Cornelis Tromp depicted on the facade stone above the central door on Oudezijds Voorburgwal (Onno Boers, 2007).

Figure 11: Margaretha van Raephorst. Painting by Jan Mijtens (1668)

In 1954, an application was submitted to the City of Amsterdam (1954) to convert the souterrain of the building into a basement. This alteration was achieved through the installation of a poured concrete cellar pit and an elevated ground floor, increasing the clearance height at this location in the building from 175 cm to 190 cm (*Figure 13*). Consequently, this modification facilitated the establishment of a sex shop in the basement (*Figure 12*). There were several small video viewing booths for watching pornographic videos and later DVDs.

Figure 12: Sexshop in the basement of the building (Stadsarchief Amsterdam, 1983)

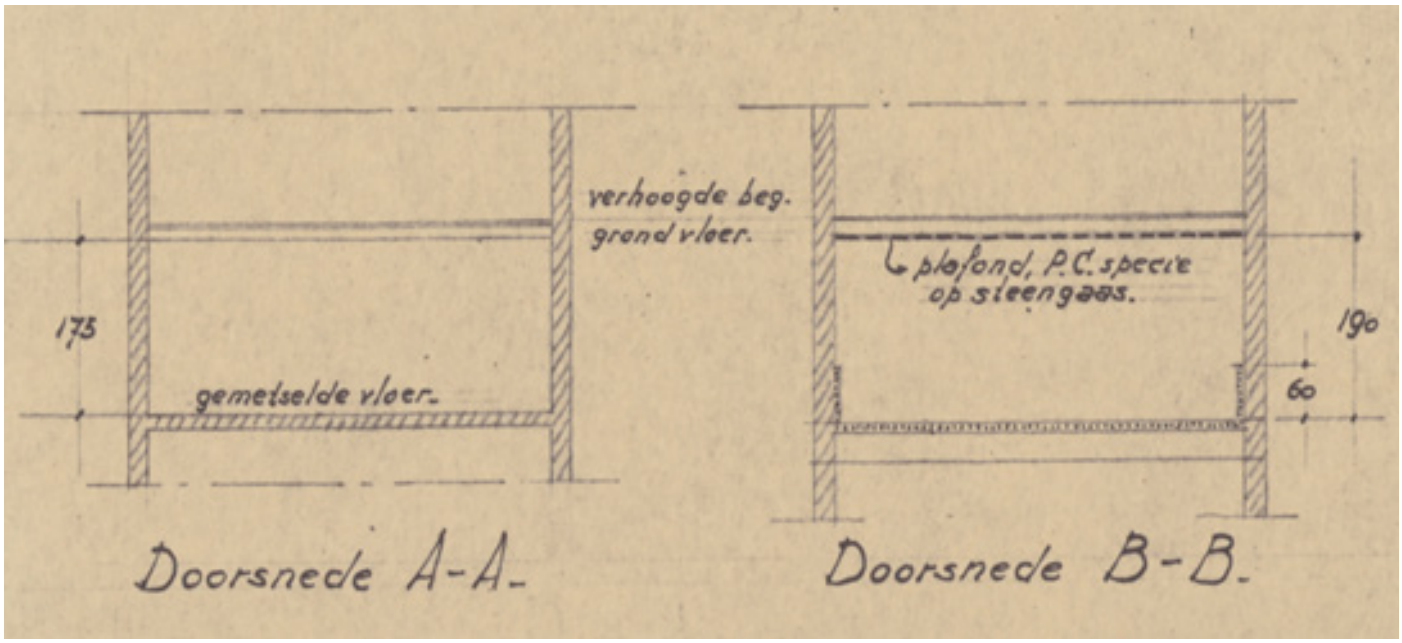

Figure 13: Transformation of het basement in 1954 (Gemeente Amsterdam, 1954)

In 1990, a request was submitted to the municipality of Amsterdam (1990) to transform the printing press into a restaurant (*Figure 15*). This transformation would involve converting the rear part of the building into a kitchen, while the ground floor would accommodate seating for 40 diners (*Figure 14*). The request to the municipality and the monument conservation authority entailed a change in designation and an application for a ventilation pipe at the rear of the property at Oudezijds Voorburgwal 136 (*Figure 16*). However, objections were raised against the plan at the time, citing concerns that the vent would be too prominently visible and that there were ample opportunities to incorporate it indoors (*Figure 17*). This rejection already shows how important the City of Amsterdam considered the streetscape with the canal houses. A small addition or change was quickly rejected by the municipality. Despite the application, a restaurant never established itself in the building, which instead assumed various other functions over the years.

Figure 14: The plan for the restaurant in 1990 (Gemeente Amsterdam, 1990)

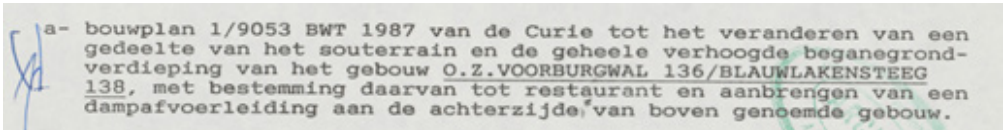
a- bouwplan 1/9053 BWT 1987 van de Curie tot het veranderen van een gedeelte van het souterrain en de geheele verhoogde beganegrond-verdieping van het gebouw O.Z.VOORBURGWAL 136/BLAUWLAKENSTEEG 138, met bestemming daarvan tot restaurant en aanbrengen van een dampafvoerleiding aan de achterzijde van boven genoemde gebouw.

Figure 15: Application to transform print shop into restaurant (Gemeente Amsterdam, 1990)

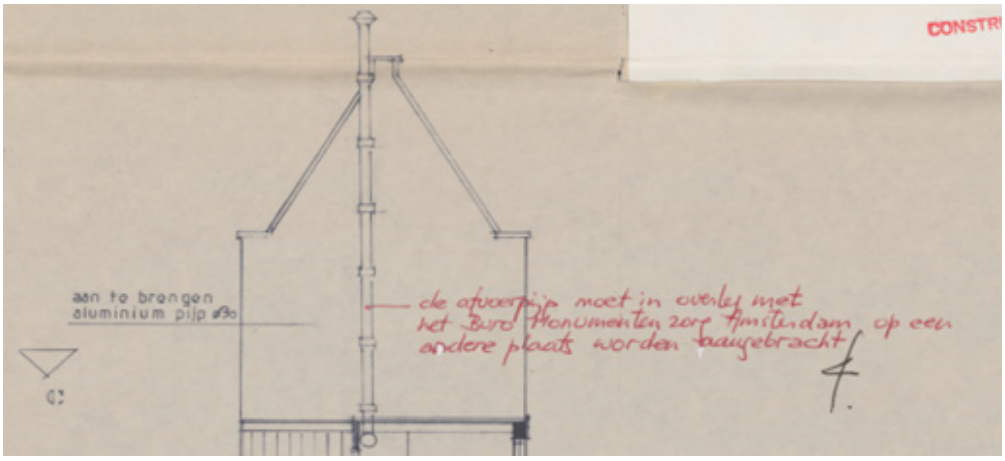

Figure 16: Application for a steam discharge pipe at the rear of the property at Oudezijds Voorburgwal 136 (Gemeente Amsterdam, 1990)

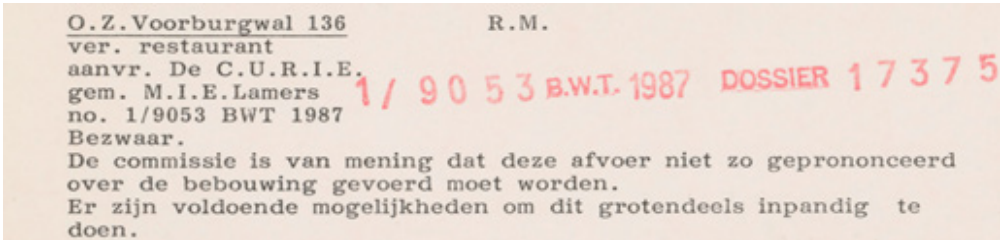
O.Z.Voorburgwal 136 R.M.
ver. restaurant
aanvr. De C.U.R.I.E.
gem. M.I.E.Lamers
no. 1/9053 BWT 1987
1/9053 B.W.T. 1987 DOSSIER 17375
Bezwaar.
De commissie is van mening dat deze afvoer niet zo gepronounceerd over de bebouwing gevoerd moet worden.
Er zijn voldoende mogelijkheden om dit grotendeels inpandig te doen.

Figure 17: The objection (Gemeente Amsterdam, 1990)

NV Zeedijk (2022) acquired the property in the summer of 2018. Prior to that, it was inhabited by squatters (*Figure 18)*, and the ground floor and basement were used for storage by the Bulldog (a chain of coffee shops, including one on Oudezijds Voorburgwal). Currently, the cellar, ground floor, and mezzanine level serve as temporary accommodations for initiatives such as the Groene Grachten and ZOEV City. Each floor above houses a single dwelling.

Figure 18: Housing of squatters (Buro Van Stigt, 2024)

03 - The Authenticity of Canal House at Oudezijds Voorburgwal 136 during the Sustainable Renovation in 2021

By considering the context and history of the building located at Oudezijds Voorburgwal 136, the authentic characteristics of the building can be determined. Additionally, it is essential to ascertain the sustainable measures implemented during the renovation. With this information, it can then be determined to what extent the preservation of the authentic features aligns with the sustainability efforts of the building. To comprehensively analyze the building, Brand's (1994) Shearing Layer model will be employed. This framework will aid the research in organizing and assessing the authentic features of the building, delineated into six components: the site, the structure, the skin, the services, the space plan, and the stuff.

3.1 Site

Following its nomination for World Heritage status, the International Council on Monuments and Sites (ICOMOS) conducted research into the authenticity and integrity of Amsterdam's canals. ICOMOS (2010) stated that the structure of the site of Amsterdam (it's geometrical layout, size and scale) has survived to the present day. The transition from public space to private property is still marked almost without exception by the open and usually stone-paved strip parallel to the front façade known as 'de stoep'. The blocks of houses between the canals, with their building lines and pattern of building plots, still dictate the rhythm of the historic urban landscape of the seventeenth-century canal ring area. The uninterrupted rows of buildings that line the main canals and transverse side streets together form blocks, within which the original pattern of (usually deep and narrow) building plots still survives. The structure, building blocks, internal layout, and the canals (including 'de stoep') remain virtually unchanged, contributing to the iconic authenticity of the city due to the uniqueness of its form (Weidenfeld, 2010). This form is deeply ingrained in the culture of Amsterdam.

The canals are an integral part of Amsterdam's authentic cityscape. However, the canal walls are becoming increasingly vulnerable, and along the Oudezijds Voorburgwal, they are already severely weakened and damaged both above and below the waterline. Cracks are visible in the wooden foundation and masonry, and the piles supporting the canal wall are leaning. To ensure the continued safe use of the quay, reinforcement of the canal wall was undertaken (*Figure 19*) (Gemeente Amsterdam, 2024).

During the sustainable renovation of the building at Oudezijds Voorburgwal 136 in 2021, transportation of construction materials was conducted via waterways. This approach not only preserves the authentic cityscape of Amsterdam but also promotes more sustainable transportation compared

to freight transport through the city streets. The capacity of 5 trucks can be replaced by 1 boat, resulting in 90% of road trips being replaced by electric boats on the canals during the renovation (Buro van Stigt, 2024). Electric transportation via waterways reduces congestion on the narrow streets of the neighborhood and limits CO2 emissions. Research by TNO (2020) has identified several sustainable improvements resulting from freight transport on Amsterdam's canals. Over the past two years, CO2 emissions have been reduced by 37%, with 1,600 fewer truck trips within the city and a decrease of 19,700 trips outside the city. Therefore, electric transportation via waterways not only protects the authentic canal walls but also reduces CO2 emissions during transportation.

Figuur 19: Reinforcement of the canal wall at the Oudezijds Voorburgwal (Gemeente Amsterdam, 2024)

3.2 Structure

The history of the canal house on Oudezijds Voorburgwal reveals that the building is constructed on wooden piles. This method of foundation has indirectly contributed to the authentic structure of the building, as over the years, the building has gradually tilted. This inclination is clearly visible in *Figure 20 & 21*, particularly noticeable in the alleyway. This effect can be attributed to various factors such as inferior quality, insufficient length, or inadequate thickness of the wooden piles. The aging and quality of these wooden piles cause the canal buildings in Amsterdam to sink unevenly into the ground, resulting in the house appearing skewed. Another contributing factor to the tilting may be the decay of the wooden poles, which occurs when the water level is lowered by the Waterschap agency, exposing the poles to oxygen.

Figure 20: Inclination of the building (Stadsarchief Amsterdam, 1955)

Figure 21: Inclination of the building (Buro Van Stigt, 2024)

The building features a goods hatch on the attic side facing Blauwlakensteeg. The overhanging facade provides a practical advantage for loading and unloading goods. During hoisting, it prevents goods from hitting the wall too quickly or breaking the glass of the windows below.

Research by Daniel van Capelleveen (2022) on the building at Oudezijds Voorburgwal revealed that while the wooden piles were not affected by rot or bacteria, they were structurally weakened by shear displacement. Although the sinking of the building contributes to its authentic appearance, further subsidence could have been dangerous, potentially leading to collapse. Therefore, it was decided to address the foundation during the renovation. Ruben Heslinga of Buro van Stigt explained in an interview with Van Cappelleveen (2022):

"In principle, the current foundation could have lasted another twenty years, but we felt the risk was too great to leave it. Especially since we were already renovating, it seemed best to address it immediately."

As part of the renovation, foundation piles from De Groene Paal were incorporated into the basement pit. These foundation piles also function as ground source heat exchangers, with screw injection piles installed with embedded pipes (*Figure 22*). These pipes extract heat from the ground and are connected to a collector linked to the apartment's heat pumps. This system operates similarly to a ground heat source, enabling cooling during the summer months. In total, 19 piles were installed up to 20 meters deep into the first layer of sand, each providing 1 kW of power, sufficient to heat the apartments (*Figure 23*). Additionally, an air source heat pump is installed in the basement for the ground floor commercial space. The Energy Piles also fulfill their usual structural function, together with the basement pit, they have taken over the load-bearing function of the existing masonry foundation strips and wooden piles.

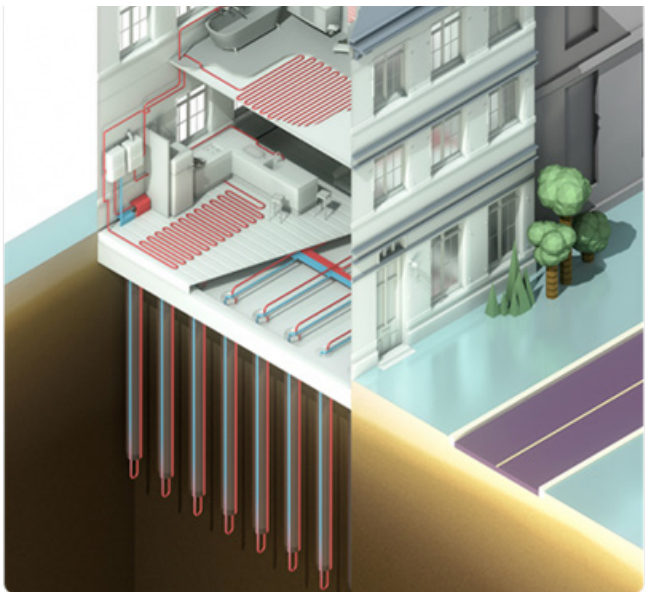

Figure 22: The functioning of a green pole (De Groene paal, 2020)

Figure 23: Nineteen Green Poles were installed in the new basement (Veldt, 2022)

3.3 Skin

Schlatmann (2010) observed that the city-scape in the center of Amsterdam is characterized by red-orange facades with white accents, topped with blue-gray or orange roof tiles. Bronsvoort (2012) notes that the high entrance of the building on Oudezijds Voorburgwal is very typical of 18th-century Amsterdam architecture. The grand entrance provided a stately and beautiful entrance to the house, and also created a direct route to the basement through several hatches at street level. The window pattern is very sleek and static, and the different floor heights and functions in the building can also be recognized on the exterior. Floors with residential and work functions have large windows that provide ample light to the rooms behind them, while storage spaces in the attic and basement have smaller windows.

Walther Schoonenberg (2021), who holds a degree in art history specializing in architecture and urban planning from the University of Amsterdam, conducted research on the various facades in Amsterdam. He notes that in the 18th century, the clock gables became increasingly baroque. According to him, the clock gable, in the style of Louis XIV, of Oudezijds Voorburgwal 136 is very characteristic of that time. The sway becomes more pronounced, and the clock gables, like the one on this building, are often crowned with a crest.

The clock gable, high and elevated entrances, the recognizable window pattern, shutters to basement and attic, the door lintel and the use of red-orange bricks, white accents, and blue-gray or orange roof tiles contribute to the authentic appearance of the building, characteristic of canal houses (*Figure 24*).

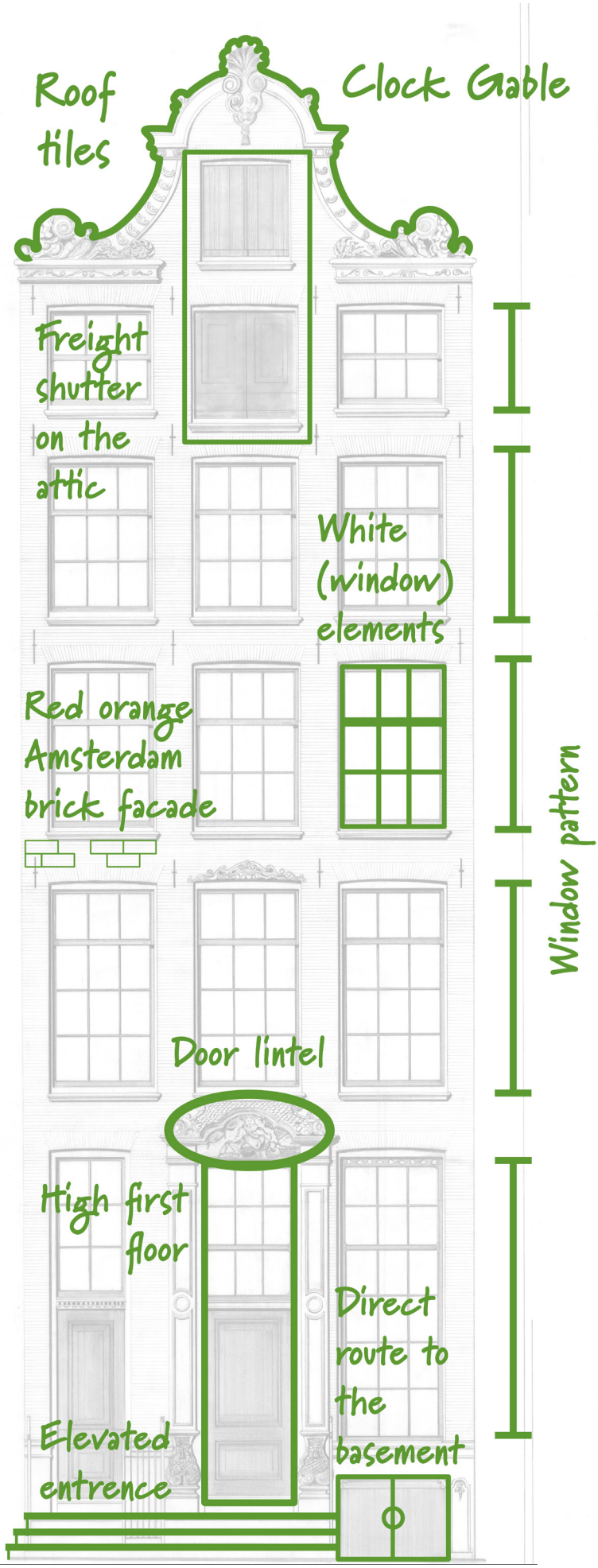

Figure 24: Facade view (Stadsarchief Amsterdam, 1989) with authentic elements (Own work)

To maintain the monumental red-orange brick exterior, a standard insulation layer was applied to the interior, based on the sustainability plan of the Groene Grachten (2021), in the form of insulated cladding (*Figure 25*) (Van Cappelleveen, 2022). The walls are kept two centimeters away from the outer walls for ventilation purposes. The partially restored and replaced beam heads of the wooden floors are also kept away from the insulation to prevent condensation from forming locally. For insulation, seven centimeters of PIR with an Rc value of 3.5m^{2}K/W was used, meeting the requirements of existing buildings. "If you want to meet new construction standards, you lose so much space here, which is not realistic," explains Heslinga the choice. "Moreover, the large window frames constitute the largest thermal bridge. You can indeed provide the small intermediate posts with 20 centimeters of insulation, but that does little overall."

The window frames are insulated with Fineo vacuum glass (*Figure 26*) in two different ways. The first method is simply by replacing the single glazing with vacuum glass and setting it in the (modern) putty. Due to the monumental appearance of the building, the frames were only minimally allowed to be affected. Heslinga explains, "The beauty of Fineo is that it is only 7.7 mm thick. So you don't have to mill out much wood from the window and can almost directly replace the glass." The other method is to install secondary glazing with the vacuum glass incorporated (*Figure 27*). "We only did this on the first floor. There were still three monumental, drawn glass panels that had to remain in place. This immediately shows what the alternative is if you don't want or can't replace the existing glass."

The blue-gray roof tiles on the building also contribute to its monumental appearance. However, De Groene Grachten wanted to generate as much green energy as possible from solar panels. After , they were ultimately allowed to be installed on the roof (*Figure 28*), but they were not allowed to be visible from the public space (Buro Van Stigt, 2024).

Figure 25: Standard insulation layer applied to the interior in the form of insulated cladding (Veldt, 2022)

Figure 26: Fineo vacuum glass (Veldt, 2022)

Figure 27: Secondary glazing incorporating vacuum glass (Van Cappelleveen, 2022)

Figure 28: Solar panels not visible from the public space (NV Zeedijk, 2022)

3.4 Services

The canal houses are one of the earliest examples of buildings that could house different functions (Bronsvoort, 2012). One of the important aspects of this flexibility was that the building had fireplaces in all the rooms. This gave the dweller the option to turn every room into a sleeping room, working room or dining room for example. Many of today's installations were not yet invented at the time of construction of the canal house. The main installation features that were taken into account during the design of canal housing were heating and later on sewerage. Heating was done by fireplaces at several different places inside the dwelling. Nowadays, the fireplaces provide only as indexical cues to the heating system of the past (*Figure 29*).

New sustainable installations were considered during the 2021 renovation. Due to the sightlines from the street, it was not feasible to place these new installations on the roof or hang them on the facade. Consequently, the installations had to be mainly installed indoors, which posed a significant challenge according to the architect (Van Cappelleveen, 2022). The apartments are equipped with two separate HRV (Heat Recovery Ventilation) systems (*Figure 30*): one for all living spaces and one for all bathrooms. The reason for this division was limited space. "Horizontal pipes under the ceiling reduce the clear height. Because the technical rooms and bathrooms are located in the same place on each floor plan, by splitting the HRVs, we only had to install vertical ducts," explained Heslinga. The commercial space on the ground floor has its own HRV ventilation system.

Because of the combination of insulation, solar panels, underfloor heating, HRV ventilation, heat pumps, and the green piles, the canal house is completely gas-free. This demonstrates that it is indeed possible to

improve the energy performance of a monumental building without extensive interventions (Van Cappelleveen, 2022).

Figuur 29: fireplaces provides indexical cues to the past (Veldt, 2022)

Figure 30: HRV ventilation system on the right side of the basement (Veldt, 2022)

3.5 Space Plan

Bronsvoort (2012) observes that an authentic indication of the canal house is the elevated entrance (*Figure 31)*. This elevation relative to street level serves multiple purposes. The souterrain constitutes the lowest level of the building and is situated half a floor higher in the ground. This was due to the groundwater level in Amsterdam, making a completely submerged cellar nearly impossible. Additionally, it was very convenient for routing purposes. When the building on Oudezijds Voorburgwal was used as a printing house, this floor was used as storage space. Goods could easily be transported in and out of the building through the street hatches. The main entrance was located on the elevated ground floor (bel étage). The elevation creates a semi-private space that provides distance between the public street and the private residence. The elevated entrance is highly characteristic of authentic canal houses in Amsterdam.

The canal houses are built on narrow lots and therefore built in depth rather than width. Costs along the canals are very high and are determined by the width of the property on the canal side. As a result, many canal houses have an authentic small appearance. Moreover, this design advantage allows the floors to be supported by the walls, reducing the need for additional load-bearing columns or walls. As a result, the spatial layout of the building can be highly flexible. This flexible arrangement of canal houses was innovative for its time (Bronsvoort, 2012). This inherently multifunctional nature renders the buildings inherently sustainable, as it reduces the likelihood of premature demolition when there is a need for different programs and spatial layouts in the building.

The structural framework plays a significant role in this flexibility. The building can con-

tinue to accommodate changes in functions due to its oversized structural framework and floor areas. However, the structural beams in the attic were a subject of discussion during the sustainable renovation in 2021. The attic was previously used as storage where a high space was not necessary. The authentic wooden roof trusses hung quite low, resulting in a restricted height of 1.85 meters for the apartment. To address this issue, the beams were sawn through, and new beams were laid on the corbels, providing an additional height of 20 centimeters (*Figure 32*). The intervention was not straightforward, as the Monumentenwacht (Monument Inspection Agency) only agreed to it if two of the trusses remained in their original state (*Figure 33*) (Van Capelleveen, 2022).

Figure 31: Elevated entrance (Amsterdam Stadsarchief, 2009)

Figure 32: beams were sawn through providing an additional height of 20 centimeters (Veldt, 2022)

Figure 33: The two trusses that remained in their original state (Veldt, 2022)

3.5 Stuff

Boers (2007) observed that during the repainting of the building in 1941, the door lintel was also restored. At that time, the relief was covered with a thick crust of yellowish paint and had lost all sharpness (*Figure 34*). Even the inscription was no longer legible. Upon removing the paint crust, the old polychromy was discovered, highlighting the detailed nature of the carving. The relief was subsequently cleaned, repaired in parts, and painted in the colors found. In this way, it once again became a showpiece on the Oudezijds Voorburgwal (*Figure 35*).

Figuur 34: Wooden relief featuring Admiral Tromp before restoration (Boers, 2007)

Figuur 35: Wooden relief featuring Admiral Tromp after restoration (Boers, 2007)

While restoring the facade stone may not be directly linked to the sustainability of the building, it does contribute to making it contemporary and adapting it to the present time. On the facade stone, Admiral Cornelis Tromp is depicted with the black servant he brought for his wife from Angola. Leito (2020) from Black Heritage Tours observes that the legacy of slavery is still visible in Amsterdam. “On the ornament, you see Admiral Cornelis Tromp standing. Next to him is an eight-year-old black boy. He was kidnapped during one of Tromp’s voyages and brought to Amsterdam as a gift for his wife. A so-called servant but actually made a slave.” The racist ideas spread to justify slavery continue to resonate in our society to this day. Soon, the distinctive facade stone with the face of Admiral Cornelis Tromp will be reinterpreted. Amsterdam schoolchildren are working on a design for a new ornament next to the facade stone, which aims to complete the memory of the slavery past.

Conclusion

To provide a comprehensive answer to the main question:

"To what extent does the integration of sustainability align with the authenticity of heritage in the renovation of Amsterdam's canal houses?",

it was first necessary to establish what authenticity is and how it can be recognized in cultural heritage. Then, for each shearing layer (Brand, 1994), the authentic values and sustainable improvements in the building could be examined. The layers examined are location, structure, skin, services, space plan and stuff.

To begin with the site, Amsterdam's canals has multiple historical links and the iconic cues of the form contribute to the authenticity. The fan-shaped layout of the canals, together with the narrow houses lining the canals, has contributed to the iconic image of Amsterdam since the 15th century. However, due to aging, these canals are becoming increasingly vulnerable to the heavy freight traffic that travels along the roads adjacent to the canals. By predominantly using water transport (90%) during the 2021 renovation, the vulnerable canal walls were relieved, and the use of electric boats resulted in reduced CO2 emissions. While other layers of the building may compromise on authenticity or sustainability, this alternative is advantageous for both authenticity preservation and sustainability.

The structure layer also boasts numerous authentic features, primarily attributed to the iconic form of the building. The overhanging structure contribute to the building's authentic appearance. However, this form could potentially lead to a hazardous situation if the wooden foundation piles were to sink further. Consequently, permission was granted to replace the wooden piles. Seizing this opportunity, the piles were replaced with green piles that also serve as a ground heat source, enabling cooling during the summer and heating in the winter months. The authentic overhanging facades of the Amsterdam canals remain intact. However, measures are implemented to prevent the facades from collapsing and sustainable measures are directly applied in the process. This demonstrates a smart utilization of preserving the authentic structure of the building, while simultaneously incorporating sustainable practices to protect against collapse. Thus, the preservation of authenticity is safeguarded through sustainable interventions.

The skin embodies the most characteristic features that render the canal house authentic. Indexical cues in the skin are primarily found in the materialization, colors, window structure with large doors, and clock gable. These features serve as historical links to the authentic architectural style of the 18th century. Therefore, during the sustainable renovation in 2021, these elements were minimally affected. The distinctive white wooden frames were minimally altered to accommodate the new vacuum glass, or in some cases, new glass had to be installed to preserve the authentic frames. Similarly, the authentic exterior with orange-red bricks was not to be tampered with, leading to the choice of internal insulation. In doing so, it meets current sustainability requirements for existing buildings, but not those for new construction. To meet sustainable new building standards, sig-

nificant space loss within the building would be incurred. So, in many cases, the authentic external character of the building outweighs the achievement of maximum sustainability requirements for the building.

The space plan development of the canal house ensured that each room had a fireplace, which served as the primary heating source. The presence of fireplaces in every room facilitated easy alteration or exchange of room functions, making the canal houses one of the first multifunctional buildings. Despite no longer serving as heating elements, the fireplaces still serve as indexical cues to the heating systems of the past, necessitating their protection and preservation. In addition to the fireplaces, the oversized beams spanning from wall to wall were integral to the flexible partitioning of interior walls. After a lengthy process, these characteristic wooden structural beams were permitted to be sawn on the attic, making the attic inhabitable and transformable into a residence, with the condition that two of the original beams remained intact. Here, the emphasis by authorities was on extending the building's lifespan, prioritizing sustainability over the authentic structure of the building. However, two beams that remained intact and still serve as a historical link to the past. Ultimately, a compromise was reached where this part of the building would have a longer lifespan and ultimately become more sustainable, because the building remains functional. However, this required cutting through most of the authentic load-bearing beams.

Initially, services were not permitted on the facade or roof. This was also evident from the municipality's rejection of the change in land use from printing press to restaurant in 1990. However in 2021, after intensive discussions with the Bureau of Monuments and Archaeology, solar panels were allowed to be installed on the authentic blue-gray roof tiles, albeit concealed from public view. This does characterize the sustainable interventions in terms of systems and services in the building. Sustainable systems such as: the green poles, the solar panels and the HRV ventilation system may all be applied as long as the authentic facade of the building remains untouched.

According to the shearing layers model, the stuff layer has the shortest lifespan, thus having the least connection to the historical links of the building. The items within the building change too rapidly to significantly contribute to the building's authenticity. The only authentic object is the door lintel, which, after numerous restorations and repainting, still holds an iconic position above the door, enhancing the building's authentic appearance.

Overall, the balance between the authenticity of the building and sustainability interventions varies significantly across different shearing layers. The layers where the most authenticity of the building exists and where the most sustainability interventions need to take place is the skin of the building. The skin largely contributes to the authentic appearance of a canal house. Therefore, authenticity and sustainability often come into conflict in this aspect. The structural and service-oriented aspects still occasionally conflict with each other, but compromises can often be reached. Authentic elements can be preserved partly as a tribute to the past while making room for necessary sustainable interventions. The flexible space plan of the canal house makes it possible to extend the life of the building, which is advantageous in terms of sustainability. Stuff aspects play a minimal role in the authentic value of the building, as most objects change too rapidly to contribute to authenticity, thus avoiding conflicts during sustainable interventions.One area where the preservation of authenticity and sustainability go hand in hand and reinforce each other is in spatial planning (site layer).

Bibliography

Frontpage image retrieved from:
Amsterdam Monumentenstad, database van de Amsterdamse grachtengordel. (n.d.-b). https://www.amsterdam-monumentenstad.nl/database/grachtenboek_tekst.php?id=1

Boers, O. (2007). *De gevelstenen van Amsterdam*. Uitgeverij Verloren.

Brand, S. (1994). *How Buildings Learn. What happens after they're built.* New York: Viking.

Bridgwood, B. and Lennie, L. (2013). *History, Performance and Conservation, Taylor & Francis, London.*

Bronsvoort, F. (2012). *The Barcode - creating a mixed use program for Amsterdam North.* TU Delft. https://repository.tudelft.nl/islandora/object/uuid%3Ae4df8245-bbc6-46c2-ae53-e01903f472df

Buro van Stigt. (2024). *Oudezijds Voorburgwal 136.* Buro Van Stigt. https://burovanstigt.nl/oudezijds-voorburgwal-136/

De Groene Grachten (2018). *GreenDeals.* https://www.greendeals.nl/green-deals/de-groene-grachten

De Groene Paal. (2020). *Werkwijze van de Groene Paal.* https://degroenepaal.nl/

Del Rio Carrasco, J.M. (2008). *Values of heritage in the religious and cultural tradition of Christianity: the concept of authenticity*. Values and Criteria in Heritage Conservation, Polistampa, pp. 1000-1023.

Dezzi Bardeschi, M. (2008). *The discriminating value of the authenticity in the debate on the restoration: before and after Nara*. Values and Criteria in Heritage Conservation, Polistampa, pp. 1000-1004.

Farrelly, F., Köck, F., & Josiassen, A. (2019). *Cultural heritage authenticity: A producer view*. Annals of Tourism Research, 79, 102770. https://doi.org/10.1016/j.annals.2019.102770

Galla Face Hotel (2023). *Embracing timeless beauty: the colonial architecture of the Galle Face Hotel | Galle Face Hotel*. Galle Face Hotel. https://www.gallefacehotel.com/blogs/embracing-timeless-beauty-the-colonial-architecture-of-the-galle-face-hotel/

Geisen, S. (2011). *Achter de gevel de ruimte van het woonhuis aan de Amsterdamse gracht.* TU Eindhoven

Gemeente Amsterdam. (1928). *Bouwdossier 1928.* In Archief Amsterdam.

Gemeente Amsterdam. (1954). *Bouwdossier 1954.* In Archief Amsterdam.

Gemeente Amsterdam. (1990). *Bouwdossier 1990.* In Archief Amsterdam.

Gemeente Amsterdam. (2023, February 20). *De geheimzinnige eerste kaart van Amsterdam.* Amsterdam.nl. https://www.amsterdam.nl/nieuws/achtergrond/eerste-kaart/

Gemeente Amsterdam. (2024). *Oudezijds Voorburgwal 16 t/m 50: maatregelen door slechte kademuur.* Amsterdam.nl. https://www.amsterdam.nl/projecten/kademuren/maatregelen/oudezijds-voorburgwal/?pk_vid=1da07dc8e448c856171051403863abe2#PagCls_17030992

ICOMOS (International Council on Monuments and Sites). (1993). *Guidelines on Education and Training in the Conservation of Monuments, Ensembles and Sites.* Paris: ICOMOS.

ICOMOS (International Council on Monuments and Sites). (2010). *The seventeenth-century canal ring area of Amsterdam within the Singelgracht.* https://whc.unesco.org/en/list/1349/documents/

Jokilehto, J. (2007). *History of Architectural Conservation.* Taylor & Francis, Oxford.

Jokilehto, J. (2008). *Aesthetics in the world heritage context*. Values and Criteria in Heritage Conservation, Polistampa, pp. 1000-1010.

Karsten, I.A. (2017). *Reconstruction of historic monuments in Poland after the second world war–thecase of warsaw*. Authentic Reconstruction: Authenticity, Architecture and the Built Heritage, Part 1, p. 47.

Labadi, S. (2010). *World Heritage, authenticity and post-authenticity: international and national perspectives*. Heritage and Globalisation, Routledge, pp. 80-98.

Leito, A. (2020). *Oudezijds Voorburgwal - straten van Amsterdam* [Video]. https://www.youtube.com/watch?v=3a2zRDQtKJw&t=1044s.

Levie, T., & Zantkuijl, H. (1980). *Wonen in Amsterdam in de 17e en 18e eeuw, Amsterdam*.

Macchi, G. (2008). *Authenticity of structural conception*. Values and Criteria in Heritage Conservation, Polistampa, pp. 1000-1010.

Mehr, S. Y., & Wilkinson, S. (2020). *The importance of place and authenticity in adaptive reuse of heritage buildings*. International Journal of Building Pathology and Adaptation, 38(5), 689–701. https://doi.org/10.1108/ijbpa-01-2020-0005

Meischke, R. (1969). *Het Nederlandse Woonhuis van 1300-1800*, Haarlem.

Mijtens, J. (1668). *Portrait of Margaretha van Raephorst (1625-90).* Rijksmuseum, Amsterdam, Netherlands.

Nezhad, S.F., Eshrati, P. and Eshrati, D. (2015). *A definition of authenticity concept in conservation of cultural landscapes*. International Journal of Architectural Research: ArchNet-IJAR, Vol. 9 No. 1, pp. 93-107.

NV Zeedijk (2022). *Oudezijds Voorburgwal 136 als duurzame inspiratiebron.* https://nvzeedijk.nl/2022/11/28/oudezijds-voorburgwal-136-als-duurzaam-inspiratiebron/

NOS. (2023). *Rembrandt gebruikte speciale techniek om Nachtwacht te beschermen tegen vocht.* NOS https://nos.nl/artikel/2501723-rembrandt-gebruikte-speciale-techniek-om-nachtwacht-te-beschermen-tegen-vocht

Peirce, C. (1998). *Collected papers of Charles Sanders Peirce Bristol* Thoemmes 8 Vols.

RTL Nieuws (2023) *Eiffeltoren ontruimd na bommelding: duurde anderhalf uur.* https://www.rtlnieuws.nl/nieuws/buitenland/artikel/5401358/eiffeltoren-ontruimd-na-bommelding-bezoekers-geevacueerd

Schlatmann, M. (2010). *Delirious Amsterdam.* TU Eindhoven, 12. https://research.tue.nl/nl/studentTheses/delirious-amsterdam

Schoonenberg, W. (2021). *Amsterdam Monumentenstad, database van de Amsterdamse grachtengordel.* https://www.amsterdam-monumentenstad.nl/database/grachtenboek_tekst.php?id=9#:~:text=De%20klokgevel%20wordt%20toegepast%20in,vlakke%20gevel%20aan%20populariteit%20wint.

Sekler, E. (2008). *In praise of principles*. Paper Presented at the Conservation and Preservation: Interactions between Theory and Practice: In Memoriam Alois Riegl (1858-1905): Proceedings of the International Conference of the ICOMOS International Scientific Committee for the Theory and the Philosophy of Conservation.

Smith, A. (1988). *The American House Styles of Architecture Book.* https://www.amazon.com/American-Styles-Architecture-Coloring-History/dp/0486244725

Spies, P. (1991). *Het Grachtenboek*. Den Haag.

Stadsarchief Amsterdam. (1928). *Oudezijds Voorburgwal 136.* Stadsarchief.Amsterdam. https://archief.amsterdam/beeldbank/detail/bc313d08-8804-afc9-5b0e-d4f81c26a2c8/media/202cb899-f8e3-6543-f1f4-749056c9bde7?mode=detail&view=horizontal&q=oudezijds%20voorburgwal%20136&rows=1&page=14

Stadsarchief Amsterdam. (1955). *Oudezijds Voorburgwal 126 (ged.)-158 (ged.) (v.r.n.l.).* https://archief.amsterdam/beeldbank/detail/f15764dc-6173-7350-07fa-64847a1597f7/media/0a995f04-d525-9918-114b-90a26feb0b3d?mode=detail&view=horizontal&q=oudezijds%20voorburgwal%20136&rows=1&page=17&fq%5B%5D=search_s_geografische_aanduiding_sk_geografische_naam:%22Oudezijds%20Voorburgwal%22

Stadsarchief Amsterdam. (1983). *Oudezijds Voorburgwal 134 (ged.) 136 (V.R.N.l.).* https://archief.amsterdam/beeldbank/detail/f1eff45a-1fe9-bab1-f258-e09f12e2dee4/media/1e85074f-1a49-e3da-b308-37e21c314e5a?mode=detail&view=horizontal&q=oudezijds%20voorburgwal%20136&rows=1&page=4

Stadsarchief Amsterdam. (1989). *Oudezijds Voorburgwal 136* https://archief.amsterdam/beeldbank/detail/03f3b82a-5320-d745-1ee3-cf7d3d0df087/media/d7c90ff5-b078-a783-330f-fb802e0173dd?mode=detail&view=horizontal&q=oudezijds%20voorburgwal%20136&rows=1&page=7&sort=order_i_sk_date%20desc

Stadsarchief Amsterdam. (2009). *Oudezijds Voorburgwal 136, the Erotic Cellar* https://archief.amsterdam/beeldbank/detail/0fc67e2a-30f6-5fa4-5c32-ce83f0573468/media/d0f8b03f-4f28-8d9d-9b70-8e52b7c276ec?mode=detail&view=horizontal&q=oudezijds%20voorburgwal%20136&rows=1&page=5&sort=order_i_sk_date%20desc

TNO. (2020). *Amsterdam Vaart! 2019 Resultaten Duurzame bouwlogistiek over water.* In https://blvc.nl/2020/08/01/blog-bouwlogistiek-over-water/.

UNESCO World Heritage (2017). *Operational Guidelines for the Implementation of the World Heritage Convention*. Paris.

UNESCO World Heritage (2010). *Seventeenth-Century Canal Ring Area of Amsterdam inside the Singelgracht.* https://whc.unesco.org/en/list/1349

University of Amsterdam (2008). *Our Lord in the Attic: A case study.* https://www.getty.edu/conservation/publications_resources/teaching/case/olita/building/construction_building.html

Van Caplleveen, D. (2022). *Verduurzaming Grachtenpand blauwdruk Voor historische wijk. Bouwwereld.* https://burovanstigt.nl/oudezijds-voorburgwal-136-2/

Van Leeuwen, T. (2000). *What is authenticity?* Discourse Studies, 3(4), 392–397. http://www.jstor.org/stable/24047523

Veldt, A. (2022, December 12). *In de nieuwe kelderbak zijn 19 Groene Palen aangebracht.* https://burovanstigt.nl/oudezijds-voorburgwal-136-2/

Wikipedia. (2023a, September 5). *Buckingham Palace.* Wikipedia. https://nl.wikipedia.org/wiki/Buckingham_Palace

Wikipedia. (2023b, July 27). *Chinese muur.* Wikipedia. https://nl.wikipedia.org/wiki/Chinese_Muur#/media/Bestand:Great_wall_of_china-mutianyu_4.JPG

Wikipedia. (2024a, January 25). *Sagrada família.* Wikipedia. https://nl.wikipedia.org/wiki/Sagrada_Fam%C3%ADlia

Wikipedia. (2024b, March 12). *Mona lisa.* Wikipedia. https://en.wikipedia.org/wiki/Mona_Lisa