SCRATCHING THE SURFACE PROJECT (2017)
INVESTIGATION AND PLANNING OF A CONCEPT FOR MAINTENANCE OF A STREET ART MURAL BY VHILS AT THE EMBASSY OF PORTUGAL, BANGKOK, THAILAND

By
MISS Khakhanang JONGANURAK

An Independent Study Submitted in Partial Fulfillment of the Requirements
for Master of Arts CULTURAL HERITAGE CONSERVATION AND MANAGEMENT
Silpakorn University
Academic Year 2023

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Title	SCRATCHING THE SURFACE PROJECT (2017) Investigation and Planning of a Concept for Maintenance of a Street Art Mural by VHILS at the Embassy of Portugal, Bangkok, Thailand
By	MISS Khakhanang JONGANURAK
Field of Study	CULTURAL HERITAGE CONSERVATION AND MANAGEMENT
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Street art is a contemporary art form that can be found worldwide. However, conserving this art remains a topic of ongoing debate, as it raises important questions about balancing artistic value with the need to protect public spaces and property. This thesis investigates the ‘Scratching the Surface Project’ street art mural (2017) by VHILS at the Embassy of Portugal, Bangkok, by exploring the walls’ structure and materials, identifying factors of deterioration and damage, and collecting information on the artwork to create a suitable preservation concept and maintenance guideline. Since the artwork is located in an outdoor environment without any cover, the analysis indicates that the primary deterioration factor for this art is the environmental impact. Furthermore, there is an investigation in the direction of the artist’s opinion to find a way to appropriately intervene with this artwork and follow the artist’s intention.

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Street art has evolved into a tool for city development, attracting tourists and improving the city's scenery. In addition, it represents the identity, culture, and social conditions of the neighbourhood as well. Street art also can be found in various locations throughout Thailand, especially in Bangkok's creative district of Bang Rak. This is a well-known area where tourists from Thailand and the rest of the world can see various forms of street art. One of the outstanding artworks in this area is 'Scratching the Surface Project' on the Portuguese Embassy's property wall, created by the famous Portuguese artist VHILS in 2017. The artist takes a different approach from traditional street art techniques by using various tools to go beyond the surface of the existing wall to create the desired images and patterns. This art project highlights the strong friendship between Thailand and Portugal, a popular tourist attraction spot in Bang Rak district. After six years of his creation in 2023, this work has shown signs of deterioration, leading to a study and development of a conservation concept in the framework of this Thesis.

The study focuses on exploring mural street art through the 'Scratching the Surface Project', with a total study period of approximately six months that involves literary studies and field exploration. The measures carried out for the conservation treatments will not be discussed here due to their duration and other restrictions.

Street art now plays a vital role in urban culture, which raises the question of whether this type of art should be preserved. People have differing perspectives on street art because it includes legal and illegal projects.[1] Furthermore, the conservation methods developed in various cases differ due to the diversity of their artwork technique and their context.

The objectives of this thesis are determining deterioration factors and planning for a concept of maintenance of the work 'Scratching the Surface Project' at the Portuguese Embassy's property wall to extend the artwork's life. It also sets out to answer the question of whether this street art should be conserved or not.

This thesis first describes of the artwork with its location, the meaning of street art, the Portuguese embassy in Thailand, the history of this artwork, and the artist's information. The second chapter is a technological survey of the concerned wall and the artwork that can be divided into three layers: masonry, plaster, and paint layers. These materials include both the original and new additions made by the artist. In the third chapter, the environmental impact that affects the artwork is discussed. It includes the surrounding context, vibration and traffic, pollution, climate, anthropogenic influences, and interference from pests and microorganisms. After discussing deterioration factors, chapter four focuses on a condition survey to identify damages in each material layer. Chapter five discusses several issues regarding the suitability of street art conservation and the aim of the preservation. The final chapter deals with the importance of preservation and maintenance guidelines for future care of the artwork.

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[1] Carlota Santabarbara, "Street art conservation: beyond surfaces' restoration," *OPUS Journal of History Architecture Conservation Drawing* 2 (2018).

Chapter 1
Scratching the surface project

'Scratching the Surface Project' is a street art mural on the exterior property wall of the embassy of Portugal in Bangkok, Thailand. The artwork was created by the Portuguese artist Alexandre Farto also known as VHILS on February 10th, 2017. The technique used was scratching or chiselling the surface into deep grooves at different levels on the original exterior wall to make a pattern, which is similar to the old technique of Sgraffito. The difference between these two techniques is that VHILS worked on an existing wall, while for the traditional technique new colourful layers of plaster or paint are applied before scratching.

The overall visuals in the 'Scratching the Surface Project' consist of geometric patterns combined with anonymous faces, not identifying individuals. On the left side of the artwork, a half-face of a woman is depicted. She has double eyelids, thick eyebrows, and looks to the right. On the right is the older man's face, full of wrinkles with narrow eyes staring straight ahead. A large depiction of a left eye is next to the older man's face. It is a big, round eye that stares forward, with double eyelids, long curly eyelashes, and arched eyebrows. This eye image is similar to the VHILS's artwork at Macau that was created in May 2017 (figures 1-2). The last depiction on the right is a face of a woman whose head is slightly tilted upwards, and her eyes look down. Other patterns are scattered between the portraits.

Figure 3 shows patterns in the artwork, which can be roughly divided into four categories that look like different geometric patterns. Some are diamond-shaped or arrowhead-shaped as elements in the pattern. These patterns may have been influenced by Islamic art that draws inspiration from nature and mathematics. David Wade has compiled a collection of illustrations of the patterns in Islamic art in his book, one of which, like the red pattern in figure 3, is classified as an isometric-based pattern.[2] Islamic art has had a significant impact on Portuguese art and architecture. Geometric patterns inspired by Islamic sources can still be seen in Portugal's famous tile works.[3] For this reason, it is possible that Portuguese artist 'VHILS' was influenced by this art form. These patterns appear to be designs created by the artist for use in various projects. These designs also appear in other VHILS artworks in the Scratching the Surface series at various locations, such as in Oeiras, Portugal, in 2016 (figure 4), the Arche Gardens, Paris, France, in 2019 (figure 5), and so on.

[2] Wade, David. Pattern in Islamic Art Woodstock, N. Y.: The Overlook Press, 1976.

[3] Aydan Aghabayli, "Geometric Patterns in Islamic Decoration A Parametric Envision of Portuguese and Azerbaijan Islamic Geometric Motifs" (Universidade de Lisboa (Portugal), 2016).

Figure 1 Depiction of the eye by VHILS in Bangkok, February 2017
Source: Khakhanang Jonganurak (June 12, 2023)

Figure 2 Depiction of the eye by VHILS in Macau, May 2017
Source: José Pando Lucas, https://vhils.com/tag/walls/

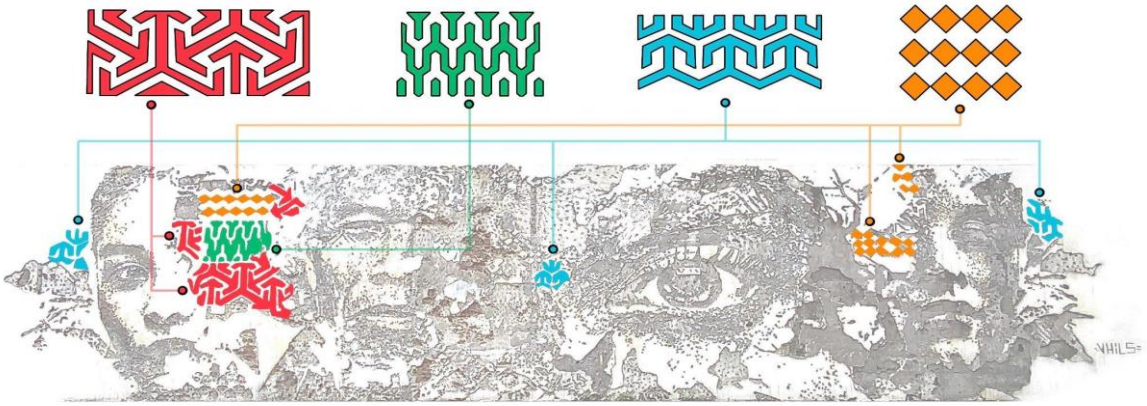

Figure 3 Diagram of geometric patterns on the 'Scratching the Surface Project', Bangkok
Source: Khakhanang Jonganurak (August 8, 2023)

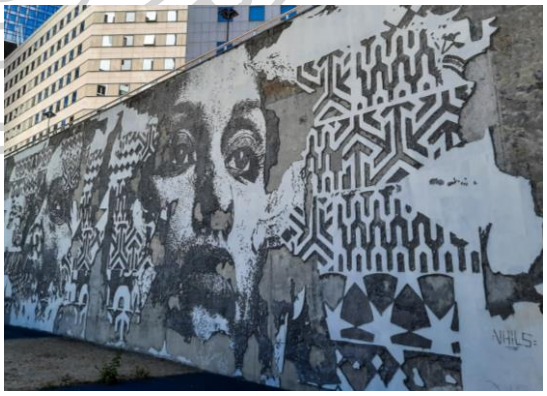

Figure 4 Scratching the Surface Project at Oeiras, Portugal in 2016
Source: Bruno Lopes/ https://vhils.com/tag/walls/

Figure 5 Scratching the Surface Project at the Arche Gardens, Paris, France in 2019
Source: Sortiraparis / Caroline J. https://www.sortiraparis.com/en/news/in-paris/articles/295692-vhils-a-work-by-the-portuguese-street-artist-enters-unesco-in-paris

Black spray paint appears on the edges of the patterns, contrasting the scratched designs (figure 6). Brown stains are translucent in most places with a smooth run-down in the longitudinal direction, supporting the designs (figure 7). In the lower right area of the wall the signature of the artist ‘VHILS’ can be found (figure 8). The wall is a multi-material complex including brick masonry, concrete blocks, plaster layers, and painted layers (figure 9).

Figure 6 Black spray paint around the edges of the pattern
Source: Elias Campidell (June 12, 2023)

Figure 7 Fluid brown stain on the wall
Source: Elias Campidell (June 12, 2023)

Figure 8 The signature of the artist ‘VHILS’ in the lower right area of the artwork
Source: Khakhanang Jonganurak (December 1, 2022)

Figure 9 multi-material layers of the wall
Source: Elias Campidell (June 12, 2023)

The project was completed in five days from February 6th to 10th, 2017, and was presented by the Embassy of Portugal and the Portuguese Cultural Centre with the support of MINOR GROUP and Camões Institute for Cooperation and Language.[4]

Artist:	Alexandre Farto (VHILS)
Title/Description:	Scratching the Surface Project
Technique:	Scratching of existing plastered wall
Dimensions: (h x w)	Approx. 3 x 12,5 m
Dating:	10/02/2017
Location:	Bangkok, Thailand
Owner:	The Embassy of Portugal, Bangkok

Figure 10 Scratching the Surface Project (2017), 3 x 12,5 m.
Source: Khakhanang Jonganurak (December 1, 2022)

1.1 Location: Charoen Krung Road, Bang Rak, The Creative District

The wall of the 'Scratching the Surface Project' outside the Embassy of Portugal in Bangkok is located near Charoen Krung Road in Bang Rak district which has a reputation as a 'Creative District' in Bangkok, Thailand.

The 'Creative District' is an area that was established to promote businesses and services in the creative industry by connecting the stories of the district, people, and traditional businesses together with measures to promote creative businesses and encourage participation from the government, private sector, and local people. Its aim is to foster creative businesses and develop infrastructure that facilitates thinking, production, sales and enables traditional businesses in the area to benefit from development. To attract new investment from both domestic and foreign countries as well as stimulate the local economy and create movement among business groups and

[4] "Scratching the Surface," 2017, accessed May 10, 2023, https://www.bangkokriver.com/event/scratching-the-surface/.

creative personnel. This has led to the establishment of a centre of creative personnel both domestically and internationally that leads to the transfer and exchange of knowledge as well as works and opportunities for the development of Thai businesses and personnel.[5] Charoen Krung is an old commercial centre in Bangkok renowned as a premier creative neighbourhood due to its strategic location, importance as a trading hub, and historically diversified cultural treasures. The Thai government has made significant investments in the area to establish it as a creative district with the relocation of the Thailand Creativity and Design Centre (TCDC) serving as its focal point. The Creative Economy Agency (CEA) has been essential in elevating Charoen Krung's status as a creative destination, resulting in an increase in the number of galleries, cafes, stores, studios, and start-ups. These tangible and intangible assets are critical components in the establishment and maintenance of a creative environment.[6]

In addition, Bang Rak district is also famous for street art, which is one of the highlights of this district and makes the city lively and colourful. Most of the street art was created during the 'BUKRUK Urban Arts Festival II' in 2016. This art festival is a showcase of street art in Bang Rak district by artists from Asia and Europe who come together to create art on walls, buildings, and various places in the neighbourhood of Charoen Krung Road, Talad Noi, and Song Wad Road.[7] The project also helped to preserve the old buildings in the area and bring them back to life through art, and it also improved the direction of the local economy and tourism in the area. Figures 11-12 are examples of street artworks from well-known Thai street artists like Alex Face (figure 11) and Bonus TMC (figure 12) at Charoen Krung Road that are also part of the 'BUKRUK Urban Arts Festival II' project. After that, new street art emerged, including the 2017 event 'Scratching the Surface Project'.

Figure 11 Street art by Alex Face at Soi Charoen Krung 32
Source: Khakhanang Jonganurak (April 7, 2023)

Figure 12 Street art by Bonus TMC at Soi Charoen Krung 32
Source: Khakhanang Jonganurak (April 7, 2023)

[5] Benjamin Punson, "A Land Use Approach to Promote Charoenkrung District as the Creative Industry Hub for Bangkok Comprehensive Plan" (Thammasat University, 2019).

[6] J Yee et al., *Creative and Cultural Districts in Thailand* (British Council Thailand, 2020), https://www.britishcouncil.or.th/sites/default/files/bc_creative_cultural_districts_in_thailand_online.pdf.

[7] "ออ – ร – ญา. "บุกรุก สตรีทอาร์ต เทศกาลศิลปะข้างถนน ครั้งที่ 2 - บ้านและสวน." Baanlaesuan. Accessed April 12, 2023. https://www.baanlaesuan.com/25274/design/lifestyle/bukruk-street-art."

1.2 Street art

Street art is a genre of art that has seen a huge movement in modern times around the world. The essence of street art is an appearance among public urban spaces that can be found on every urban element like building's exteriors, walls, or on other public structures throughout cities. The main purpose is to communicate between artists and people in the community through art that reflects the problems that occur in society, politics, satire, and so on. Street art shows a variety of work techniques and materials. Materials used are not only paints or sprayed surfaces but also textiles, mosaics, posters, stickers, or stencils on any urban surface. Nowadays, new techniques are still being found, such as drillings and engravings to create patterns on the surface or using projection mapping, as a temporary show.[8]

Street art originated from graffiti, starting with the use of tags and signatures that eventually evolved into murals covering entire subway cars in Philadelphia during the 1960s.[9] Then it spread to New York City and expanded to Europe and beyond. Today, street art culture can be found in various corners of the world. Generally, street art is classified into two types: 1.) Work created freely in a simple and quick style that reflects the artist's uniqueness and ideals. Many of them are carried out illegally. 2.) Creation through projects or festivals collaborating with agencies or organisations to support and legally operate. This form of street art aims to enhance the urban landscape by embellishing building facades and transforming derelict spaces into visually appealing ones. The local culture influences the intricate process and aims to attract visitors.[10]

There are several distinctions between street art and graffiti. Graffiti is not meant to be communicated to the public but rather to serve the needs of the artists themselves or interact with other graffiti artists' communities. Graffiti is influenced by hip-hop culture, where people 'tag' and autograph themselves, often without revealing their real names. The resulting works are highly rebellious and difficult to interpret for the public. In addition, graffiti is often created illicitly and therefore is usually found in hidden locations, unlike street art, which tends to be in more open areas. Street art has a broader purpose, which is to communicate with the public, where artists want viewers to understand the message hidden in the artwork and interact and provoke public discussion. Street art incorporates graphic design elements and is more about visuals, whereas graffiti focuses on a text-based theme through tagging and lettering.[11] Street art is an artistic expression with its own guidelines and requires specific materials. It is a legitimate art form, and talented street artists are often commissioned to create painted murals or unique effects on exterior walls. It is also known as Public Art or Urban Art to differentiate it from graffiti.[12]

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[8] "Street Art: Definition & History - Video & Lesson Transcript," Study.com, accessed April 17, 2023, https://study.com/academy/lesson/street-art-definition-history.html.

[9] "What is Street Art? History & Famous Artists," Artland Magazine, accessed April 17, 2023, https://magazine.artland.com/street-art/.

[10] Santabarbara, "Street art conservation: beyond surfaces' restoration."

[11] Hencz, "What is Street Art? History & Famous Artists."

[12] Ahmet Türe, and Elif Türe, "The Relationship between Street Art and Contemporary Culture," *International Conference on Studies in Education and Social Sciences 1* (November 2021). 54.

Street art in Thailand was developed and influenced mainly by graffiti, which originated in the Western world and began by scribbling words or phrases in public places for fun, irony, or to declare territory. It was influenced by hip-hop culture through media such as TV, magazines, and music for the last 15 years. After 2006, street art in Thailand became more visible, beginning with exhibitions of Thai street artists, P7 and Cider, at art galleries. Both P7 and Cider are renowned in Thai street art circles, with their works also exhibited internationally. Peerapong Limthamrong, also known as P7, is a Thai street artist who has worked in this field for over 20 years. His work can be considered as contemporary art with vibrant colours and sculptures presented in three-dimensional forms.[13] Cider is an anonymous street artist from Thailand who has been active since 1992. He specialises in graffiti and draws inspiration from both Western and Eastern cultures.[14] The turning point that resulted in street art being known more widely was the 'F.O.R. Wall Painting Showcase', which was an exhibition that features street art from ten artists who represent a rebellious subculture. The exhibition intended to convey a message through genuine and raw expression, allowing viewers to freely interpret the artwork. It had been held in an exhibition at the Bangkok Art & Culture Centre (BACC) from November 3, 2009, to March 28, 2010. After that, people began to appreciate street art more and more.[15] [16] Exhibitions are one of the accepted tools in Thailand for disseminating works to society.

Street art in Thailand comes from a variety of backgrounds and techniques, and it is usually done with the permission of the property owners. It focuses on the beauty and the development of the urban landscape, not harsh content, or satirizing society.[17] The main intention of street art in Thailand can be divided into four types: 1. Artist's personal intention project 2. Projects in cooperation with organizations 3. Community development for tourism 4. Commissioned for commercial use.[18] 'Artist's personal intention project' emphasize purity that fully and freely reflects the individuality of each street artist. 'Projects in cooperation' with organisations will retain the design autonomy of the participating artists but differ in terms of the location, which may be more challenging. The organisation usually provides the location, available equipment, and facilities for exhibition or venue promotion. For example, many street artists collaborated on the 'BUKRUK II' Urban Arts Festival project in Bangkok's Bang Rak district in 2016.[19] 'Community development for tourism' is mostly done by artists who are not influenced by graffiti but are initiated by local artists who want to preserve the stories and ways of life of people in that area by using street art as a tool to convey the artwork to revitalise the tourist attraction and invite people to participate by taking pictures. 'Commissioned for commercial'

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[13] "P7 Street Art, Artwork and Color Lines," Kiji.life, accessed August 10, 2023, https://kiji.life/p7/.

[14] "CIDER - 5 works for sale, profile & content on The Artling," accessed August 10, 2023, https://theartling.com/en/artist/cider/.

[15] Manrit Tengya, "Development of street art form in Thailand" (Master Silpakorn University, 2015).

[16] "FOR: Wall Painting Showcase," accessed April 26, 2023, https://en.bacc.or.th/event/240.html (Bangkok Art & Culture Centre).

[17] Manrit Tenya, "From Graffiti Culture to Street Art in Thailand," *Veridian E-Journal, Silpakorn University* 2, no. 9 (2016). 2424-2436.

[18] Tengya, "Development of street art form in Thailand."

[19] "สตรีตอาร์ต ชุบชีวิตมรดกเมืองและสถาปัตยกรรม," งานสถาปนิก, updated January 23, 2020, https://www.asaexpo.org/post/street-art.

will be an extension of street art, that is, customers will be interested in promoting products or places by hiring artists who work in street art to be part of the design.[20]

The 'Scratching the Surface Project' is a collaborative artwork created with the support of the Portuguese embassy in Bangkok. The artist utilised the exterior wall of the embassy as his workspace during the project. Furthermore, the artwork's message is positive and pertinent to the neighbouring community and surroundings, thus helping to enhance the urban environment.

1.3 The Embassy of Portugal, Bangkok, Thailand

The Thai - Portuguese relationship has been solid for more than 500 years, dating back from the Ayutthaya period till the present. The relationship resulted in the settlement and formation of a Portuguese community in Thailand since the 15th - 16th centuries. Ways of life and cultures have been exchanged and blended seamlessly, including language, food, and architecture.

Portugal is a country that flourished with great seafaring skills and first visited Siam (Thailand) in 1511, during the Ayutthaya period. It was the initial European nation to establish trade and religious ties with Thailand. In 1518, the first treaty of Siam[21] with the Western world was signed, solidifying a bond of friendship and commerce between the two nations. The Thai side granted trade privileges in this treaty and allowed the Portuguese to settle in Thailand, while the Portuguese side provided support for the military in terms of equipment and training for the Siamese troops. After that, there were more marriages between Portuguese and native Thais, resulting in the Portuguese community called 'Baan Portugal' in Ayutthaya. After the collapse of the Ayutthaya Kingdom, Thon Buri was established as the new capital city of Thailand. King Taksin of the Thon Buri gave a piece of land along the Chao Phraya River to the Portuguese from Ayutthaya to settle down and create a community called 'Baan Kudi Chin', which still exists today. In the Rattanakosin period in the late 17th century, it was the establishment of the Kalawar (Calvario) Church. In 1820, HM King Rama II granted land to build a consulate in Thailand. The new residence of the Portuguese embassy (figure 13), created by an Austrian-Italian architect, Joachim Grassi, with a combined architectural design of Neo-Palladian and Thai-bungalow-style-architecture, was completed and officially opened in 1875. Today it still stands gracefully along the Chao Phraya River and was also s elected as an outstanding Heritage Conservation Building in 1984 by the Association of Siamese Architects under Royal Patronage. The Embassy office was renovated in 2016 from an old warehouse, which is a good combination of the 100-year-old wooden structure with an additional modern interior design. The Portuguese Garden is an area belonging to an embassy, which the Royal Orchid Sheraton Hotel has permission to rent. As part of the agreement, the hotel must construct a swimming pool and tennis courts and take care of the garden. This enables the embassy and its guests to enjoy the outdoor

[20] Tengya, "Development of street art form in Thailand."
[21] 'Siam' was the original name of the country before it was officially changed to 'Thailand' in 1939.

spaces without any expenses for upkeep or development. On the outermost part, like the exterior property wall, there is the street art from VHILS.[22] [23]

Figure 13 Residence of the Portuguese Embassy, Bangkok
Source: Time Out Bangkok / Chaiyawat Chaiyachote/ https://www.timeout.com/bangkok/attractions/the-embassy-of-portugal

1.4 History and timeline of the wall

This chapter is about the history and timeline of the exterior property wall of the Portuguese embassy on which the street art project by VHILS was created. The wall of the Embassy of Portugal has been renovated several times. This can be seen from the many layers of plasters, paint and masonry that were uncovered by creating the work (figure 14). According to old maps and photographs, the current wall that has the artwork, Scratching the Surface Project, on it and the main entrance are not at the same location as the original place in the past.

Figure 14 Layers of the wall at the artwork area
Source: Khakhanang Jonganurak (December 1, 2023)

[22] Kevin P. Colleary Amarin Publishing Services (APS), and Ana R. Freitas, eds., *THE EMBASSY OF PORTUGAL BANGKOK The first diplomatic mission in Thailand* (Bangkok: Thai Beverage Public Company Limited, 2020).

[23] "Embassy of Portugal the first embassy in Bangkok, over 150 years old," The Cloud, accessed April 13, 2023, https://readthecloud.co/embassy-4/.

Some photographs of the embassy from 1918 show the original entrance located on the back of the Residence, which is different from the current entrance (figures 15-16). From the picture, it was known that the embassy has changed the location of the main entrance, which may be related to building the wall that we see today. But the question is: When was the wall, that we see today, built?

Figure 15 The original embassy's main entrance in 1918
Source: The Embassy of Portugal Bangkok /Arquivo Diplomatico, Ministerio dos Negocios Estrangeiros

Figure 16 The embassy's main entrance at the back of the residence of the Portuguese Embassy in 1918
Source: The Embassy of Portugal Bangkok / Arquivo Historico Ultramarino

Changes were discovered in each era of the Bangkok maps. On the Map of 1887 (figure 17) from Manuscript Publishing Library, the Embassy of Portugal was still a consulate.[24] The map only provides a rough idea of the Portuguese consulate's boundaries without details. But the map shows that there were many foreigners living around the Charoen Krung area at that time, and it also had many important places for foreigners such as the Portuguese, the French, the American, the German, the Austrian, the British Consulates, the Hong Kong-Shanghai Bank, etc. Many places in the area had changed and vanished over time. Only two consulates remained, which were later converted to embassies and are still in the same location today: the Portuguese and the French Embassy.

[24] "Manuscript Publishing Library. "Bangkok old map 1887 No.7." Open Educational Resources. Accessed April 17, 2023. https://oer.learn.in.th/search_detail/result/116089#/Chicago.."

Figure 17 The location of the Portuguese Consulate in Bangkok map, 1887
Source: Manuscript Publishing Library of Thailand / https://oer.learn.in.th/search_detail/result/116089 / modified by Khakhanang Jonganurak

A 1932 map (from Royal Thai Survey Department, Thailand Research Fund, and Faculty of Architecture, Chulalongkorn University)[25] and an aerial photograph of 1958 (from Royal Thai Survey Department and International Cooperation Administration, U.S.A)[26] show that the main entrance remained in the same location behind the Residence of Portugal. In the area where the wall with the street art is present, there used to be a building that looked like a warehouse. Therefore, it is assumed that the outer wall that we see today may not have been built in 1958 (figures 18 - 19). The satellite image data from Google Earth, with data from 2001-2022, shows that the exterior wall has been visible since 2001 (figures 20 - 21). It is still not clear in what year the wall was built.

[25] "Royal Thai Survey Department, Thailand Research Fund, and Faculty of Architecture, Chulalongkorn University, “Bangkok map 1932,” Accessed April 17, 2023, https://nla.gov.au/nla.obj-2918525520/view.."

[26] "Royal Thai Survey Department and International cooperation Administration, U.S.A. n.d. “Bangkok map 1958.” Accessed April 17, 2023. https://nla.gov.au/nla.obj-2936850305/view.."

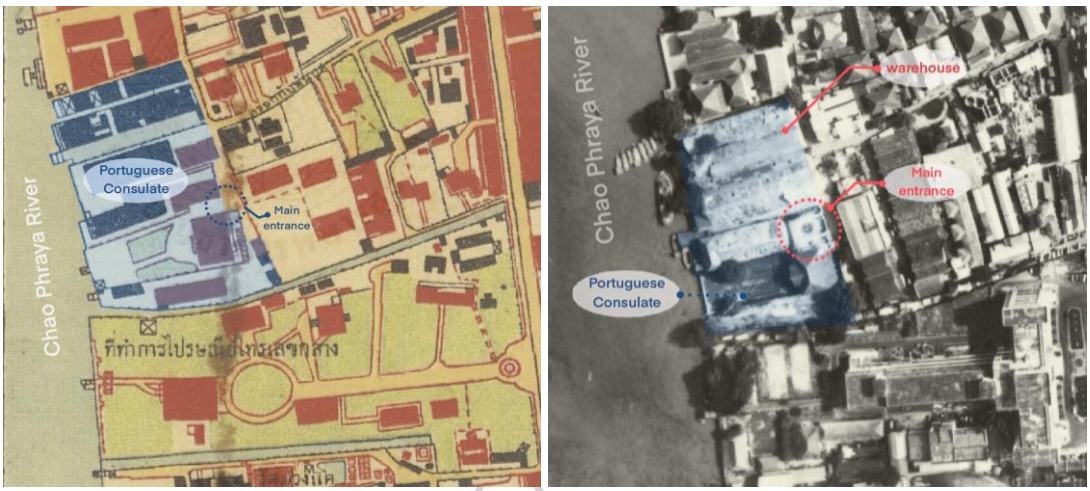


Figure 18 Bangkok map 1932
Source: Royal Thai Survey Department, Thailand Research Fund, and Faculty of Architecture, Chulalongkorn University 2007 / modified by Khakhanang Jonganurak

Figure 19 Bangkok map 1958
Source: Royal Thai Survey Department and International Cooperation Administration, U.S.A / modified by Khakhanang Jonganurak

Figure 20 Google Earth 2001
Source: Google / modified by Khakhanang Jonganurak

Figure 21 Google Earth 2022
Source: Google / modified by Khakhanang Jonganurak

Google Street View images show that from 2011 to 2016, the wall was painted white without any embellishments (figures 22 - 23). The appearance of the street art on the wall was then captured for Google Street View 2018 (figure 24).

On the Bangkok River website, it was mentioned that the wall had sustained damage from a bus crash. However, it had been repaired by filling the hole with concrete blocks.[27]

[27] "Street Art: Vhils," accessed April 16, 2023, https://www.bangkokriver.com/place/street-art-vhils/ (Bangkok River).

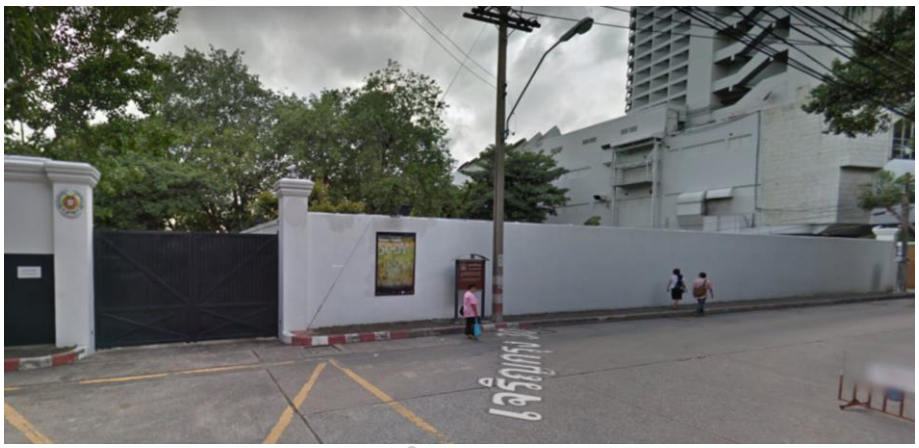


Figure 22 Exterior property wall of the Portuguese Embassy from Google Street View 2011
Source: Google

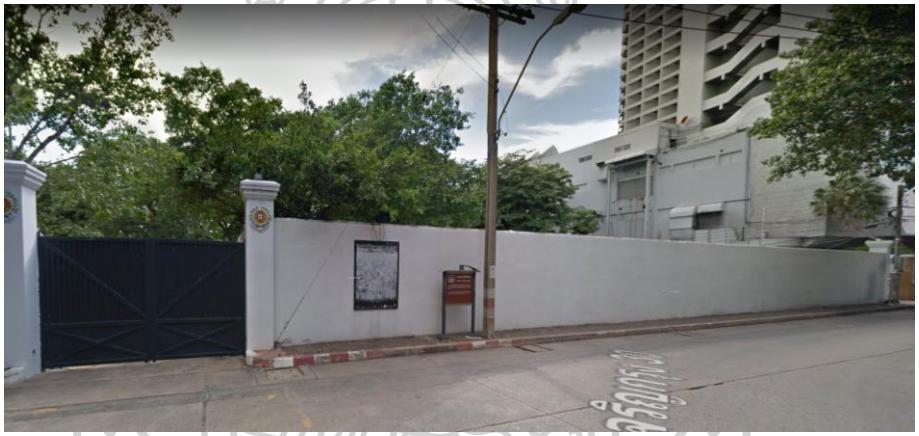


Figure 23 Exterior property wall of the Portuguese Embassy from Google Street View 2016
Source: Google

Figure 24 Exterior property wall of the Portuguese Embassy from Google Street View 2018
Source: Google

In 2017, Ambassador Francisco Vaz Patto came up with the idea to invite the Portuguese artist Alexandre Farto, also known as VHILS, to create street art on the exterior wall of the embassy using the artist's unique style involves scratching an existing wall and plaster, similar to sgraffito. This project is named 'Scratching the Surface Project'. The idea originated from the ambassador's belief that Portugal had a conservative public image, but this perception is no longer accurate. To showcase Portugal's modernity, it was decided to invite contemporary artists from Portugal to create modern art as a gift for Bangkok. Figure 25 shows a photograph of the artwork taken on the day the artist completed it on February 10, 2017. Nowadays, due to various environmental factors combined with time, this work has deteriorated, and signs of damage are visible.

Figure 25 The completed artwork on February 10, 2017
Source: Maria Madureira

1.5 Alexandre Manuel Dias Farto "VHILS"

Alexandre Manuel Dias Farto, born in 1987, is a Portuguese artist best known for his innovative bas-relief carving technique, which has been regarded as one of the most captivating approaches to street art established in the last decades. He has shown his work in over 30 countries and created his aesthetic across a range of media.[28]

According to Emília Ferreira's interview with the artist 'VHILS', he has always attempted to consider the realities of the urban environment, using some material as a point of departure. This strong interaction with materials, geography, and the source of support is the key to his work. He sees the urban environment as a collection of overlapping layers that are constantly imbricating with one another, and he feels that the excavation process is the most crucial component of the operation. VHILS also depicts human faces in several of his street art projects. In an interview, he stated that people shape cities while being moulded by them. The human-

[28] "vhils » About," vhils, accessed April 16, 2023, https://vhils.com/about/.

environment bond is extremely strong, and both the city and the human face reflect the natural modifications to which they are subjected with the passage of time. Many variables influence the selection of faces, such as the expressiveness of the face or its connection to the location where the sculpture is constructed. Faces in the artist's work are more abstract and symbolic, usually not genuine or depicting a real person but rather visual constructs based on many pictures and portraits. They are almost completely anonymous, faceless individuals, some of whom the artist has never met.[29]

The technique and style of VHILS art are destructive. Something is destroyed to create a new work. The methods he uses include scratching, engraving, and carving on the existing wall or other objects.[30] Before the destruction, he projects the picture on the wall and then traces the contours of the portrait with paint.[31] Sometimes he also chooses to draw freehand or use stencils. VHILS used stencils as a model for his artwork, which allowed him to construct a form via the process of removal to highlight the dimensions and the interaction of contrasts of positive and negative forms.[32] After obtaining the appropriate design, a bas-relief carving technique is employed using different hand tools such as a drill, hammer, chisel (figure 26), jackhammer (figure 27), knife, and even explosives.[33] Not only carving, but VHILS also extensively uses paint, spray, and brushes to make his work of art more visible.[34] When working in the area, there are stairs, scaffolding, and traffic cones to aid in the outdoor site and ensure traffic safety (figure 28).

Figure 26 Bas-relief carving technique by using a chisel and a hammer
Source: José Pando Lucas/ https://vhils.com/news/two-new-wall-pieces-in-paris/

Figure 27 Bas-relief carving technique by using a jackhammer
Source: osé Pando Lucas/ https://vhils.com/news/two-new-wall-pieces-in-paris/

[29] Alexandre Farto (aka Vhils), "Interview with Alexandre Farto (aka Vhils)," interview by Emília Ferreira, 2012, https://www.academia.edu/30751374/Interview_with_Alexandre_Farto_aka_Vhils_.

[30] "Vhils Biography & Artwork | Artists," Street Art Bio, accessed April 16, 2023, https://www.streetartbio.com/artists/vhils/.

[31] "Portuguese Street artist Vhils| Euromaxx - Street Artists," accessed April 16, 2023, https://www.youtube.com/watch?v=uG31ZwpK_1Yhttps://www.youtube.com/watch?v=-aFlSgjhpLk.

[32] Vhils), interview.

[33] "Vhils, o "arqueólogo urbano" da destruição criativa," accessed April 16, 2023, https://www.youtube.com/watch?v=-aFlSgjhpLk.

[34] "How Street Artist Vhils Creates a Mural," The Atlantic, accessed April 16, 2023, https://www.theatlantic.com/entertainment/archive/2011/12/how-street-artist-vhils-creates-a-mural/250612/.

Firstly, VHILS patrolled and photographed locals to serve as inspiration for making faces on the walls[35], which he then merged with Portuguese patterns[36], which blends both extremely effectively and reflects Thailand and Portugal's positive connection. VHILS also gave an interview to Latitudes magazine that the wall has numerous layers, each acting as a time capsule, preserving the stories and history of its context. Once the surface is breached and the contents within are revealed, what was previously invisible becomes visible. His intention was to extract an image of this context from the wall layers. He also wanted to create a bridge with some of the patterns and historical portraits from the Embassy and from the tales of the relationship. He aimed to connect the stories of the Thai-Portuguese relationship by narrating some of the patterns and historical portraits from the Embassy. The objective was to develop a design that embodies the essence of both cultures, using graphic elements that portray people and their interconnections.[37]

Figure 28 The process of creating the artwork by the artist and his team
Source: Time Out Bangkok / Sereechai Puttes / https://www.timeout.com

[35] Bangyikhan, "Embassy of Portugal the first embassy in Bangkok, over 150 years old."
[36] Partners, "Street Art: Vhils."
[37] Christophe Chommeloux, "VHILS Scratching the surface," *Magazine Latitudes*, April-May, 2017. 48-53.

Chapter 2
Technological survey

The existing Portuguese Embassy's property wall are made of various materials. A conservation survey was conducted by counting the layers of the wall at various locations where the artist's scratch marks revealed the inner material of the wall. The wall contains a combination of traditional and modern materials. To count the layers, a triangle sticker with written symbols was attached on the surface layers at various levels. The goal was to identify the materials in each layer and the technology of the wall.

The wall layers can be divided mainly into three groups: masonry, plaster, and paint layer. The first and innermost layers are masonry, represented in the diagram figure 29 by the letter M. The next layer is the plaster, represented by the letter P. The last one is the paint layer, which can be divided into two phases. The first paint layer stays inside between the plaster and the second paint layer is on the top surface of the wall. The inner paint layer between the plaster layers is represented by the letter A, while the outer paint layer is represented by the letter B. All symbols will be followed by a number indicating their order from the supporting masonry to the top surface. Please note that all these symbols refer to the original materials of the existing property wall without any additions from the artist. Additional material layers created by the artist will be discussed in a separate section (figure 29).

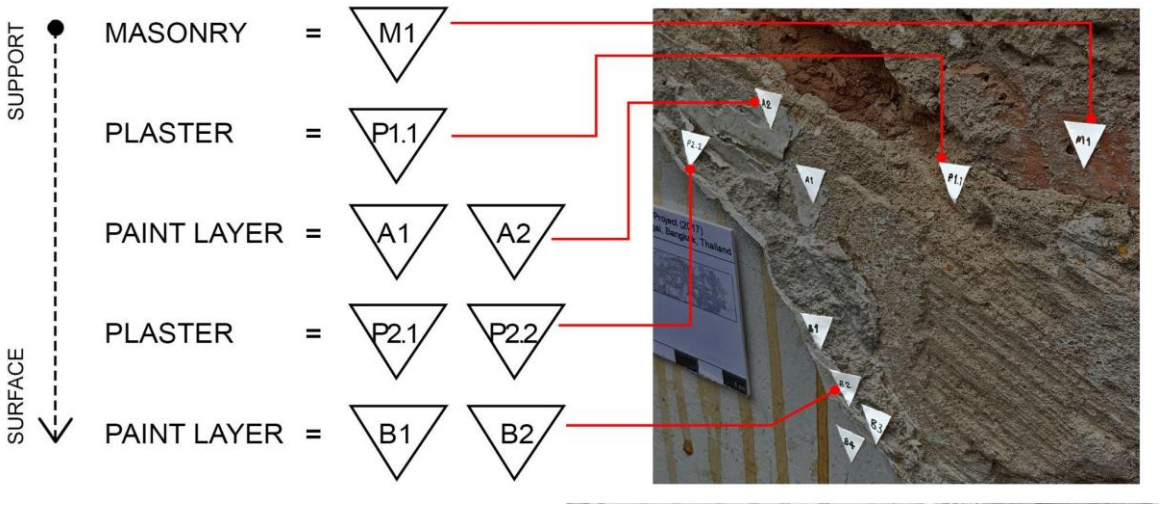


Figure 29 Diagram of numbering layers by using triangle stickers
Source: Khakhanang Jonganurak (August 9, 2023)

2.1 Masonry

Based on optical observation, the masonry layer beneath the artwork contains two types of materials: bricks (figure 30) and concrete blocks (figure 31). The wall's structure includes columns, which provide vertical support for the wall's stability and strength. They act as a sub-support for each small section of the wall. In Figure 32, the artwork on the wall is divided into small sections. Red markers indicate the location of vertical support columns that are inserted between the sections. These columns are represented by using the letters K to U, which help in referencing

specific areas within the artwork. The distance between each column, from centre to centre, is approximately 1.56 m, and the columns are 6 - 6.5 cm thick. The columns are most visible in the plaster layer. They have a darker grey colour than the rest of the wall plaster, and some parts show small vertical cracks along the column line (figures 33 - 34).

Figure 30 Brick masonry wall
Source: Khakhanang Jonganurak (December 1, 2022)

Figure 31 Concrete masonry wall
Source: Khakhanang Jonganurak (December 1, 2022)

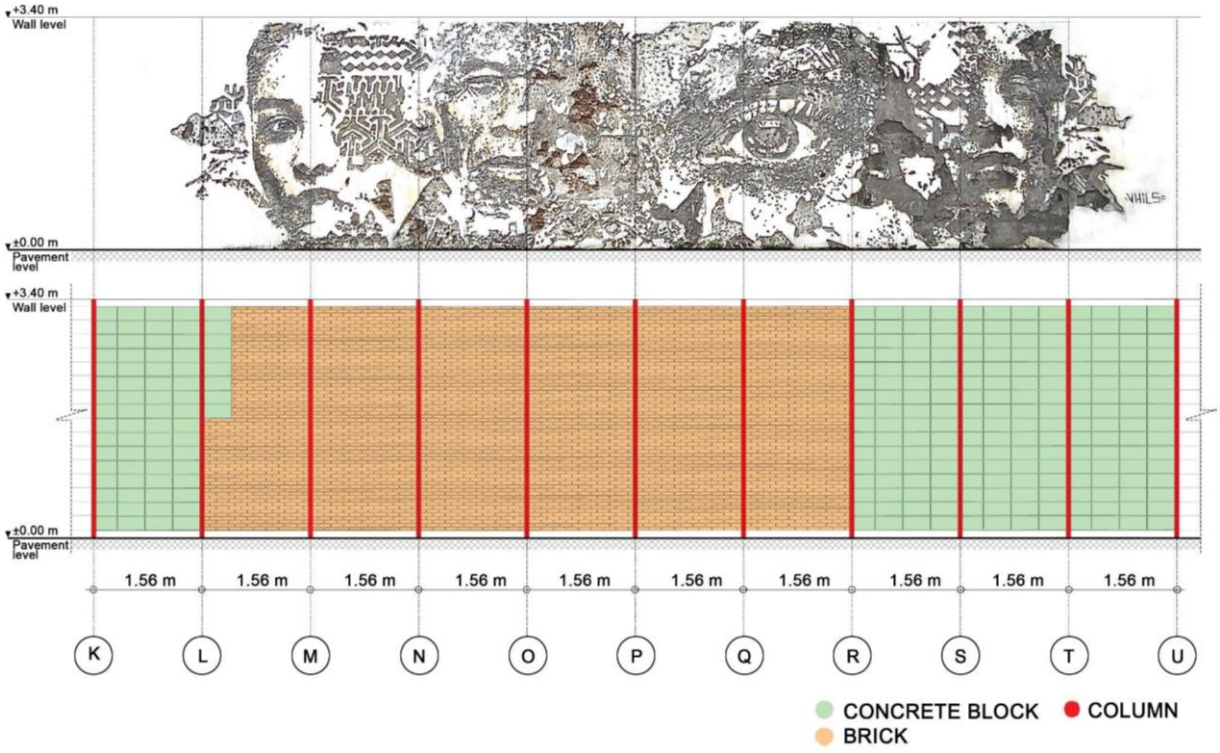


Figure 32 Masonry materials diagram
Source: Khakhanang Jonganurak (August 10, 2023)

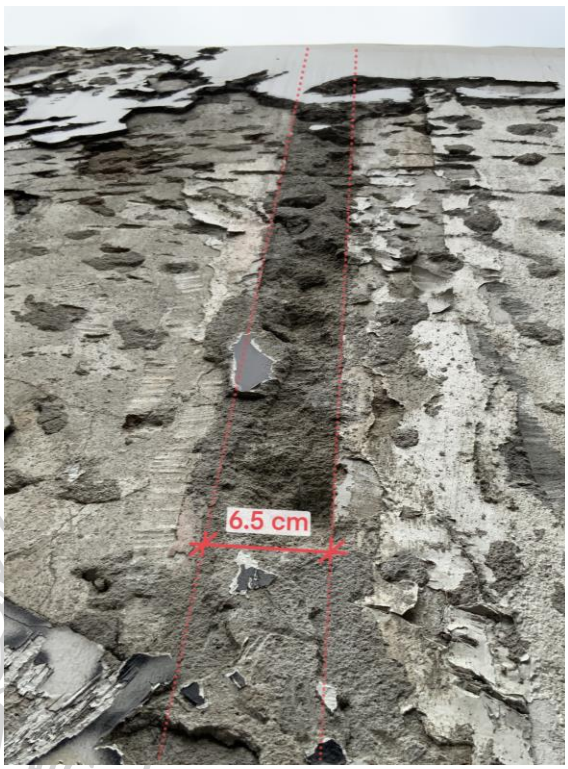


Figure 33 The position of a vertical support column in the wall
Source: Khakhanang Jonganurak (August 9, 2023)

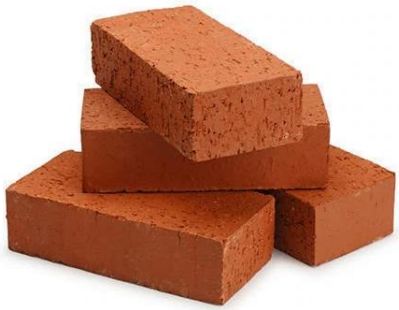
Figure 34 Close up picture of the vertical support column
Source: Khakhanang Jonganurak (August 9, 2023)

Figure 32 shows that the wall sections in between the sections K - L and R - U consist of concrete blocks, and most of the rest is brick masonry. But on the left wall section in-between the columns letters L - M is a mixture of concrete blocks and brick masonry, presumably due to a renovation of the wall in the past.

Brick masonry is the most significant section of the wall and seems to be the oldest. Brick is a material created by burning clay to create a material that retains its shape and strength. It can be produced in-house by local labour in all regions of Thailand. Most of the traditional Thai craftsmanship involves burning bricks with rice husk. Bricks have properties that allow to transfer and absorb heat for a long time before cooling down.[38]

Based on the brick masonry layer's appearance, it seems to be a stretcher or running bond pattern. Each row in this pattern is offset from the rows above and below by half a brick. It is also popular and widely used for masonry bond patterns (figures 35-36). The approximate dimensions of the bricks are 3.5 cm high and 16 cm wide, with a mortar thickness between the bricks of 1.5 cm.

[38] Chatchawan Sethaputra, "Bricks and construction," in *Cement and Applications* (Siam Cement Industry co., ltd, 2005).



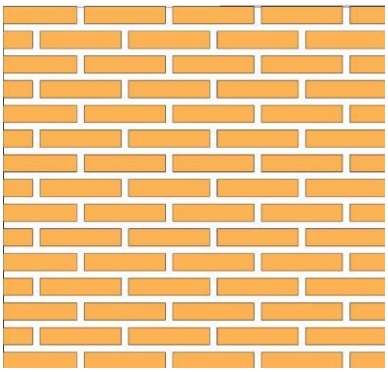


Figure 35 The assumed appearance of bricks on a wall
Source: https://www.tsksuphan.com/th/articles/261579-the-difference-of-red-bricks-block-bricks-lightweight-bricks

Figure 36 A stretcher or running bond pattern of bricks
Source: Khakhanang Jonganurak (August 9, 2023)

The second used construction material is concrete blocks, which is a modern material and widely used today. A good-quality and accepted concrete block in the majority of Thailand must meet the standards specified by The American Society for Testing and Materials, ASTM, or Thai Industrial Standard. Portland cement, water, and a variety of aggregates such as gravel, sand, and fine stone are used to make concrete blocks. They may also be mixed with suitable additives to give the concrete special properties, such as dispersants, paints, and water-repellent substances, which must meet relevant industrial product standards. They will be compressed into a standard format and divided into various blocks.[39]

In this case, these concrete blocks contain a hollow space and are commonly referred to as “Hollow Concrete Blocks” (figure 37). The hollow space inside is useful as it acts as an air insulator, reducing heat buildup and weight. However, they are brittle and can break easily when drilled or nailed. Also, water can penetrate and spread easily. To avoid any damage, it is recommended to plaster over or cover with waterproof materials.[40] The concrete block has a stack bond pattern in which bricks are placed in matching positions on both the vertical and horizontal axes (figure 38). The size of the hollow concrete blocks is 19 cm in height and 39 cm in width. The thickness of the mortar is 1.0 cm.

[39] Sravut Patinyasak, "Strength Development of Hollow Non-bearing Concrete Masonry Units Using Fly Ash as an Additive" (Suranaree University of Technology, 2017).
[40] Sethaputra, "Bricks and construction."

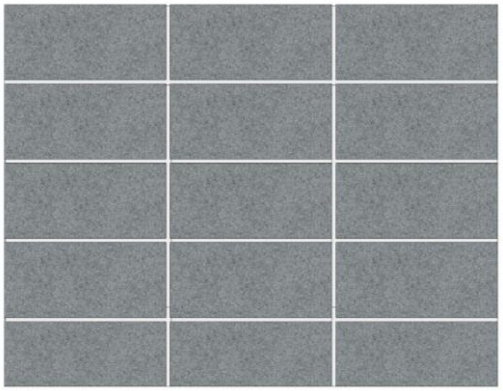


Figure 37 The assumed appearance of a concrete block on a wall
Source: https://www.tsksuphan.com/th/articles/261579-the-difference-of-red-bricks-block-bricks-lightweight-bricks

Figure 38 A stack bond pattern of concrete blocks
Source: Khakhanang Jonganurak (August 9, 2023)

2.2 Plaster

Plaster is a mixture made by combining binding medium materials and fine sand, which may also include additives or colours. When used, it can be mixed with water to change the properties of the liquid as desired. Plaster is used for plastering walls with single or multi-layer plastering to achieve the specified thickness. Plastering is usually roughly applied into two layers. The first layer is a coarse and thick plaster base levelling layer that is applied directly to the masonry. The second layer will be plastered to get a smooth surface with a finer and thinner texture than the first layer. In Thailand, traditional wall plastering used to be done with a mixture of quicklime (calcium oxide (CaO)), sand, and sugarcane juice as a binder before the invention of cement. This mixture reacts with carbon dioxide in the air to form a strong and long-lasting material. Quicklime is known to have better adhesion than cement. However, due to its slow hardening process, cement was later introduced to help with the hardening process, along with sand for better bonding. The use of sugarcane juice was no longer needed when cement was introduced because it did not help with the solidification process.[41]

There is a large variety of plaster layers on the wall. The analysis of the plaster layers on the wall involves the examination of four specific locations, namely Location I, Location II, Location III, and Location IV, as depicted in figure 39. These four locations have several overlapping plaster layers. The total number of plaster layers is about 3 - 4 which also have paint layers in-between (figure 40). It also has paint layers in between plaster layers. The plaster layer appears differently in each surveyed location.

[41] Sethaputra, "Plastering Techniques."

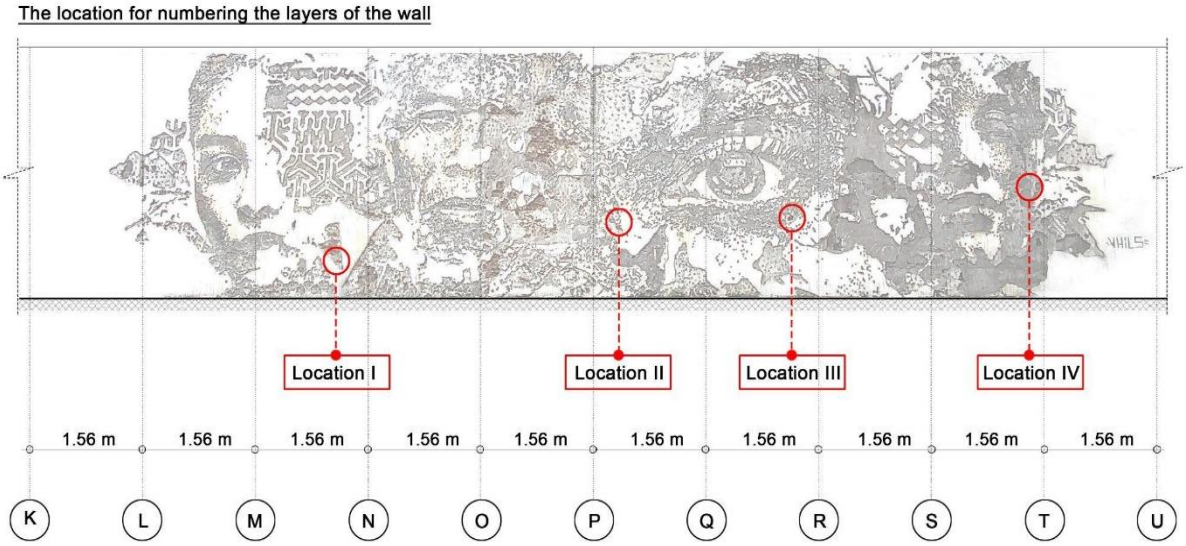


Figure 39 The locations for numbering the layers of the wall
Source: Khakhanang Jonganurak (June 15, 2023)

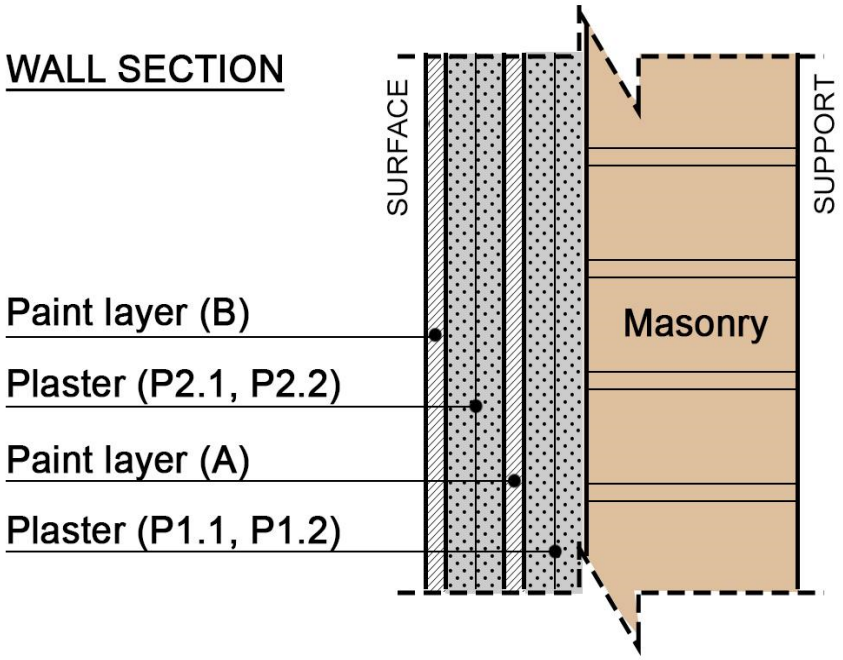


Figure 40 Section diagram of wall layers
Source: Khakhanang Jonganurak (June 15, 2023)

Numbering of Layers: Location I - Figure 41, the first plaster layer on the brick masonry wall is marked as P1.1. It is about 1-1.5 cm thick and has a matte surface with a slightly yellowish colour. Some small pebbles and sand can be seen mixed in the plaster. There are also white grains about 0.1-0.5 cm in size, which are assumed to be lime lumps. Lime lumps occur when quicklime isn't properly mixed with water and sand. It is basically inclusions of quicklime.[42] Because of this finding we can assume that the binding media of this layer is lime. The next plaster layer (P1.2) is like the first plaster layer (P1.1) but thinner, with a layer thickness of less than 0.5 cm. After the two plaster layers, there are two paint layers (A1, A2). On top of them another plaster layer follows (P2.1). It has a greyish colour and a slightly shiny texture compared to P1.1 and P1.2. The last plaster (P2.2) is the layer beneath the top paint layers (B1-B4). It has a finer grain and a thinner surface than other plaster layers.

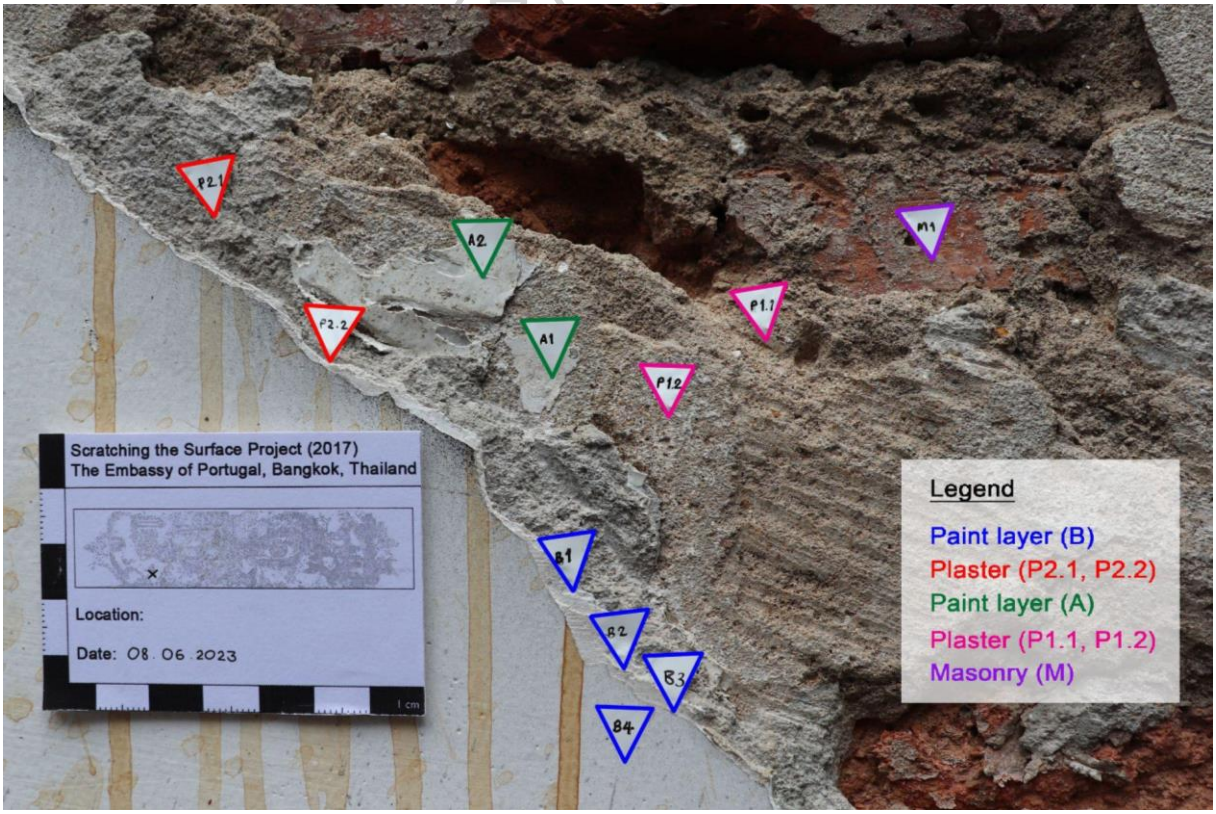


Figure 41 The numbering of Layers: Location I
Source: Khakhanang Jonganurak (June 15, 2023)

[42] Gerard T. Barrett, Kerry Allen, Paula J. Reimer, Asa Ringbom, and Jesper Olsen, "Ramped pyrolysis radiocarbon dating of lime lumps: Establishing the earliest mortar-based construction phase of Turku cathedral, Finland," *Journal of Cultural Heritage*, no. 61 (May 2023), https://doi.org/https://doi.org/10.1016/j.culher.2023.04.004.

Numbering of Layers: Location II - Figure 42, the first plaster layer (P1.1) is on a brick masonry. It has a similar overall appearance to the fist plaster layer from 'Numbering of Layers: Location I'. Next plaster layer (P1.2) has a thickness of about 1-1.5 cm, with a metal mesh inserted in the plaster layer for reinforcement. The metal mesh can be found in a small area of the wall (P-Q) (Fig. x). Next comes the plaster layer P2.1 on top of the A1 paint layer, which has a rough texture, grey colour, and about 0.3 cm thickness. After that, it follows P2.2, which looks like P2.1 but with slightly finer texture.

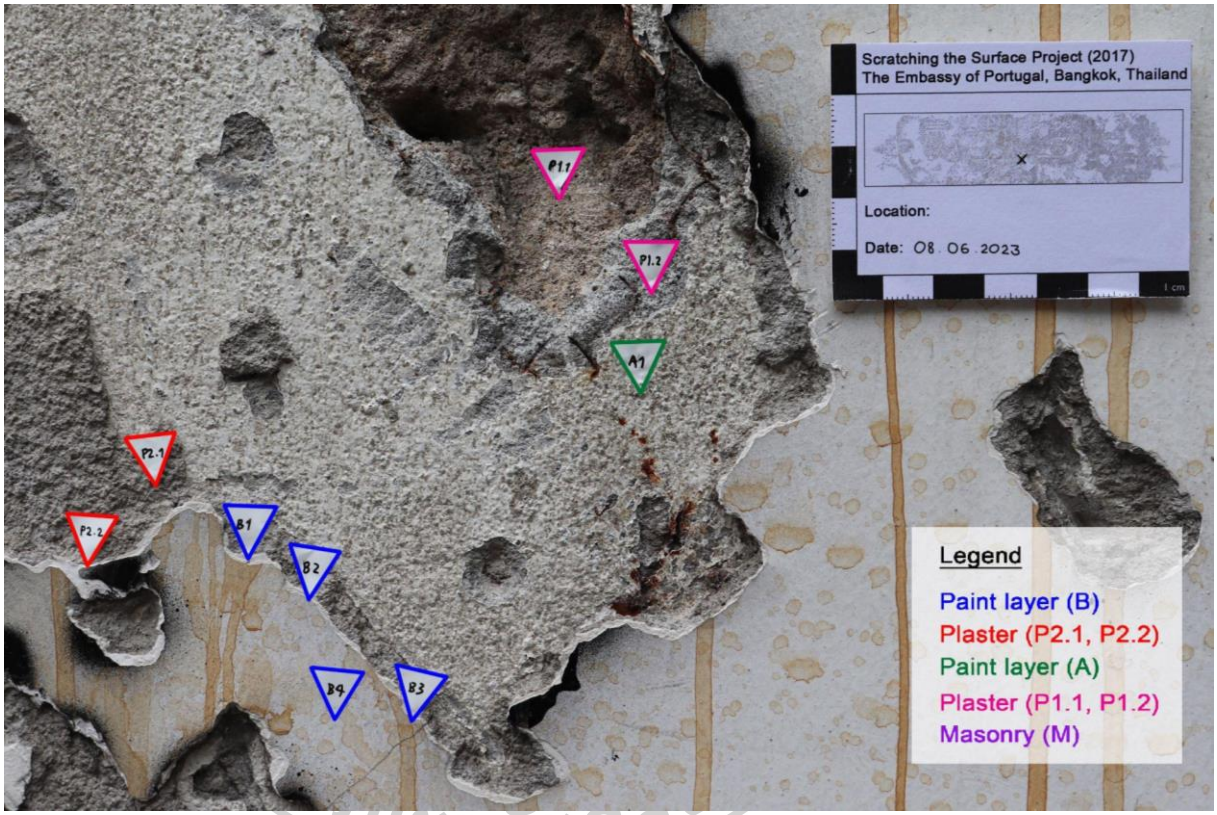


Figure 42 The numbering of Layers: Location II
Source: Khakhanang Jonganurak (June 15, 2023)

Numbering of Layers: Location III - Figure 43, in this location, the first plaster layer is still on the brick wall and looks similar to the first plaster layer from 'Numbering of Layers: Location I'. In location III, a metal plate and nut were found attached to the wall at one point, the purpose of which is still unknown. The next layer (P1.2) is a pebble wash plaster that is about 1 cm thick and has a rough texture. It is a grey plaster and consists of coarse-grained material, which is mostly white rock with a diameter of about 0.3 cm. After the paint layer (A), two plaster layers (P2.1 - P2.2) follow. They are about 0.2 - 0.3 cm thick. It has a coarse grey texture with small grains with diameters ranging from 0.1-0.15 cm.

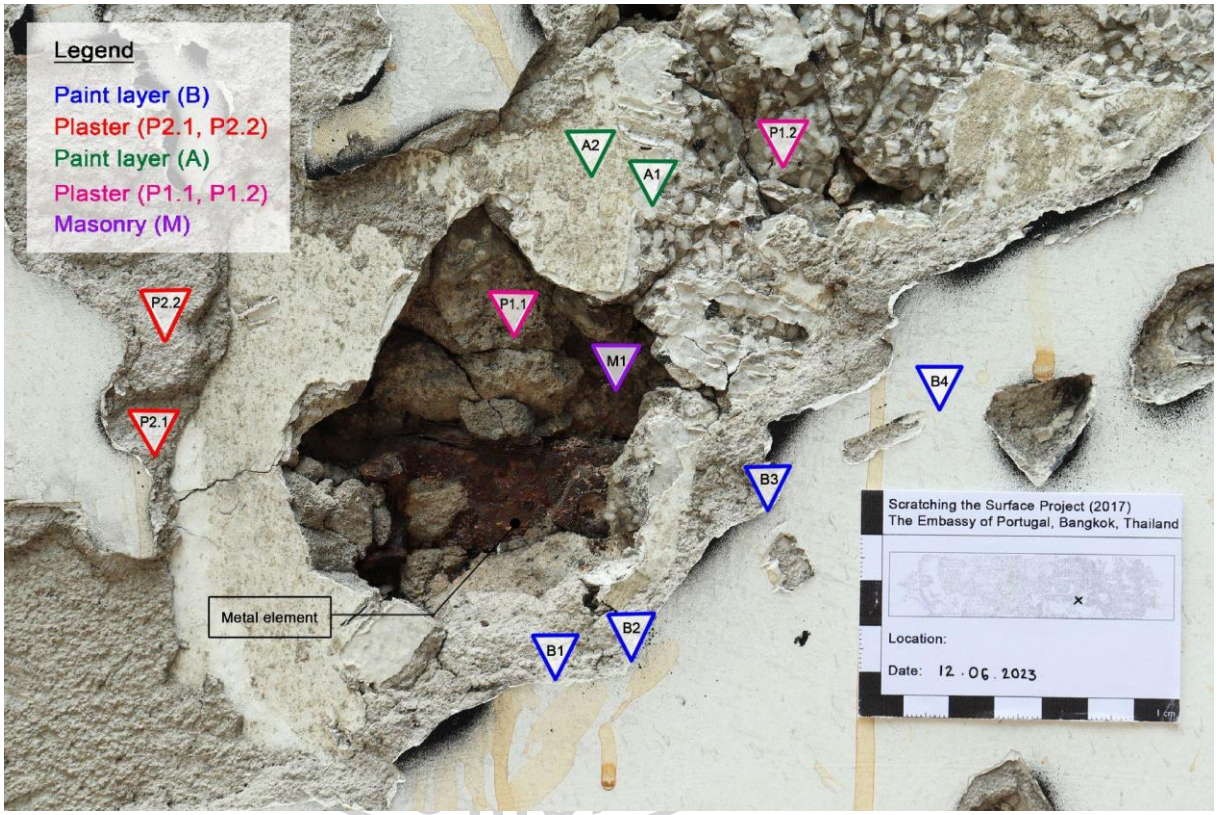


Figure 43 The numbering of Layers: Location III
Source: Khakhanang Jonganurak (June 15, 2023)

Numbering of Layers: Location IV - Figure 44, the first plaster layer (P1.1) is on the concrete block wall. It has a grey colour and is less than 0.5 cm thick. On top of this plaster, two paint layers (A1 and A2) follow. Next, another two plaster layers follow (P2.1 and P2.2). Their thickness is approximately 0.3 cm, and their colour is grey with a mixture of small grains.

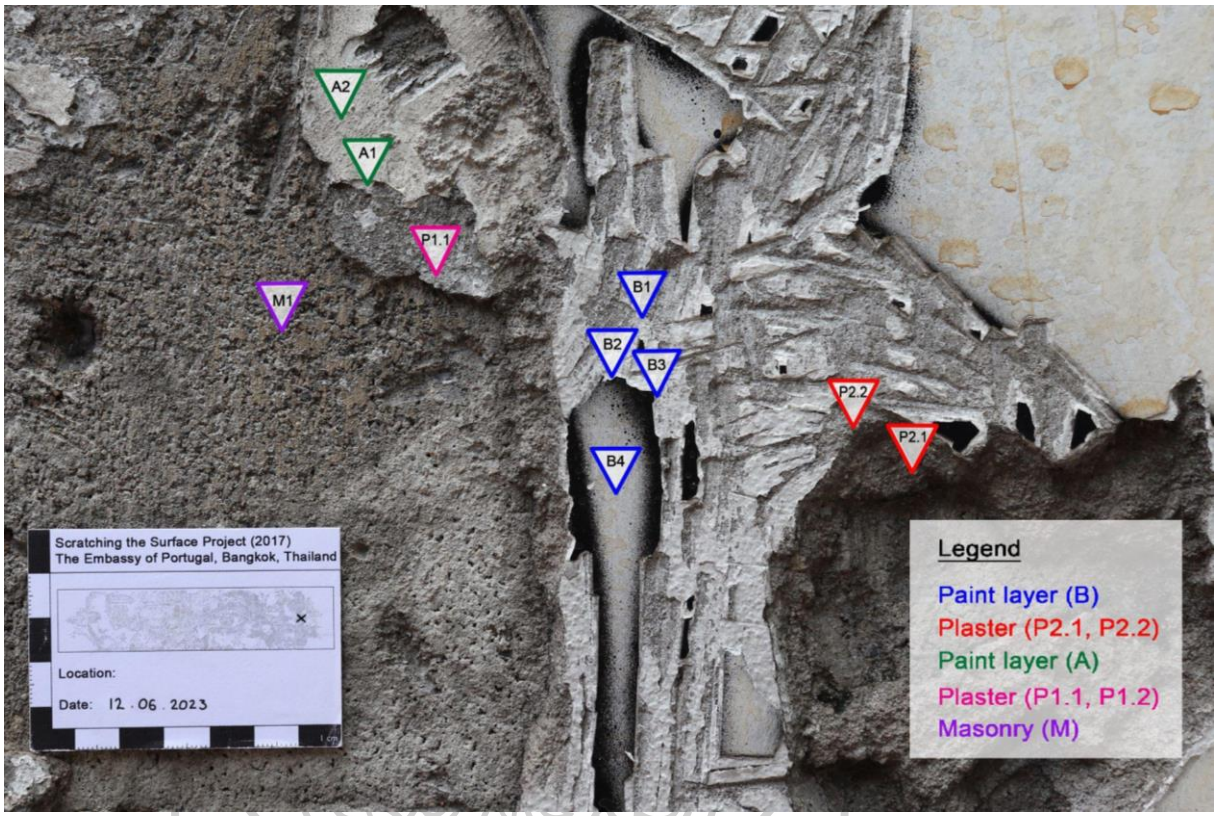


Figure 44 The numbering of Layers: Location IV
Source: Khakhanang Jonganurak (June 15, 2023)

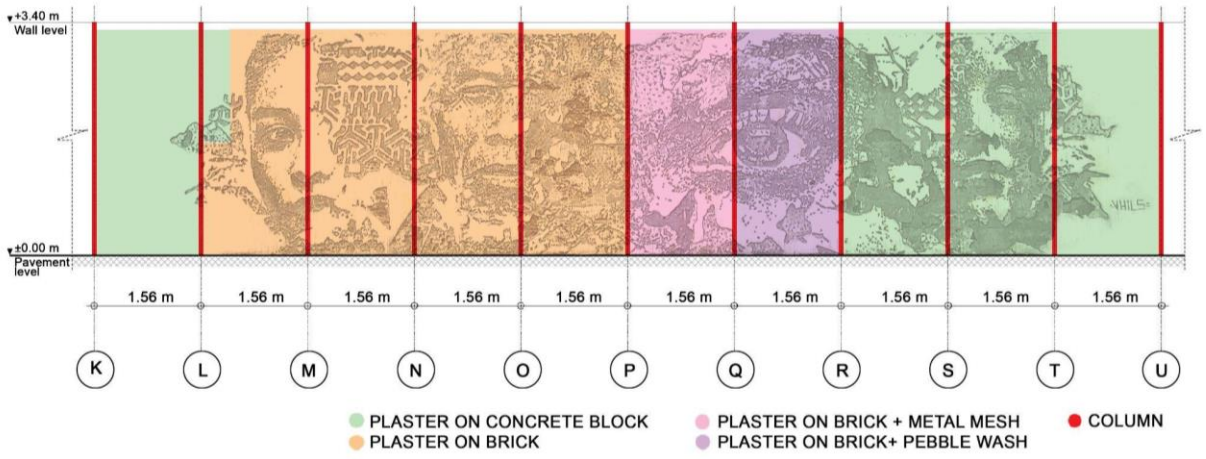


Figure 45 The diagram of plaster on masonry wall that divided into a small section by the column
Source: Khakhanang Jonganurak (June 15, 2023)

Figure 45 depicts the location of the various types of plaster layers discovered on the wall beneath the street artwork in various colours. The plaster on the concrete block masonry is represented by the green area. The orange area is plaster applied over brick masonry. The pink area is plaster with metal mesh over brick masonry. The plaster and pebble wash on brick masonry is the final type in the purple area.

Based on the observations made in the existing wall, the first applied layer of plaster on the brick masonry in Locations I, II, and III is similar. It can be postulated that this plaster layer is likely the oldest among those present plasters. It might be a traditional plaster with a mixture of quicklime and sand.

Due to the variety of materials found in the existing wall, the concrete blocks are expected to have been restored in the past. The appearance of the first applied layer of plaster on the concrete block masonry, in location IV, is completely different from the others first applied layers of plaster on the brick masonry. This material appears to be a modern type that probably contains cement, which has a greyish tone and is commonly used as plaster over concrete blocks in Thailand today. Upon visual inspection, the first layer of plaster applied to the concrete block did not reveal any white grains of lime lumps. However, in terms of materials, further research would be needed to gather more precise information about the ingredients of each type of plaster on the wall.

There are traces of keying of the plaster by mechanically roughening the surface to improve adhesion to prepare the surface for the next layer of plaster.[43] Figure 46 shows a newer layer of plaster from a past renovation that has been embossed from an old keying of the plaster hole. Even though the newer layer has been chipped off, traces of the new plaster layer can still be found in the holes. All of these are the original plasters that have been applied over many layers in the past, prior to the creation of the artwork by VHILS.

Figure 46 Traces of keying the plaster
Source: Khakhanang Jonganurak (June 12, 2023)

Figure 47 Overlapping plaster on the top surface
Source: Khakhanang Jonganurak (June 15, 2023)

[43] Angela Weyer et al., *EwaGlos-European illustrated glossary of conservation terms for wall paintings and architectural surfaces*, vol. 17 (Michael Imhof Verlag, 2015). 138.

2.2.1 Plaster layer from the artist

Additionally, a small region approximately the size of a fist was found where a plaster was applied, partially overlapping the breaking edge of the topmost layer. It is believed that this was either applied by the artist during the creation process or later (figure 47). Presumably, it was added as a consolidation of the fragile plaster layers after chiselling.

2.3 Paint layer

Overall, the paint layers are seen in two areas. Figure 48 shows that the paint layer (first area) is located in between the plaster layers represented by the symbol A. Another one is the paint layer that is located on the top surface of the wall, represented by the symbol B. These two symbols are followed by the number of layers found.

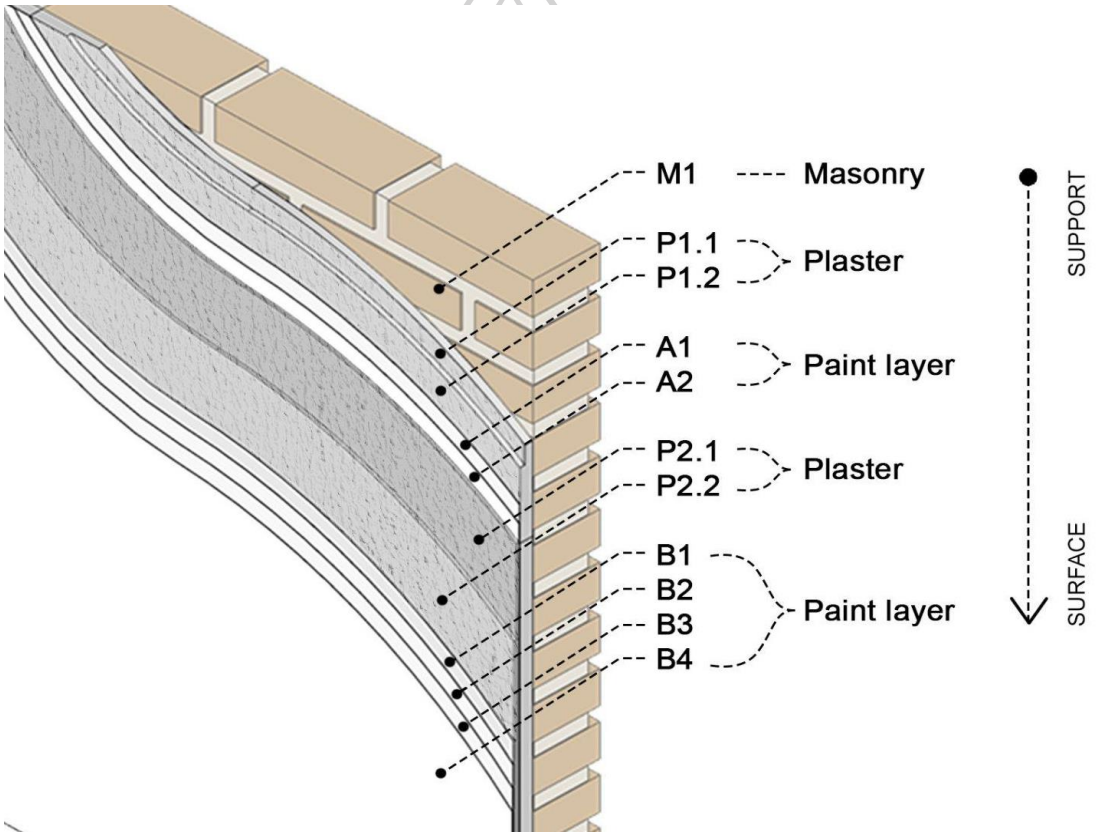


Figure 48 Layes of the wall diagram
Source: Khakhanang Jonganurak (June 15, 2023)

The paint located deep in the wall is composed of a minimum 1-2 paint layers, denoted as A1 and A2 (figure 48). Both paint layers are white, but the outer layer (A2) is glossy and slightly thicker than the inner layer (A1). In addition, some areas in this section also show traces of red and blue colour (figures 49-50). There seem to be traces of old inscriptions or advertisements on the wall. The paint on the top surface shows approximately four layers. Figure 48 illustrates the four paint layers denoted as B1, B2, B3, and B4. All layers have a white colour. Layers B1, B2, and B3 are matte finish and thinner than the top layer (B4). The top paint layer (B4) is the outermost paint layer, which is glossy and thicker than other paint layers in this area.

Figure 49 Traces of red colour on the inner paint layer
Source: Khakhanang Jonganurak (June 12, 2023)

Figure 50 Traces of blue colour on the inner paint layer
Source: Khakhanang Jonganurak (January 31, 2023)

2.3.1 Paint layers from the artist

The existing wall has two original paint layers, A1-2, and B1-4. This subsection discusses the additional paint layer by "VHILS", which is mainly on the surface of the outermost layer (B4). On the original existing top surface (B4), additional uneven distributed paint layers added by the artist during the creation of the artwork, including black spray paint, brown stains, and white paint are seen. Figure 51 depicts a wall that was previously sketched with black spray paint before the scratching method, which represents the process of the artist's work with his team was applied. Traces of the aerosol dispersion of the spray paint can be observed in figure 52. The long brown dripping stains are mostly translucent, but there are also some areas where the uneven colour is highly concentrated and opaque (figure 53). The brown stain can be seen in other artworks by the artist, especially in his street at various locations. In 2016, the Feed magazine of the Jerónimo Martins Group highlighted VHILS' technique on their website, mentioning that VHILS uses coffee grounds and bleach for creating his artwork.[44] The brown stains for this artwork may also contain coffee, which needs further study. It seems like some additional binding media like acrylics was added to this brown mixture. The artist applied white paint unevenly over black spray paint by brush (figure 54), resulting in varying thickness and an impasto texture with tiny bubbles in some areas (figure 55)

[44] "Having a blast with... Vhils | Feed," Feed Magazine, accessed August 24, 2023, https://magazine.artland.com/street-art/.

Figure 51 Sketched process with black spray paint before the scratching method of the artwork

Source: Khaosod English / Kaewta Ketbungkan / https://www.khaosodenglish.com/life/events/2017/02/08/portuguese-artist-vhils-makes-mark-charoen-krung-wall/

Figure 52 Traces of the aerosol dispersion of the black spray paint
Source: Elias Campidell (June 12, 2023)

Figure 53 The uneven brown dripping stains
Source: Elias Campidell (June 12, 2023)

Figure 54 Traces of the brush stroke of the white paint from the artist
Source: Khakhanang Jonganurak (June 12, 2023)

Figure 55 An impasto texture with tiny bubbles of the white paint from artist
Source: Khakhanang Jonganurak (June 12, 2023)

Chapter 3
Environmental impact

The environment is a major factor in the deterioration of artworks, particularly for street art that is displayed in an outdoor setting. The following elements can both be the source of the problem and an acceleration of deterioration.

3.1 Exposure and built environment

The concerned wall is next to the Portuguese Embassy's main entrance. In front of the wall is a footpath with a width of about 1.00 m. Next to it is the concrete road, Captain Bush Lane, also known as Soi Charoen Krung 30 in the Bang Rak area. On the street next to the sidewalk, there are manholes to drain the water along the line. Behind the wall is a tennis court at the Royal Orchid Sheraton Hotel & Towers, on land belonging to the Portuguese Embassy. The side of the wall is adjacent to the walkway to the Si Phraya express boat pier next to the Chao Phraya River. Around there are trees near the wall behind the entrance gate, and across the street are palm trees and a large Bodhi tree that has branches covering a wide area and giving shadow.

3.2 Vibration and traffic

Captain Bush Alley, or Soi Charoen Krung 30, is a one-way road with bus numbers 187, 93, 45, and 36 passing by between 4 a.m. and 10 p.m.[45] The alley has busy traffic, especially in the morning, because motorcycle taxis stand on the side of the alley on their way to Si Phraya Pier, waiting for customers who arrive from the pier during rush hour. There are also occasional tuk-tuks parked in front of the opposite wall. Due to its proximity to the Royal Orchid Sheraton Hotel, large buses carrying tourists pass by regularly. The concerned wall is also close to Rivercity Bangkok, which is an art gallery that is popular among the new generation, and there is also a parking lot for people who come to visit that area, causing cars to drive through all the time. Due to its location near the corner of the road, the turns of large vehicles are awfully close to the wall, almost at the level of the sidewalk (figure 56). Additionally, there was an occurrence where a bus collided with a wall before the creation of street art in 2017.[46]

The vehicles cause road vibrations, which is a common problem caused by large vehicles such as public buses and heavy tour buses. Another factor is the texture of the road surface. Very rough surfaces produce more vibration than smooth surfaces, generating dynamic loads on the road and becoming stress waves that travel down into the soil, which can carry vibrations to the foundation of the wall. When a large vehicle traverses an uneven road, it exerts a forceful impact on the ground, generating a load that results in oscillating vibrations. Traffic vibration can result in cracks in walls or foundations where it accumulates in the wall structure (multiple times), causing fatigue damage. However, the vibration from vehicles is not strong enough to

[45] "Bus Lines | Bangkok Mass Transit Authority (BMTA)," องค์การขนส่งมวลชนกรุงเทพ, accessed May 12, 2023, http://www.bmta.co.th/en/bus-lines.

[46] Partners, "Street Art: Vhils."

cause major damage to the wall. But it creates cumulatively minor damages connected with other existing problems like structural problems in the wall caused by previous repairs, soil subsidence, humidity, and temperature.[47]

Figure 56 The turns of large vehicles at the corner of the road in front of the artwork

Source: Khakhanang Jonganurak (December 1, 2022)

3.3 Pollution

The wall is most affected by pollution caused by vehicles, which release harmful particles such as carbon monoxide (CO), nitrogen dioxide (NO_2), and some sulphur dioxide (SO_2) from the exhaust of gasoline-powered cars, as well as ozone resulting from chemical reactions of nitrogen oxides (NO_2) and hydrocarbons.[48] [49] In many parts of Bangkok, there is dust in the air from construction work.

Nitrogen dioxide (NO_2), which can be oxidised to nitric acid (HNO_3), can cause colour fading, which is responsible for most of the subsequent material degradation, particularly in vegetable-tanned leather and paper. Ozone (O_3) may harm materials by breaking down the double bonds between carbon atoms. The most researched phenomena is the deterioration of vulcanised natural rubbers under stress and the fading of artist's colourants. Sulphur dioxide (SO_2) can cause colour fading and copper corrosion.[50] If enormous amounts of SO2, NOx, and ozone enter the earth's atmosphere, they may generate acidic rain, which can erode the building material, especially marble and limestone, and cause corrosion on steel to occur more quickly than usual.[51] [52] Fine particles come in many sizes and are carried by the air

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[47] Osama Hunaidi, "Traffic Vibrations in Buildings," *Construction Technology Update*, no. 39 (June 2000), https://doi.org/https://doi.org/10.4224/40002904.

[48] "How Much Air Pollution Comes from Cars?," HowStuffWorks.com, updated July 7, 2021, https://auto.howstuffworks.com/air-pollution-from-cars.htm.

[49] "Pollutants," Canada.ca, updated February 17, 2021, https://www.canada.ca/en/conservation-institute/services/agents-deterioration/pollutants.html#pollu2.

[50] Tétreault, "Pollutants."

[51] Subodh Kumar, "Acid Rain-The Major Cause of Pollution: Its Causes, Effects," *International Journal of Applied Chemistry* no. 13 (2017). 53-58.

[52] Mays F. Alrubaie, Shakir A. Salih, and Waleed A. Abbas. , "The Effect of Acid Rain on Strength and Corrosion Performance of Slurry Infiltrated Fiber Concrete," *ZANCO Journal of Pure and Applied Sciences* (2019), https://doi.org/http://dx.doi.org/10.21271/zjpas.

which can cause problems with surface discoloration. Small particles might collect on the surface or inside porous materials, making cleaning difficult. They are sometimes accompanied by the acceleration of deterioration by substances such as oil, hygroscopic, and metallic particles, among others. In recent years, Thailand has faced the problem of PM 2.5 pollution, which is particulate matter with a diameter equal to or smaller than 2.5 μm. The paper 'Stay Safe in the PM2.5' from Chulalongkorn University mentioned the rise in PM2.5 levels occurs during the transition between the winter and summer seasons. High-pressure areas or cold air mass spreading from China to Thailand is causing strong monsoons and covering the northeastern part of the country. Temperature inversions in the lower atmosphere cause floating dust and poor air circulation and ventilation, with the dust originating from vehicle combustion and peripheral biomass burning.[53] [54]

3.4 The climate in Bangkok

Bangkok's climate is tropical and humid under the influence of two monsoon winds, the northeast monsoon, and the southeast monsoon. This results in three different seasons: the summer from February to April, the rainy season from May to October, and the winter from November to January.[55]

3.4.1 Sun and light

Bangkok is in the lower central region, and most of the area is floodplain. Most of the land use has been changed to large-scale construction instead of agricultural land, the temperature is quite high because the city's ground is mostly covered with concrete and asphalt, which heat up in the sun. The weather is extremely hot and stuffy in the summer. In winter, it is not too cold and still warm. The average temperature throughout the year is 28 - 30°C, the average maximum temperature is 32 - 34°C, and the average minimum temperature is 24 - 26°C. The hottest months with the highest temperatures are April and May, while the coldest months are usually December and January. The lowest temperature ever measured was 9.9°C on January 12, 1955, at the Bangkok Meteorological Station, Chaloem Phra Kiat.[56]

Thailand recently encountered a significant heat crisis in April 2023, when temperatures reached 45.4 °C.[57]

Not only Thailand but many countries in Asia have been affected by the brutal and violent heat wave in April 2023. A heat wave is a natural phenomenon where the air heats up rapidly over a period that may only last a few days or weeks. The World Meteorological Organisation (WMO) also defines a heat wave as a condition in which the daily maximum temperature exceeds the average maximum temperature by 5 °C for at least five consecutive days, affecting life and the environment worldwide. The

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[53] Tétreault, "Pollutants."

[54] Thanutra Teerasuphaset, and Jason Culp, *Stay Safe in the PM 2.5* (Chulalongkorn University, 2020).

[55] "Our Bangkok," accessed May 12, 2023, https://apps.bangkok.go.th/info/m.info/nowbma/.

[56] "Bangkok climate," Climatological center, updated January, 2023, chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://climate.tmd.go.th/data/province/%E0%B8%81%E0%B8%A5%E0%B8%B2%E0%B8%87/%E0%B8%A0%E0%B8%B9%E0%B8%A1%E0%B8%B4%E0%B8%AD%E0%B8%B2%E0%B8%81%E0%B8%B2%E0%B8%A8%E0%B8%81%E0%B8%A3%E0%B8%B8%E0%B8%87%E0%B9%80%E.

[57] "A 'once-in-200 years' heat wave caught Southeast Asia off guard. Climate change will make them more common," CNN, updated modified June, 2023, https://edition.cnn.com/2023/06/06/asia/southeast-asia-heat-wave-humidity-climate-intl-hnk-dst-scn-dg/index.html.

air on land and in the sea has warmer average temperatures, threatening endangered plant and animal life, and the climate is becoming increasingly volatile.[58] Some Asian countries, such as Thailand, India, and Myanmar, saw temperatures hit 45 °C, while in Bangladesh, Laos, Vietnam, Nepal, and China, temperatures reached 42 - 43 °C. Most Asian countries have not experienced such elevated temperatures in decades, resulting in many people dying from heat stroke.

Direct sunlight can have negative effects on materials. Heat can be problematic as it can cause the material to expand, and material damage will increase with temperature fluctuations. For example, the material may expand in the morning due to the heat of the sun and shrink at night when the temperature is cooling down.[59] This process of temperature fluctuations can result in the cracking of materials due to physical changes.

Sun radiation like UV light can cause colour fading by initiating photodegradation. This process causes changes at the molecular level in the compounds that give the material its colour, which causes deterioration and a loss of ability to absorb and reflect visible light at specific wavelengths.[60] In addition, most pigments and binders are light-sensitive paint components and UV radiation can cause chemical deterioration.[61]

The walls of the Portuguese embassy are facing east, so they are exposed to the full morning sun until noon, which causes heat in the walls. Sunlight (UV) causes the paint layer of the wall to fade and dry out, causing cracking and peeling of the paint layer. Therefore, the temperature of the wall was monitored at the selected position to examine the thermal degradation properties of the material.

To analyse the temperature fluctuations at the wall for one day on June 21, 2023, a small investigation over the time of twelve hours was done. The temperature was measured on twenty specific areas of the wall using an infrared thermometer, which performs non-contact temperature measurements. The thermometer determines the surface temperature of the object by measuring the infrared energy of the radiation from the surface of the object.[62] According to the monitoring, the temperature of the wall in the specified location was measured from top to bottom, every 2 hours from approximately 6:00 AM to 6:00 PM. It turned out that the surface temperature of the overall wall was the hottest between 12:00 and 12:30 PM, with an average calorific value of 43 °C, which relates to the hottest temperature during that time of the day. Overall, the heat generated in the brick masonry wall has a higher heating value than the hollow concrete block wall. Exposed walls experience greater temperature

[58] "Monster Asian Heatwave," Bangkokbiznews, accessed May 8, 2023, https://www.bangkokbiznews.com/lifestyle/1067096.

[59] "Brick Cracks [types and course]," Structural Guide, accessed May 15, 2023, https://www.structuralguide.com/brick-cracks/.

[60] "Why Does Sunlight Fade Colors? What You Need to Know," Temperature Master, updated March 24, 2023, https://temperaturemaster.com/why-does-sunlight-fade-colors/.

[61] Mark Nichols, and Ford Research and Advanced Engineering, "Principles of Accelerated Weathering: Evaluations of Coatings," *Coatingstech* (January 2020), https://docs.paint.org/Ct-Analytical-Series/Analytical-Series_Jan2020.pdf.

[62] "R & D Instruments. “Moisture Meter User Guide.”."

fluctuations on their surface throughout the day than usual covered painted walls. Normally, exterior paints that are commonly used also have durable properties. Some types will be able to prevent some heat, help protect the materials inside the wall, and therefore act as a protective shell. (Found the table of temperature monitoring in the appendix)

3.4.2 Rain and water

In most areas of Bangkok, the average total rainfall is in the range of 1,400 - 1,600 mm,[63] except in the central part of the city where the rainfall is more than 1,600 mm. The total rainfall over the year was over 1,600 mm. The number of rainy days 120 - 130 days, and the rainiest month September, which has an average amount of precipitation of 300 - 340 mm and rain for 20 - 21 days.[64] The highest amount of rain in one day measured was at 248.6 mm on May 8, 1986, at the Bangkok Meteorological Station, Chaloem Phra Kiat.[65]

Bangkok is prone to frequent flooding in many areas, due to heavy rainfall, inadequate sewers, and inefficient waste management. Thailand's water flows from the north to the middle plains, where Bangkok is located, has a lowland landscape that resembles a basin. Bangkok is situated in a strategic location where water from the northern parts of the country flows through to the Gulf of Thailand. Unfortunately, the city's expansion developed over this area, making it vulnerable to flooding during periods of excessive water flow. This can cause disruption and negatively impacts the lives of the people living in the city. Bangkok is also located next to the Chao Phraya River, which flows into the Gulf of Thailand. River water usually drains into the sea, but if sea levels rise above average, seawater sometimes spills back into the Chao Phraya River.

Heavy rain that comes directly on the surface of the artwork on the Portugal embassy's wall can wash away some of the plaster at the loose parts and decrease the adhesion of the wall layers. Moisture can also lead to mechanical damage, corrosion, mould development and so on.[66]

Furthermore, the ground beneath the wall contains a significant amount of clay, resulting in poor drainage.[67] The Charoen Krung Road near the Robinson Bang Rak building was recently flooded in 2021. The water level reached the walkway on the street due to the rising sea level, which overflowed from the Chao Phraya River.[68] Flooding and groundwater have also affected the Portuguese Embassy, which is located near the Chao Phraya River.[69]

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[63] Measure the amount of rain with a rain gauge, a device that measures the precipitation in a specific area over time.

[64] Climate statistics that are averages use data for a 30-year period from 1991 - 2020 and the most valuable climate statistics use data from 1951 - 2022.

[65] Department, "Bangkok climate."

[66] "Incorrect relative humidity," Canada.ca, accessed February 5, 2021, https://www.canada.ca/en/conservation-institute/services/agents-deterioration/humidity.html.

[67] "Bangkok Sewer," Urban Creature, updated October 1, 2018, https://urbancreature.co/bangkok-sewer-rainy/.

[68] "ท่วมบางรัก," ไทยรัฐออนไลน์, updated November 7, 2021, https://www.thairath.co.th/news/local/bangkok/2237070.

[69] "M. Madureira, personal communication, May 11, 2023.."

The embassy's walls are built mainly of porous materials with a high affinity for absorbing water, such as plaster and brick. There is a risk that groundwater can seep into the walls along with salts and minerals, forming salt crystals, which appear as small groups of white flakes on the surface. Salt stains on the surface have no significant impact, but salt crystallisation inside the porous substance of the wall can cause additional cracking off the paint layer and hasten degradation.[70]

It is essential to analyse the relationship between humidity and wall deterioration. Monitoring moisture content in each wall at several points can investigate whether humidity affects wall damage. The moisture content in the wall was measured with a moisture metre which is a pin less instrument that does not harm the surface of the object. According to the user guide handbook, this instrument can detect moisture up to 19 mm below the surface of the wall with a detection accuracy of +/- 4%. Additionally, it is a capacitive value detection instrument, so it is not suitable for non-capacitive moisture measurements, such as metal, a conductive film, and other conductive objects.[71] On 21st June 2023, a survey was carried out measuring specific areas of the wall every 2 hours starting from 6:00 AM to 6:30 PM. On that day, there was rain in the afternoon until around 4:00 PM, thus making the highest relative humidity measured up to 88% in the evening. The moisture content of each area had a different value depending on the type of material and the weather conditions at that time. The walls in the painted area were found to have a higher moisture content than other areas. The humidity level reached a peak of 66.1% at 4:30 PM after it rained, indicating that the painted wall may not effectively release moisture from the inside out. On the other hand, brick and plaster had less moisture content due to their higher porosity, which allows moisture to escape more easily. (Found the table of humidity and moisture monitoring in the appendix)

[70] Nuanlak Watsantachad, "Salts in Brick Walls," *JOURNAL OF THE FACULTY OF ARCHITECTURE SILPAKORN UNIVERSITY* (2006-2007).

[71] "Habotest. User's Manual Infrared Thermometers.."

3.5 Anthropogenic influences

'Scratching the Surface Project' at the Portuguese Embassy wall is an important and outstanding piece of street art in the Bang Rak district that attracts tourists who regularly take pictures. It is also located near the pier, so there are always people passing by. On-site observation revealed that many people often stop by to take pictures in front of the artwork, sometimes even touching the wall directly. To pose for photographs, some people lean on it, raise one foot against the wall (figure 57), touch it by hand, put stickers on it (figure 58), or even use their hand to hit the wall while walking through, etc.

Figure 57 A man posing for photo
Source: Khakhanang Jonganurak (December 1, 2022)

Figure 58 Sticker on the artwork
Source: Khakhanang Jonganurak (January 16, 2023)

3.6 Pests and Microorganisms

A large Bodhi tree and other trees (figure 59) in the surrounding area attract birds for shelter and to eat fruits from them. What follows is bird excrements on the wall, which causes stains. Bird droppings also contain a lot of seeds (figure 60), which, in humid climates, encourage the growth of plants in the wall's crevices (figure 61). Furthermore, the artistic technique used to reveal the surface of the wall created many gaps, which are a habitat for pests (figure 62).

In some parts of the rough wall surface, moss, mould, and microorganisms were found. Their growth requires high humidity, moss 40–50% RH or higher and mould at least 65% RH.[72] [73] There are also vegetation growth emerging from cracks in the walls, one of which was a bodhi tree, presumably from seeds in bird droppings.

[72] "Agent of Deterioration: Pests," Canada.ca, updated March 7, 2022, https://www.canada.ca/en/conservation-institute/services/agents-deterioration/pests.html#pest-parasites2a.

[73] "Preserved Moss Walls vs. Living Walls - 2021 Guide," Naturalist Interiors, 2021, https://naturalist.us/preserved-moss-walls-vs-living-walls/.


Figure 59 The Bodhi tree close to the artwork
Source: Khakhanang Jonganurak (January 23, 2023)

Figure 60 Bird droppings that contain a lot of seeds
Source: Khakhanang Jonganurak (January 23, 2023)


Figure 61 The growth of plants in the wall's crevices
Source: Elias Campidell (June 12, 2023)

Figure 62 Spider webs on uneven wall surfaces
Source: Khakhanang Jonganurak (June 12, 2023)

Chapter 4
Condition survey

Different layers of walls have problems, especially the inner layers of materials which are uncovered due to the artist's technique are more sensitive to the environment without their usual covering plaster and paint layers.

The existing wall was drilled and scratched to reveal the layers of various materials beneath, according to the artist's technique. Unfortunately, the destruction of protective layers and the masonry's exposure made the border more open to the environment and created various damage phenomena. Consequently, nearly every layer of the wall has suffered damage. The artwork was created through deliberate destruction. An aspect of this artwork is to create forms by using various damage patterns. As a result, it is critical to approach the examination of the condition and damages, and to not confuse the artist's intended interventions with damages that occurred after the art was created due to deterioration or other factors.

Figure 63 is a condition mapping the observable damages on the artwork. On the right side of the wall, there are visible cracks in red. The pink areas in the image indicate hollow spaces that are typically situated in the middle of the wall. These areas are usually next to loosen parts that are marked in green, typically found around corners of the pattern. Light green represents biological growth, which tends to thrive near the floor and on the surface of plaster. Blue indicates areas of peeling, commonly found in the upper part of the wall where paint has been applied. Rust is shown in orange and appears in metal areas within the wall layers. A footprint can be seen in blue at the bottom left of the work. Lastly, there are animal droppings, particularly bird droppings, represented in purple. While they are present in some areas of the wall, they are not widespread.

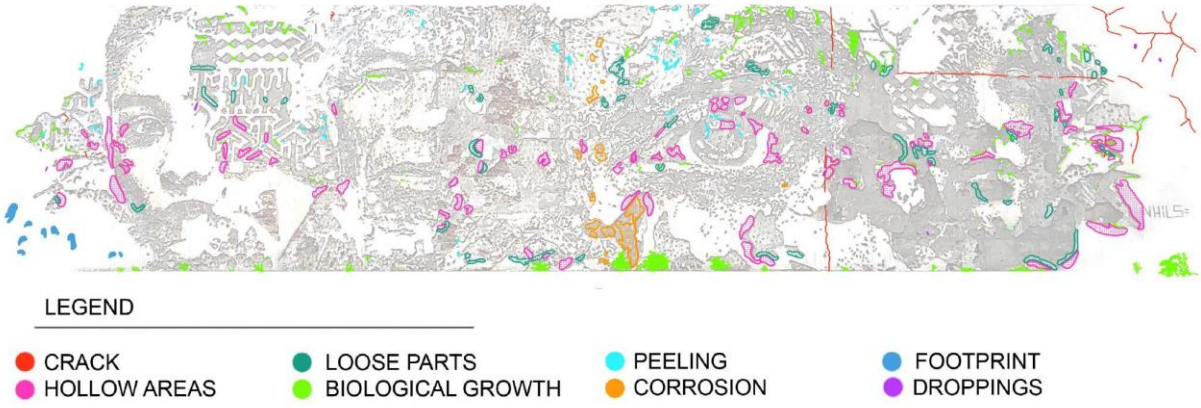

Figure 63 Condition mapping
Source: Khakhanang Jonganurak (June 15, 2023)

4.1 Masonry

On the surface of uncovered masonry, there is an accumulation of dirt and dust. Some bricks are cracking and crumbling into small fragments (figure 64). The concrete blocks have cracks in the area near the drilling marks (figure 65). Drilling holes in the concrete block allowed dirt and dust to accumulate in the hollow space inside (figure 66), which also became a habitat for ants, spiders, and geckos (figure 67). Some areas show biological growth and weed roots growing on the walls have the potential to penetrate this layer and cause further problems in the future by expanding cracks until some loss occurs.

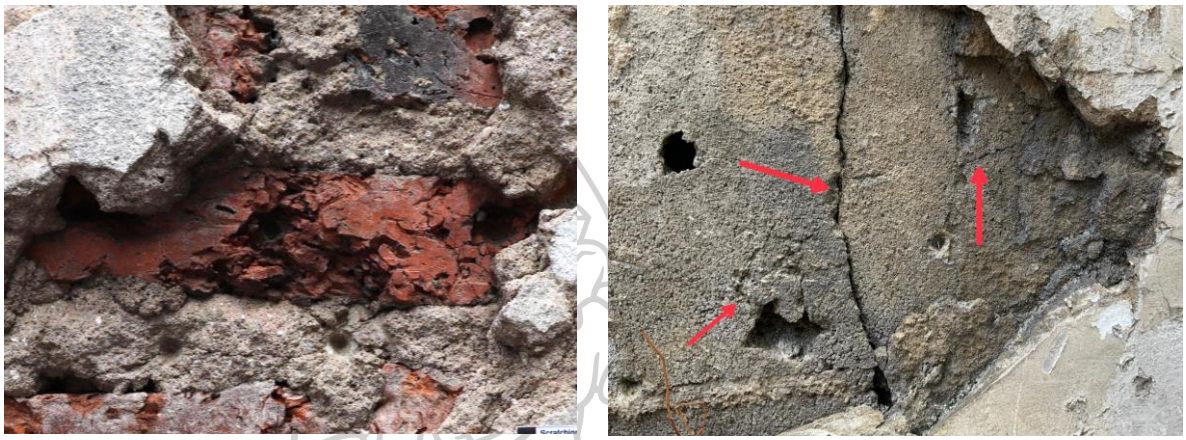

Figure 64 Cracking and crumbling brick
Source: Khakhanang Jonganurak (June 12, 2023)

Figure 65 Cracking concrete block
Source: Khakhanang Jonganurak (June 12, 2023)

Figure 66 Dust and dirt accumulate in the hollow space of the concrete block
Source: Khakhanang Jonganurak (June 12, 2023)

Figure 67 Gecko live inside the hollow concrete block
Source: Khakhanang Jonganurak (January 23, 2023)

4.2 Plaster

The plaster layer is loose in many places, with gaps appearing beneath the top plaster layers. This loose area can be at the edge of the pattern formed by perforation of the wall layer, indicated in dark green colour in the condition mapping (figure 63). It is caused by an adhesion problem between the layers. Figure 68 clearly shows the loose part from inefficient adhesion between the layers caused by the smooth surface of the inner paint layer with no grip under the plaster. Furthermore, the intense rainfall in Thailand can contribute to the deterioration of walls by washing plaster between the top and inner layers of walls, causing gaps in the plaster layers. Near the loose parts, hollow areas can be observed by gently knocking on the walls. There is also an accumulation of dust and dirt in the gaps between loose parts, especially in the lower area of the wall (figure 69). The loose and hollow parts that exist in many places on the wall are a significant issue because they can easily fall off and harm the optical appearance of the wall in the future. Moreover, fragments of the wall's plaster were already found partially on the floor (figure 70).

Figure 68 The loose part between the plaster layers
Source: Elias Campidell (June 12, 2023)

Figure 69 An accumulation of dust and dirt in the gaps between loose parts
Source: Khakhanang Jonganurak (June 12, 2023)

Iron corrosion can be observed in the plaster area where additional metal components, such as metal mesh and nails, are built in (figure 71). This causes brown stains to seep into the layer of plaster. The corrosion of metallic elements can cause internal pressure from the expansion of the corroding metal elements to cause damages such as cracking and the loss of material layers.[74]

Cracks in the plaster layer can be found everywhere, especially in the areas near the drilling and scratching marks. This can happen for a variety of reasons, including heat expansion and contraction, traffic vibration, foundation subsidence, exposure to excessive humidity, and so on. In the long run, environmental effects also catalyse further deterioration.

[74] Weyer et al., *EwaGlos-European illustrated glossary of conservation terms for wall paintings and architectural surfaces*, 17. 188.

Most of the plaster layer issues encountered here are caused by biological growth, which can be found in many crevices and rough areas. Biological characteristics range from yellowish green to dark green to almost black. These can be lichens, mould, moss, and other organisms (figures 72-73). The biological colonisation of a material may include its use as a food source or as a support for the colony's development. Typically, the materials of the wall appear to be inorganic materials used for support rather than nourishment. Microorganisms form biofilms to adhere to the material's surface, and biofilms can absorb particles and corrosive pollutants in the air that increase the reaction speed of chemical corrosion processes. More complex organisms like mosses, lichens, and plants can develop structures like roots to penetrate the material.[75] Plants and weeds are growing in the plaster crevices, particularly in the lower areas near the ground (figure 74). Plant seeds brought in by bird droppings, combined with moisture in the wall and sunlight, could be the reason for the issue. The combination of hot and humid climates, along with the environmental impact of Bangkok, also promotes rapid bio-growth.

Figure 70 A fragments of the wall's plaster on the floor
Source: Kawinthip Kittiphong (June 26, 2023)

Figure 71 Iron corrosion from metal mesh
Source: Khakhanang Jonganurak (June 12, 2023)

[75] Daniela Pinna, and Ornella Salvadori, "Processes of Biodeterioration: General Mechanisms," in *Plant Biology for Cultural Heritage: Biodeterioration and Conservation*, ed. Maria Pia Nugari Giulia Caneva, and Ornella Salvadori (Los Angeles: The Getty Conservation Institute, 2008). 15-31.

Figure 72 Biological colonisation with a yellowish green appearance
Source: Elias Campidell (June 12, 2023)

Figure 73 Biological colonisation with a black appearance
Source: Elias Campidell (June 12, 2023)

Figure 74 Plants and weeds growing in the lower areas of the wall
Source: Elias Campidell (June 12, 2023)

4.3 Paint layer

The main problem encountered in the paint layer is peeling (figures 75-76), with more loss occurring in the upper part of the wall than in other areas. Peeling paint is frequently caused by moisture rising from the bottom and forming crystallised salts, pushing the paint layer away.[76] The cause might be poor adhesion between the paint layers or other materials, combined with the effects of the environmental impact, such as heat, humidity, pollution, etc. The peeling of paint can also occur due to the different thermal expansion rates of masonry and plaster.[77] Some areas have cracks, which are typically found along the edges and corners of the paint layers. In addition, cracks with a parallelism of about 0.1 - 0.2 mm were observed along the vertical axis of the column in the wall (figure 77). The most obvious cracks can be found in the

[76] Paint & decorating retailers association, *Paint Problem Solver: Probable Causes recommended solutions Interior & Exterior* (2012). http://pdrmag.com/wp-content/uploads/2015/02/Paint-Problem-Solver-022615.pdf.

[77] Anders Nielsen, "A case of peeling," *International RILEM Conference on Materials, Systems and Structures in Civil Engineering 2016: segment on Moisture in Materials and Structures* (2016), https://orbit.dtu.dk/files/128040590/Pages_from_Moisture_conf_proceedings_2.pdf.

upper right area of the work more than in other areas. On the top surface of paint layer, stains can be found in many places. There are black stains from dirt all along the line in the area below, near the floor (figure 78). It is expected to happen when it rains and water splashes from the floor and hits the wall. According to the observations, many footprints remain imprinted in the lower left corner of the artwork (figure 79), which is a popular spot for taking pictures. Some people pose by lifting one foot against the wall (figure 57). Stains of bird and gecko droppings can be found in some areas on the surface (figure 80).

Figure 75 Peeling of paint layer
Source: Khakhanang Jonganurak (June 12, 2023)

Figure 76 Peeling of paint layer on the drilling mark
Source: Khakhanang Jonganurak (January 16, 2023)

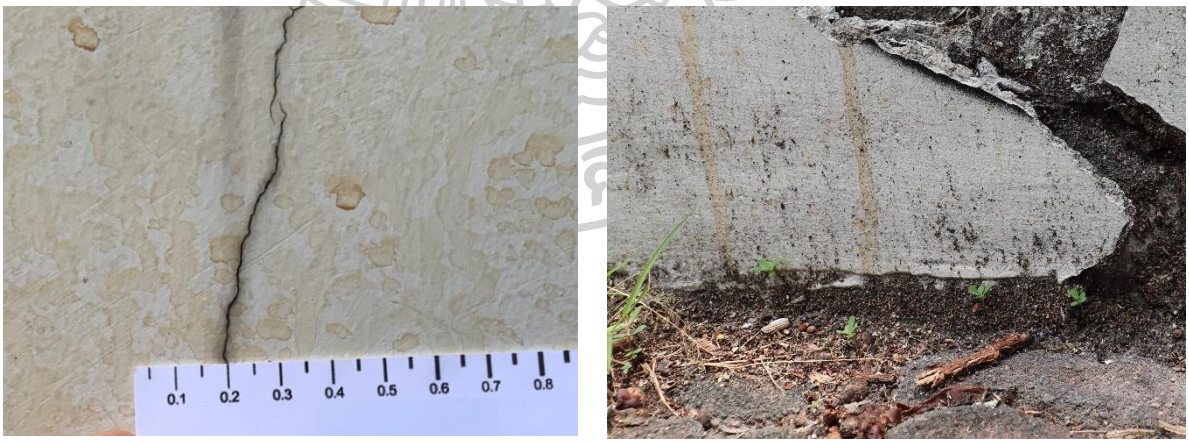

Figure 77 Cracking of the paint layer
Source: Khakhanang Jonganurak (June 12, 2023)

Figure 78 Black stain of dirt and dirt on the lower part of the wall
Source: Khakhanang Jonganurak (June 12, 2023)

Figure 79 Footprints in the lower left corner of the artwork
Source: Khakhanang Jonganurak (June 12, 2023)

Figure 80 Bird dropping
Source: Khakhanang Jonganurak (January 16, 2023)

Chapter 5
Aim of the conservation: To conserve or not to conserve?

Street art is a form of expression that reflects a community's culture, beliefs, and values. It frequently provides a unique perspective and is essential to a city's cultural heritage. As a result, the preservation of street art has become a hot topic in today's world. However, some street art is often created illegally and can be viewed as vandalism. This can make it challenging to maintain and protect. Street art also deteriorates over time due to the environment or other factors.

Looking back at the meaning and purpose of creating street art, it is found that it is made in public spaces where people can easily access and participate because it is like a message wishing to communicate with the city and the population in the area. For example, the famous British street artist Banksy's artwork 'Hula-hooping Girl' was removed from its original location in Nottingham in 2020 and later purchased by a gallery owner. BBC News reports that residents in Nottingham have commented that the artwork should stay where it belongs. According to the Nottingham Project, the Banksy Pest Control team informed them that the removal would contradict the artist's intentions.[78] This leads to a decrease in the value of the original work and fosters disrespect for it.

Street art is not meant to be permanent. Artists prefer to work in public places where people can easily access them. They have already decided to take more significant risks and conservation may jeopardise the artwork's purpose.[79]

In some cities, people pay more attention to street art and see it as part of the city's culture. As a result, various organisations and projects have arisen to promote and protect the artworks in those areas. In Paris, France, many spaces related to street art, such as walls, museums, and urban areas, have been opened for artists to work to their full potential. It also demonstrates the importance of street art culture to the city's people.[80] However, there are numerous examples of preservation and conservation street art. For example, the 2019 cleaning and installation of framing with protection against environmental degradation factors on the work of Banksy at Marble Arch, which the Westminster City Council supported, partnered with the Fine Art Restoration Company.[81] Restoration Mural art abounds in Philadelphia, USA, where street art is part of the predominant culture in the area. It was restored by an artist or conservator working through Mural Arts Philadelphia, the nation's most extensive public art programme.[82] Banksy's artwork on a wall titled 'Seasons Greetings' in Port Talbot, Wales, moved to the gallery in the Ty'r Orsaf building in 2019, where it was treated with a resin coating.[83]

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[78] "Banksy: Hula-hooping girl goes on display in Suffolk museum," BBC, updated May 21, 2021.

[79] "Should street art be preserved? | Kelcie Isabella," accessed September 28, 2014, https://kelcieisabella.wordpress.com/2014/09/28/should-street-art-be-preserved/.

[80] Valērija Želve, "Preservation of Street Art in Paris. An Example for Riga?," *Culture Crossroads* 1, no. 13 (2012).

[81] "Protection and Preservation of Street Art," accessed August 24, 2023, https://fineart-restoration.co.uk/news/protection-and-preservation-of-street-art/.

[82] "Restorations - Mural Arts Philadelphia Mural Arts Philadelphia," Mural Arts Philadelphia, accessed May 23, 2023.

[83] "Port Talbot Banksy to be moved to street art gallery," updated April 25, 2019, https://www.independent.co.uk/arts-entertainment/art/news/port-talbot-banksy-move-street-art-graffiti-gallery-move-tyr-orsaf-a8885476.html.

Photographic documentation is a critical process to keep the idea of artworks alive and make it easier for people to access them more widely. It also does not disturb or modify the original work.[84]

Finally, the preservation and conservation of street art must consider factors such as the history and cultural context of the artwork, its importance and condition, and the community's wishes. All stakeholders, particularly the owner, the artist, and the local community should approve any decision to preserve the artwork. Street art should be considered on a case-by-case basis to determine which conservation method should be used that is suitable for the area without diminishing the message of the original work.[85]

Planning to preserve and conserve the 'Scratching the Surface Project' in 2017 by VHILS at the Embassy of Portugal in Bangkok for requires the decision of all stakeholders. The most important thing is the opinion of the artist and the artwork's owner, the Portuguese Embassy. This work is considered public art significant to the community and represents Thailand's and Portugal's good relations. Therefore, asking for opinions from organisations or community members associated with the artwork may be suitable for it in the future. However, if conservation measures are taken, they must respect the original meaning and technique of the work as much as possible, also, consider the history and purpose of its creation.

In an interview with VHILS on the CBS Sunday Morning channel on YouTube in 2018, he stated that he enjoys that his art evolves to fade or be destroyed over time. Because it brings his work closer to humanity, which is like nature, nothing can last forever.[86] The artist's opinion on the conservation project of his artwork on the Portuguese Embassy wall could not be discovered at the moment. But judging from the previous statement, the artist might be against direct conservation measures. Therefore, VHILS' artwork at the Portuguese Embassy in Bangkok will not face any immediate conservation efforts or repairs. It is critical to keep a photographic record to preserve the history and the idea of the artwork, as well as proof of its existence in the future when it deteriorates over time. But preventive conservation measures such as maintenance, keeping the surrounding area clean, constructing a shelter, and so on are important in this context, they can be justified to prolong the lifetime of the artwork without direct intervention.

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[84] Enrico Bonadio, "DOES PRESERVING STREET ART DESTROY ITS 'AUTHENTICITY'?," *Nuart Journal* 1 (2019), //nuartjournal.com/wp-content/uploads/2019/04/Nuart-Journal_vol1-no2-08_Bonadio.pdf.

[85] Bonadio, "DOES PRESERVING STREET ART DESTROY ITS 'AUTHENTICITY'?."

[86] "Making his mark: Lisbon street artist Vhils," (Video), 2018, https://www.youtube.com/watch?v=P8_nZTVaaNw (CBS Sunday Morning).

Chapter 6
Concept of preventive conservation and maintenance

Regarding the artist's intention for his artwork to gradually deteriorate over time, preservation methods will focus on indirect measures and maintenance treatments to prolong the artwork's lifespan.

Maintaining the authenticity of materials is crucial for preserving the layers and historical significance of objects. Making decisions based on values helps prioritize and address pressing concerns. Evaluating objects provides information about their importance, manufacturing, issues, and environmental conditions. Proper conservation management involves not only indirect measures such as monitoring and maintenance, but also fundamental actions. Regular maintenance is the most effective conservation technique, as neglect can cause significant degradation.[87]

6.1 Cleaning of the surrounding area

Many people use the pavement next to the wall on a regular basis. An accumulation of dirt and impurities from human shoes and rubbish occurs by that. When it rains, the rainwater will disperse the soil and dirt on the ground and cause it to splash onto the wall, leaving black stains. Keeping the sidewalk floor clean is one thing that can help reduce the occurrence of stains on the lower parts of the wall. Cleaning can be done with a broom to sweep away dirt. The broom's long, hard fibres, such as a coconut fibre broomstick, which is commonly used for outdoor cleaning in Thailand, can damage the artwork by accidentally scratching the wall surface. This may be done once or twice a month to control the build-up of dirt. Cleaning with pressure washers should be prevented, as the pressure from the water jet can harm the artwork. Normally in Bangkok there are government street cleaners who take care of each area. Bangkok street cleaners assigned to the embassy area should be advised to take extra precautions when working in areas near the artwork. However, their efforts might not be enough because of the vastness of their workload in the big area. As a result, the embassy may need to assign employees to maintain the surrounding area of the artwork to ensure that the cleanliness standards are upheld.

6.2 Signage for tourists

The installation of a warning sign to remind tourists and passersby to be cautious and to avoid inappropriate behaviour around the artwork should be considered. The message on the signage should contain a precautionary list of actions that may cause damage to the work itself. For example, do not touch the work, do not lean against the wall, etc. It should be designed to harmonise with the wall without detracting from the overall aesthetics of the artwork. It should use an easy-to-read font and proper size. The text should be bilingual to appeal to both foreigners and locals. In this case, there should be both Thai as the local language and English as the international language. According to research by Max Roser, Cameron Appel, and Hannah Ritchie (2013), the average height of people in more than 20 countries in Europe, North America, Australia, and East Asia is 1.78 m for men and 1.65 m for

[87] Sofia Salema, and José Aguiar, "HMC08 Historical Mortars Conference Characterization, Diagnosis, Conservation, Repair and Compatibility Architecture surfaces conservation: (re)discovering sgraffito in Portugal," *Historical Mortars Conference Characterization, Diagnosis, Conservation, Repair and Compatibility* (2022).

women.[88] Therefore, the appropriate height for installing the sign should be in the range of about 1.50 - 1.70 m from the floor (figure 81). Installing the signage at a distance from the artwork to avoid damage during the sign installation process. Additionally, the sign should be close to the problematic footprints caused by tourists posing for photos, and it should be the appropriate size, neither too small nor too large.

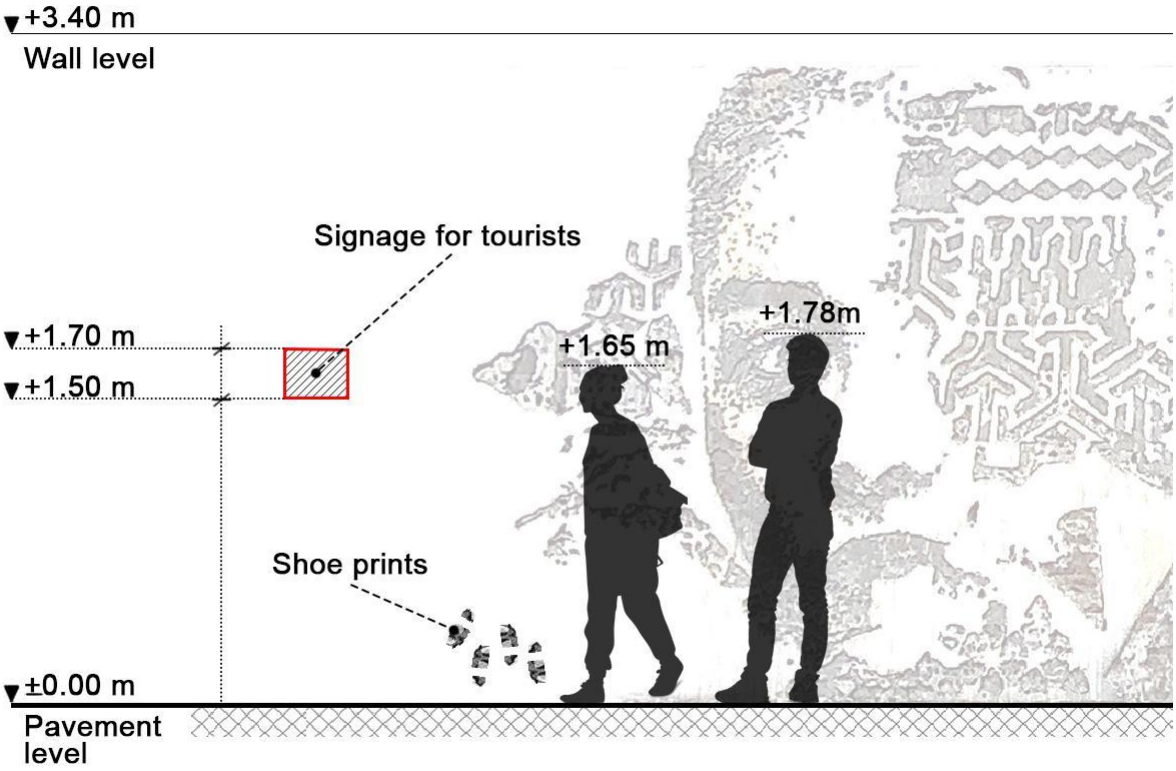

Figure 81 The signage position and dimension diagram
Source: Khakhanang Jonganurak (June 15, 2023)

6.3 Shelter protection

Shelters can serve as an effective way to protect objects against direct sunlight and rain. A comprehensive evaluation of the surrounding environment and an analysis of potential degradation factors are imperative to devise an optimal shelter design.[89] Reducing bio-colonization can be achieved through proper design and construction. The effectiveness of this method is influenced by the shape and material used. For instance, transparent roofs can enhance biological colonisation.[90] So, selecting appropriate materials that offer adequate protection is equally crucial.

[88] "Human Height," Our World in Data, 2023, https://ourworldindata.org/human-height.

[89] Cristina Cabello-Briones, "How to evaluate shelters for archaeological sites: Some recommendations based on the use of exposure trials," *Ge-Conservacion* 1 (July 2017). 34-41.

[90] Ornella and Charola Salvadori, A. Elena, "Methods to Prevent Biocolonization and Recolonization: An Overview of Current Research for Architectural and Archaeological Heritage," in *Biocolonization of Stone:*

Case study: Khao Klang Nai Monument (Inner Treasury Hill), Si Thep, Phetchabun, Thailand

According to the Buddhist religion, 'Khao Klang Nai' is a religious site believed to have been built approximately in the 7th century under the Dvaravati culture.[91] It had been covered in soil for a long time and resembled a hill. In 1978, excavation work began on the site.[92] Khao Klang Nai comprises several architectural elements, but only the basement stucco on the east and south elevations has survived until the present day.

According to the conservation reports of Khao Klang Nai in 1992 and 2003, Si Thep Historical Park found that the environment and climate are the main factors contributing to the deterioration of the decorative stucco on the base of Khao Klang Nai. As a result, a protective shelter was constructed to safeguard the historic stucco from environmental harm. Initially, the grass roof was built to shield the stucco after it was excavated at Khao Klang Nai. Then, the second time, the protection shelter was changed to a galvanised roof sheet with a wooden structure along the line to make it more permanent. At the third time, it was changed to a steel structure with a galvanised roof sheet. Then the structures were renovated to be more assertive with transparent roof sheets (figure 82). The transparent shelter allowed too much sunlight to fall on the stucco, resulting in problems caused by the heat. As a result, the stucco became fragile and susceptible to damage. After that, due to budget constraints, the previously translucent roof was painted over with a solid colour to reduce heat.[93]

Recently, after a self-guided survey in the middle of 2022, the roof has been replaced with new, all-opaque tiles with more extended eaves (figure 83). There is also a filling of seams and roof leaks to prevent rainwater from seeping into the stucco. The shade of the roof attracts birds to live beneath it. Thus, bird droppings can be found in some areas of ancient stucco (figure 84). In addition, on the south side, where the sun shines to the bottom of the base combined with the moisture from the ground, some biological growth problems are still present (figure 85)

Control and Preventive Methods, ed. A. Elena Charola, McNamara, Christopher, and Koestler, Robert J. (Washington, D.C.: Smithsonian Institution Scholarly Press, 2011). 37-50.

[91] Pongdhan Sampaongern, *SI THEP The Centre of Early Civilisation in Pa Sak Valley* (Petchabun: Si Thep Historical Park, 2015). 110-113.

[92] "Khao Klang Nai," 2015, accessed August 7, 2023, https://db.sac.or.th/seaarts/artwork/82?lang=en.

[93] Si Thep Historical Park, "Conservation Report of stucco sculptures at Khao Klang Nai Archaeological Site: Urgent Emergency Restoration Project," (2003).

Figure 82 The transparent shelter for the stucco of the Khao Klang Nai
Source: Si Thep Historical Park / The conservation reports of Khao Klang Nai

Figure 83 The galvanized shelter for the stucco of the Khao Klang Nai
Source: Si Thep Historical Park / The conservation reports of Khao Klang Nai

Figure 84 Bird dropping on the stucco of Khao Klang Nai
Source: Khakhanang Jonganurak (May 27, 2022)

Figure 85 Biological growth on the ground close to the base of Khao Klang Nai
Source: Khakhanang Jonganurak (May 27, 2022)

Regarding the 'Scratching the Surface Project' at the Embassy of Portugal, it would be essential to construct a shelter to shield the artwork from environmental factors like rain and sunlight. This is because of the numerous areas of peeling, loose paint, and plaster layers on the wall, which present a danger of falling off. In this case, using a transparent cover may not be appropriate as it may add heat to the walls.

Because the artwork is next to the public sidewalk area, no construction or alteration of any building or part of a building is allowed to encroach upon the public space without first obtaining permission from the appropriate official responsible for maintaining the area. The Portuguese embassy must first obtain government permission to build a cover protection. When permission has been granted to extend the cover roof, the lowest part of the awning or architectural protrusion must be at least 3.25 m high from the pavement level.[94]

[94] "Ministerial Regulation No. 55 (B.E. 2543)," The Building Inspectors Association, accessed August 15, 2023,

There are two possible ways to build a cover shelter: 1. A permanent shelter 2. An adjustable temporary shelter that can be opened and closed during the day. In terms of structure, the awning cover structure is attached directly to the wall without additional column or foundation structure to support the weight of the shelter. This method will cause the original wall to bear the entire weight of the awning cover structure. Therefore, the original construction plan should be considered first to see if the wall could carry enough weight. Without construction drawings, there is a high risk of performance assessment, which can lead to cracking and collapse due to the excessive weight of the cover extension. In addition, using mechanical tools to drill and install equipment may cause vibration that negatively affects the artwork.

Installing columns and foundations to support the overhanging roof in public areas is not appropriate. Because the sidewalk is only 1 m wide and the width of the road is not very wide (about 6 m), combined with the position of the road at the curvy turn, there are regular buses that drive through this way. Placing structural columns on roads or sidewalks can lead to collision accidents. Another limitation is that the artwork takes up almost the full height of the wall. The protective cover should be positioned higher than the original wall height so that the structure does not interfere with the visual of the artwork.

A possible way to install the cover shelter is to build a cover-bearing structure behind the wall in the embassy's territory for traffic safety and to cut the load on the original wall. The advantages of installing a permanent roof are that it is durable and easy to maintain in the long term. The downside is that the roof itself may become a habitat for animals such as birds, and it may ruin the aesthetics of the view on the wall. Therefore, maintenance is required after construction.

The second type is an adjustable roof installation, in which a cover protection structure should be built behind the wall in the embassy's territory, as mentioned above in the permanent cover construction. The shelter cover can be retractable and only open during heavy rain or intense sunlight. During normal times when it does not rain, the umbrella of the roof can be folded down to preserve the visibility of the street art and not disturb the surrounding scenery. The cover material must be waterproof material that is flexible and opaque for retractability, such as polyacrylic, PVC-canvas, etc. Figures 86-87 is an example of a commercially available movable awning shelter. However, if it is used for work, it should be well-designed and made in the appropriate size for the artwork. Installation must consider safety and the impact on future artwork, such as problems with leakage, suitable eave distance, harmony with the context, and durable materials. In general, there are both manual and automatic systems for movable shelters, but it is recommended to use the automatic type because of the convenience of remote control. This may be done by the security officer stationed in front of the embassy's entrance. One benefit of utilizing a retractable roof is the elimination of shadows during regular hours, which helps to maintain the impact of street art on the audience. However, there are also downsides, such as the need for careful management and more complicated maintenance, which can lead to reduced durability.

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http://www.bsa.or.th/%E0%B8%81%E0%B8%8E%E0%B8%AB%E0%B8%A1%E0%B8%B2%E0%B8%A2/%E0%B8%81%E0%B8%8E%E0%B8%81%E0%B8%A3%E0%B8%B0%E0%B8%97%E0%B8%A3%E0%B8%A7%E0%B8%87-
%E0%B8%89%E0%B8%9A%E0%B8%B1%E0%B8%9A%E0%B8%97%E0%B8%B5%E0%B9%88-55-%E0%B8%9E%E0%B8%A8-2543.html.

However, both types of cover shelter should be designed by architects and engineers to determine the appropriate form and structure. In addition to that, to ensure adequate artwork protection, the shelter must undergo regular integrity check-ups and maintenance post-installation. This ensures that the shelter is always in good condition and ready to use.

Figure 86 Movable awning shelter when it open
Source: Sang Thong Canvas Awning / Thttps://www.facebook.com/st.awning/posts/6293349357424890

Figure 87 Movable awning shelter when it close
Source: Sang Thong Canvas Awning / Thttps://www.facebook.com/st.awning/posts/6293349357424890

6.4 Biological colonisation control

One of the most problematic and widespread types of contaminants in mortars and plasters is biological colonisation. The contributing factor to biological colonisation is the environmental impact, which is difficult to control for outdoor artworks.[95] Weed roots can grow larger and burrow into the walls, they are causing cracking and falling off. So, removing weed sprouts prevents future damage and keeps the artwork area clean. In this case, most of the weeds grow on the bottom part of the wall next to the footpath, which has little impact on the overall image of the artwork and can be manually removed by hand. It is always best to check and remove weeds while they are still small. Plant removal may be done at least once a year towards the end of the year after the rainy season, which lasts from May to October, because the rainy season is usually favourable for biological growth. This can be done by embassy personnel assigned to clean the area around the artwork.

[95] Marta Caroselli, Silvestro A. Rufolo, and Francesca Piqué, "Mortars and plasters—how to manage mortars and plasters conservation," *Archaeological and Anthropological Sciences 13* (October 2021), https://doi.org/https://doi.org/10.1007/s12520-021-01409-x.

Summary

The environment of everyday life is a main factor in the deterioration of street art. 'Scratching the Surface Project' in 2017 by VHILS at the Embassy of Portugal in Bangkok is another example of street art in Thailand that challenges environmental impact. Heat and humidity are the main factors causing deterioration in this tropical climate. After monitoring the temperature and humidity, it was observed that the wall reached its highest temperature around midday. The maximum moisture content varies based on the condition and type of materials. In this study, data was collected for only one day. Additional measurements should be taken in different seasons throughout the year to analyse changes more effectively. Furthermore, the hot and humid climate promotes the cracking caused by the expansion and contraction of materials exposed to heat during the day and night. Moisture causes rust and corrosion in metal elements that are part of wall construction materials. In addition, moisture moving from the bottom also moves out to the top of the wall to release moisture, causing it to peel off the paint layers. The growth of biological colonisation, which leads to deterioration and an unsightly appearance of the wall. This can be seen in the plants that grow mostly at the bottom of the wall and some that grow in the crevices. There is also biological colonization that grows on the surface of the artwork, causing it to appear as a green-black stain. Pollution caused by heavy traffic in Bangkok also has an impact on the accumulation of dirt and dust. Vibration on the road caused by large buses can also be a factor in accelerating surface fall-off. The location of the artwork on a curve and the narrowness of the pavement are also factors that create a risk of accidents hitting the artwork by car, which can lead to serious future harm to the work. Crevices in some areas of the wall have become home to pests such as geckos, ants and spiders. Although this street art helps attract people's attention, it also comes with the adverse effects humans create in everyday life. For example, there are various marks on the surface from leaning on, placing the foot on, or even the loosening of the surface of the artwork caused by touching the wall by people who pass by, etc.

The 'Scratching the Surface Project' in Bangkok had a significant impact on the culture of the Bang Rak district. Examining the technology and materials employed in the artwork has shown the wall's diverse components, featuring both traditional and contemporary materials. The wall has undergone multiple renovations, evident from the thick overlapping layers of plaster and paint. Moreover, it was discovered that some plaster was added by the artist during the creation of the work, as evidenced by the overlay of plaster that has been deposited on the surface's outermost paint layer. There are also traces of the artist's use of paintbrushes, spray paint and brown stains as well. However, scientific analysis of materials remains crucial for future studies, especially for precise identification of their composition.

The unique technique of creating works that reveal the inner materials of the existing wall through scratching and drilling with tools, thus causing damage the wall's inner layers which is mostly porous materials like plaster and masonry. The deterioration of the inner material layer also negatively affects the paint layer, causing subsequent damage such as peeling and cracking.

Today, there is still discussion about the appropriateness and authenticity of preserving or conserving street art. Photographic documentation is essential to protect the concept and style of street art when presented to the public before it is degraded by the environment and time.

The “VHILS” artist intended for his artwork to naturally decay over time. In this case, the primary purpose of the preservation method of the ‘Scratching the Surface Project’ is to extend the life of the artwork without direct intervention. The indirect methods can maintain the artist’s intention without directly interfering with his ideas. Preventive conservation methods, such as a maintenance plan, create a signage for tourists, shelter protection and so on, will help the street art-artwork to last longer. It is essential to understand the deterioration factors from the environment and the nature of the material to elaborate the appropriate preservation methods.

Further research and updates are necessary for preventive conservation approaches in the study of street art. Since street art has a variety of technical and contextual aspects, the method of dealing with this type of artwork should therefore be explicitly studied separately for each case to obtain the most suitable maintenance method for that project. This type of art will continue to evolve along with the changing dynamics of society. However, it may also disappear and reemerge as the community context shifts.

REFERENCES

Aghabayli, Aydan. "Geometric Patterns in Islamic Decoration a Parametric Envision of Portuguese and Azerbaijan Islamic Geometric Motifs." Universidade de Lisboa (Portugal), 2016.

Alrubaie, Mays F., Shakir A. Salih, and Waleed A. Abbas. . "The Effect of Acid Rain on Strength and Corrosion Performance of Slurry Infiltrated Fiber Concrete." *ZANCO Journal of Pure and Applied Sciences* (2019): 150-58. https://doi.org/http://dx.doi.org/10.21271/zjpas.

Amarin Publishing Services (APS), Kevin P. Colleary, and Ana R. Freitas, eds. *The Embassy of Portugal Bangkok the First Diplomatic Mission in Thailand.* Bangkok: Thai Beverage Public Company Limited, 2020.

"Cider - 5 Works for Sale, Profile & Content on the Artling." accessed August 10, 2023, https://theartling.com/en/artist/cider/.

association, Paint & decorating retailers. *Paint Problem Solver: Probable Causes Recommended Solutions Interior & Exterior.* 2012. http://pdrmag.com/wp-content/uploads/2015/02/Paint-Problem-Solver-022615.pdf.

"Bus Lines | Bangkok Mass Transit Authority (Bmta)." องค์การขนส่งมวลชนกรุงเทพ, accessed May 12, 2023, http://www.bmta.co.th/en/bus-lines.

"For: Wall Painting Showcase." accessed April 26, 2023, https://en.bacc.or.th/event/240.html (Bangkok Art & Culture Centre).

"Embassy of Portugal the First Embassy in Bangkok, over 150 Years Old." The Cloud, accessed April 13, 2023, https://readthecloud.co/embassy-4/.

Barrett, Gerard T., Kerry Allen, Paula J. Reimer, Asa Ringbom, and Jesper Olsen. "Ramped Pyrolysis Radiocarbon Dating of Lime Lumps: Establishing the Earliest Mortar-Based Construction Phase of Turku Cathedral, Finland." *Journal of Cultural Heritage*, no. 61 (May 2023): 201-10. https://doi.org/https://doi.org/10.1016/j.culher.2023.04.004.

"Vhils Biography & Artwork | Artists." Street Art Bio, accessed April 16, 2023, https://www.streetartbio.com/artists/vhils/.

Bonadio, Enrico. "Does Preserving Street Art Destroy Its 'Authenticity'?". *Nuart Journal* 1 (2019). //nuartjournal.com/wp-content/uploads/2019/04/Nuart-Journal_vol1-no2-08_Bonadio.pdf.

"How Much Air Pollution Comes from Cars?" HowStuffWorks.com, Updated July 7, 2021, https://auto.howstuffworks.com/air-pollution-from-cars.htm.

Cabello-Briones, Cristina. "How to Evaluate Shelters for Archaeological Sites: Some Recommendations Based on the Use of Exposure Trials." *Ge-Conservacion* 1 (July 2017): 34-41.

Caroselli, Marta, Silvestro A. Rufolo, and Francesca Piqué. "Mortars and Plasters—How to Manage Mortars and Plasters Conservation." *Archaeological and Anthropological Sciences 13* (October 2021): 188. https://doi.org/https://doi.org/10.1007/s12520-021-01409-x.

"Our Bangkok." accessed May 12, 2023, https://apps.bangkok.go.th/info/m.info/nowbma/.

"Ministerial Regulation No. 55 (B.E. 2543)." The Building Inspectors Association, accessed August 15, 2023, http://www.bsa.or.th/%E0%B8%81%E0%B8%8E%E0%B8%AB%E0%B8%A1

%E0%B8%B2%E0%B8%A2/%E0%B8%81%E0%B8%8E%E0%B8%81%E0%B8%A3%E0%B8%B0%E0%B8%97%E0%B8%A3%E0%B8%A7%E0%B8%87-%E0%B8%89%E0%B8%9A%E0%B8%B1%E0%B8%9A%E0%B8%97%E0%B8%B5%E0%B9%88-55-%E0%B8%9E%E0%B8%A8-2543.html.

Chommeloux, Christophe. "Vhils Scratching the Surface." *Magazine Latitudes*, April-May, 2017.

"Protection and Preservation of Street Art." accessed August 24, 2023, https://fineart-restoration.co.uk/news/protection-and-preservation-of-street-art/.

"Bangkok Climate." Climatological center, Updated January, 2023, chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://climate.tmd.go.th/data/province/%E0%B8%81%E0%B8%A5%E0%B8%B2%E0%B8%87/%E0%B8%A0%E0%B8%B9%E0%B8%A1%E0%B8%B4%E0%B8%AD%E0%B8%B2%E0%B8%81%E0%B8%B2%E0%B8%A8%E0%B8%81%E0%B8%A3%E0%B8%B8%E0%B8%87%E0%B9%80%E.

"Portuguese Street Artist Vhils| Euromaxx - Street Artists." accessed April 16, 2023, https://www.youtube.com/watch?v=uG31ZwpK_1Yhttps://www.youtube.com/watch?v=-aFlSgjhpLk.

"สตรีตอาร์ต ชุบชีวิตมรดกเมืองและสถาปัตยกรรม." งานสถาปนิก, Updated January 23, 2020, https://www.asaexpo.org/post/street-art.

"Habotest. User's Manual Infrared Thermometers.".

"What Is Street Art? History & Famous Artists." Artland Magazine, accessed April 17, 2023, https://magazine.artland.com/street-art/.

"How Street Artist Vhils Creates a Mural." The Atlantic, accessed April 16, 2023, https://www.theatlantic.com/entertainment/archive/2011/12/how-street-artist-vhils-creates-a-mural/250612/.

Hunaidi, Osama. "Traffic Vibrations in Buildings." *Construction Technology Update*, no. 39 (June 2000): 1-6. https://doi.org/https://doi.org/10.4224/40002904.

"Preserved Moss Walls Vs. Living Walls - 2021 Guide." Naturalist Interiors, 2021, https://naturalist.us/preserved-moss-walls-vs-living-walls/.

"Monster Asian Heatwave." Bangkokbiznews, accessed May 8, 2023, https://www.bangkokbiznews.com/lifestyle/1067096.

"P7 Street Art, Artwork and Color Lines." Kiji.life, accessed August 10, 2023, https://kiji.life/p7/.

Kumar, Subodh. "Acid Rain-the Major Cause of Pollution: Its Causes, Effects." *International Journal of Applied Chemistry* no. 13 (2017): 53-58.

"Banksy: Hula-Hooping Girl Goes on Display in Suffolk Museum." BBC, Updated May 21, 2021.

"Khao Klang Nai." 2015, accessed August 7, 2023, https://db.sac.or.th/seaarts/artwork/82?lang=en.

"M. Madureira, Personal Communication, May 11, 2023.".

"Making His Mark: Lisbon Street Artist Vhils." 2018, https://www.youtube.com/watch?v=P8_nZTVaaNw (CBS Sunday Morning).

"Manuscript Publishing Library. "Bangkok Old Map 1887 No.7." Open Educational Resources. Accessed April 17, 2023. Https://Oer.Learn.In.Th/Search_Detail/Result/116089#/Chicago.".

"Having a Blast With... Vhils | Feed." Feed Magazine, accessed August 24, 2023,

https://magazine.artland.com/street-art/.
"Should Street Art Be Preserved? | Kelcie Isabella." accessed September 28, 2014, https://kelcieisabella.wordpress.com/2014/09/28/should-street-art-be-preserved/.
"Incorrect Relative Humidity." Canada.ca, accessed February 5, 2021, https://www.canada.ca/en/conservation-institute/services/agents-deterioration/humidity.html.
"Vhils » About." vhils, accessed April 16, 2023, https://vhils.com/about/.
Nichols, Mark, and Ford Research and Advanced Engineering. "Principles of Accelerated Weathering: Evaluations of Coatings." *Coatingstech* (January 2020): 18-25. https://docs.paint.org/Ct-Analytical-Series/Analytical-Series_Jan2020.pdf.
Nielsen, Anders. "A Case of Peeling." *International RILEM Conference on Materials, Systems and Structures in Civil Engineering 2016: segment on Moisture in Materials and Structures* (2016): 223-29. https://orbit.dtu.dk/files/128040590/Pages_from_Moisture_conf_proceedings_2.pdf.
"Port Talbot Banksy to Be Moved to Street Art Gallery." Updated April 25, 2019, https://www.independent.co.uk/arts-entertainment/art/news/port-talbot-banksy-move-street-art-graffiti-gallery-move-tyr-orsaf-a8885476.html.
Park, Si Thep Historical. "Conservation Report of Stucco Sculptures at Khao Klang Nai Archaeological Site: Urgent Emergency Restoration Project." (2003).
"Street Art: Vhils." accessed April 16, 2023, https://www.bangkokriver.com/place/street-art-vhils/ (Bangkok River).
Patinyasak, Sravut. "Strength Development of Hollow Non-Bearing Concrete Masonry Units Using Fly Ash as an Additive." Suranaree University of Technology, 2017.
Pinna, Daniela, and Ornella Salvadori. "Processes of Biodeterioration: General Mechanisms." In *Plant Biology for Cultural Heritage: Biodeterioration and Conservation*, edited by Maria Pia Nugari Giulia Caneva, and Ornella Salvadori, 15-31. Los Angeles: The Getty Conservation Institute, 2008.
"Vhils, O "Arqueólogo Urbano" Da Destruição Criativa." accessed April 16, 2023, https://www.youtube.com/watch?v=-aFlSgjhpLk.
"Brick Cracks [Types and Course]." Structural Guide, accessed May 15, 2023, https://www.structuralguide.com/brick-cracks/.
"Street Art: Definition & History - Video & Lesson Transcript." Study.com, accessed April 17, 2023, https://study.com/academy/lesson/street-art-definition-history.html.
Punson, Benjamin. "A Land Use Approach to Promote Charoenkrung District as the Creative Industry Hub for Bangkok Comprehensive Plan." Thammasat University, 2019.
"R & D Instruments. "Moisture Meter User Guide."."
"Scratching the Surface." 2017, accessed May 10, 2023, https://www.bangkokriver.com/event/scratching-the-surface/.
"Human Height." Our World in Data, 2023, https://ourworldindata.org/human-height.
"Royal Thai Survey Department and International Cooperation Administration, U.S.A. N.D. "Bangkok Map 1958." Accessed April 17, 2023. Https://Nla.Gov.Au/Nla.Obj-2936850305/View.".
"Royal Thai Survey Department, Thailand Research Fund, and Faculty of Architecture,

Chulalongkorn University, “Bangkok Map 1932,” Accessed April 17, 2023, Https://Nla.Gov.Au/Nla.Obj-2918525520/View.".

Salema, Sofia, and José Aguiar. "Hmc08 Historical Mortars Conference Characterization, Diagnosis, Conservation, Repair and Compatibility Architecture Surfaces Conservation: (Re)Discovering Sgraffito in Portugal." *Historical Mortars Conference Characterization, Diagnosis, Conservation, Repair and Compatibility* (2022).

Salvadori, Ornella and Charola, A. Elena. "Methods to Prevent Biocolonization and Recolonization: An Overview of Current Research for Architectural and Archaeological Heritage." In *Biocolonization of Stone: Control and Preventive Methods*, edited by A. Elena Charola, McNamara, Christopher, and Koestler, Robert J., 37-50. Washington, D.C.: Smithsonian Institution Scholarly Press, 2011.

Sampaongern, Pongdhan. *Si Thep the Centre of Early Civilisation in Pa Sak Valley.* Petchabun: Si Thep Historical Park, 2015.

Santabarbara, Carlota. "Street Art Conservation: Beyond Surfaces’ Restoration." *OPUS Journal of History Architecture Conservation Drawing* 2 (2018): 147-62.

Sethaputra, Chatchawan. "Bricks and Construction." In *Cement and Applications*, 73-83: Siam Cement Industry co., ltd, 2005.

———. "Plastering Techniques." In *Cement and Applications*, 97-114: Siam Cement Industry co., ltd, 2005.

"A ‘Once-in-200 Years’ Heat Wave Caught Southeast Asia Off Guard. Climate Change Will Make Them More Common." CNN, Updated modified June, 2023, https://edition.cnn.com/2023/06/06/asia/southeast-asia-heat-wave-humidity-climate-intl-hnk-dst-scn-dg/index.html.

"Why Does Sunlight Fade Colors? What You Need to Know." Temperature Master, Updated March 24, 2023, https://temperaturemaster.com/why-does-sunlight-fade-colors/.

"Agent of Deterioration: Pests." Canada.ca, Updated March 7, 2022, https://www.canada.ca/en/conservation-institute/services/agents-deterioration/pests.html#pest-parasites2a.

"Bangkok Sewer." Urban Creature, Updated October 1, 2018, https://urbancreature.co/bangkok-sewer-rainy/.

Teerasuphaset, Thanutra, and Jason Culp. *Stay Safe in the Pm 2.5.* Chulalongkorn University, 2020.

Tengya, Manrit. "Development of Street Art Form in Thailand." Master, Silpakorn University, 2015.

Tenya, Manrit. "From Graffiti Culture to Street Art in Thailand." *Veridian E-Journal, Silpakorn University* 2, no. 9 (2016): 2424-36.

"Pollutants." Canada.ca, Updated February 17, 2021, https://www.canada.ca/en/conservation-institute/services/agents-deterioration/pollutants.html#pollu2.

"ท่วมบางรัก." ไทยรัฐออนไลน์, Updated November 7, 2021, https://www.thairath.co.th/news/local/bangkok/2237070.

Türe, Ahmet, and Elif Türe. "The Relationship between Street Art and Contemporary Culture." *International Conference on Studies in Education and Social Sciences 1* (November 2021): 50-62.

Vhils), Alexandre Farto (aka. "Interview with Alexandre Farto (Aka Vhils)." By Emília Ferreira. 2012. https://www.academia.edu/30751374/Interview_with_Alexandre_Farto_aka_Vhils_.

Wade, David. *Pattern in Islamic Art* Woodstock, N. Y.: The Overlook Press, 1976.

Watsantachad, Nuanlak. "Salts in Brick Walls." *JOURNAL OF THE FACULTY OF ARCHITECTURE SILPAKORN UNIVERSITY* (2006-2007): 237-54.

"Restorations - Mural Arts Philadelphia Mural Arts Philadelphia." Mural Arts Philadelphia, accessed May 23, 2023.

Weyer, Angela, Pilar Roig Picazo, Daniel Pop, JoAnn Cassar, Aysun Özköse, Jean-Marc Vallet, and Ivan Srša. *Ewaglos-European Illustrated Glossary of Conservation Terms for Wall Paintings and Architectural Surfaces.* Vol. 17: Michael Imhof Verlag, 2015.

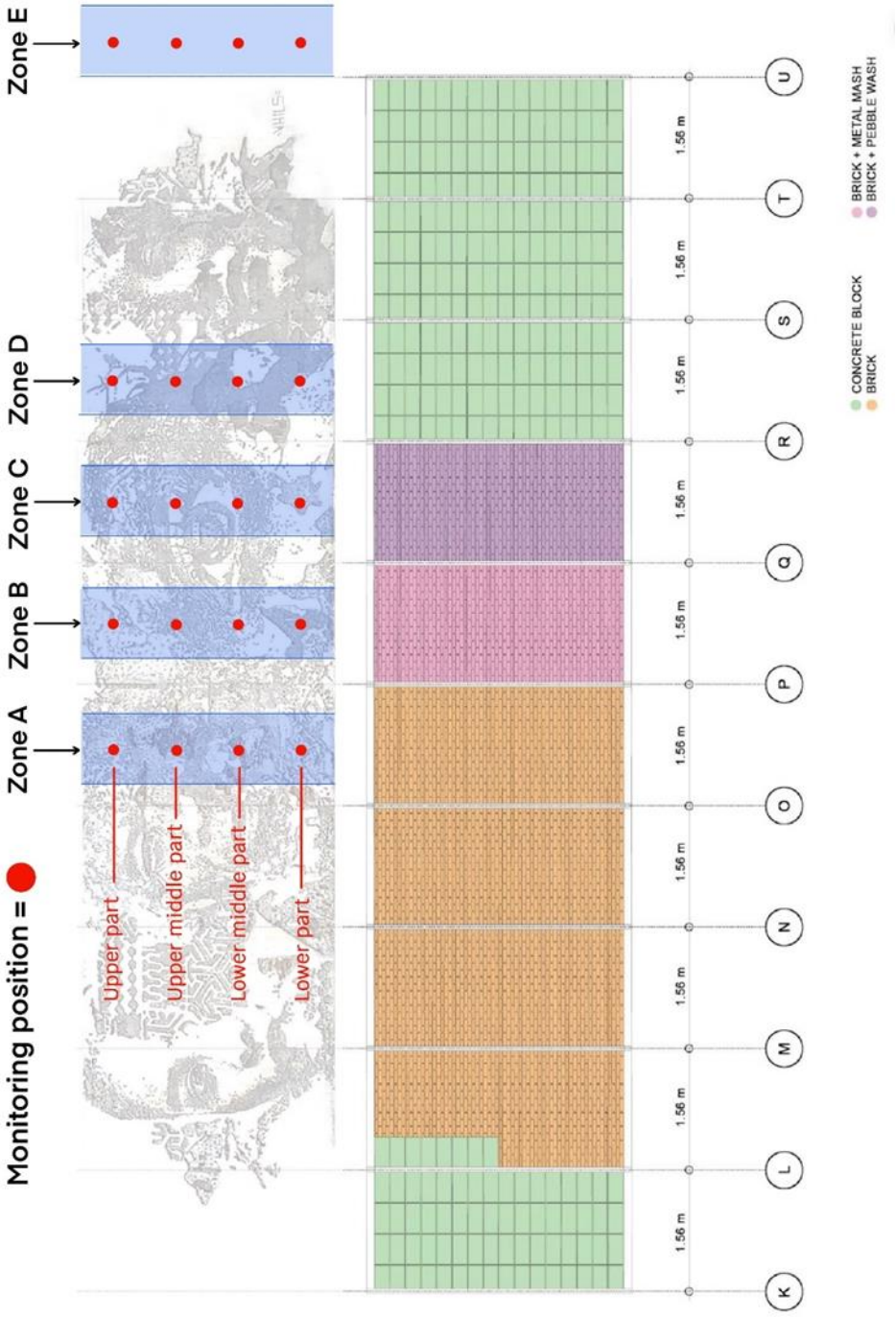
Yee, J, Y Akama, K Teerapong, and V Petrella. *Creative and Cultural Districts in Thailand* British Council Thailand, 2020. https://www.britishcouncil.or.th/sites/default/files/bc_creative_cultural_districts_in_thailand_online.pdf.

Želve, Valērija. "Preservation of Street Art in Paris. An Example for Riga?". *Culture Crossroads* 1, no. 13 (2012): 65-72.

"ออ – ร – ญา. “บุกรุก สตรีทอาร์ต เทศกาลศิลปะข้างถนน ครั้งที่ 2 - บ้านและสวน.” Baanlaesuan. Accessed April 12, 2023. Https://Www.Baanlaesuan.Com/25274/Design/Lifestyle/Bukruk-Street-Art."

Appendix

Appendix I - Scientific investigations: Temperature and humidity monitoring of the wall.



Date 21.06.2023

Zone A

				Temperature (°C)				Humidity (%)			
Time	Outside condition	RT (°C)	RH (%)	Upper part	Upper middle part	Lower middle part	Lower part	Upper part (Plaster)	Upper middle part (Brick)	Lower middle part (Inner Paint)	Lower part (outer paint)
06:15	Clear sky, Light wind, Full shading	32.4	68	27.1	27	27.2	27.7	40	24	37.1	51
08:15	Clear sky, Light wind, Little shading	30	73	31.7	31.8	32.3	32.7	32	19	42	52
10:05	Light wind, Direct sunlight	32	70	40.9	40.9	42.5	42.3	38.1	22.2	48.1	56.9
12:15	Cloudy, Direct sunlight	32	66.5	44.4	46.4	46.3	46.3	41	18.6	35	56
14:00	Sprinkling, Dull cloud, Windy	33.5	62	39.5	39.4	38.8	38.5	39	23.2	46	62
16:13	After rain, Dull cloud, Sprinkling, Windy	30	73	39	38.4	38.2	38.8	37.9	32.8	40	62.6
18:00	Dull cloud, Windy	28	88.5	31.6	36.5	39.1	39.7	31	29.1	39.1	58

Zone B

				Temperature (°C)				Humidity (%)			
Time	Outside condition	RT (°C)	RH (%)	Upper part	Upper middle part	Lower middle part	Lower part	Upper part (Inner paint)	Upper middle part (Plaster)	Lower middle part (Outter	Lower part (Plaster with metal
06:20	Clear sky, Light wind, Full shading	32.4	69	27.9	27.9	27.9	27.9	47	27	40	36.9
08:20	Clear sky, Light wind, Little shading	31	72	32.7	33.4	33.2	32.8	48	30.3	43	45
10:10	Light wind, Direct sunlight	34	62	43.1	46.5	44.5	42.9	52.1	43.3	46	52
12:20	Cloudy, Direct sunlight	36	57.5	44.4	46.8	45.3	44.2	51	27	33	27
14:05	Sprinkling, Dull cloud, Windy	34.5	61.5	37.4	38.4	37.3	36.8	53	34	35	50.1
16:20	After rain, Dull cloud, Sprinkling, Windy	31	74	38.2	38.2	36.9	37.7	54	32	34	55
18:05	Dull cloud, Windy	29	88	38.9	39.2	38.1	37.9	53.4	29	38.1	41

Zone C

				Temperature (°C)				Humidity (%)			
Time	Outside condition	RT (°C)	RH (%)	Upper part	Upper middle part	Lower middle part	Lower part	Upper part (Outer paint)	Upper middle part (Plaster)	Lower middle part (Plaster)	Lower part (Plaster after
06:25	Clear sky, Light wind, Full shading	32.5	69	28.1	28.2	28.7	28.9	40	24.1	22	22
08:25	Clear sky, Light wind, Little shading	32	70	32.8	33.1	32.9	32.8	45	23	20	23.9
10:15	Light wind, Direct sunlight	37	54	40.2	42.3	42.3	40	58.5	25.2	19	28
12:25	Cloudy, Direct sunlight	38.5	52	43.1	44.8	44.9	45.3	44	22.8	15	24.1
14:10	Sprinkling, Dull cloud, Windy	35	60	36.9	37.8	37.6	36.9	58.9	24.2	20	27
16:25	After rain, Dull cloud, Sprinkling, Windy	31.7	71	37	36.4	36.1	36.2	58	31	23.1	27
18:10	Dull cloud, Windy	30.5	82.5	38	37.5	36.8	36.7	47	25.1	21	32

Zone D

				Temperature (°C)				Humidity (%)			
Time	Outside condition	RT (°C)	RH (%)	Upper part	Upper middle part	Lower middle part	Lower part	Upper part (Plaster)	Upper middle part (Plaster)	Lower middle part (plaster)	Lower part (Outer paint)
06:30	Clear sky, Light wind, Full shading	32.8	68	28.2	28	27.7	27.2	18	38.1	15.4	46
08:30	Clear sky, Light wind, Little shading	32.5	68	32.1	32	32	30.7	19.2	37	26.4	49
10:20	Light wind, Direct sunlight	38.5	50	40.1	40.7	42	38.2	21	40	21	57.2
12:30	Cloudy, Direct sunlight	40.5	48	43.5	44.5	45	43.5	18	34	18	54
14:15	Sprinkling, Dull cloud, Windy	35.5	57.5	36.8	36.8	36.7	35.4	26.4	41.8	23.2	60
16:30	After rain, Dull cloud, Sprinkling, Windy	32.1	70	35.6	34.9	33.8	33.8	25	40.8	24.1	66.1
18:15	Dull cloud, Windy	31	78.5	36	35.5	34.2	33.5	19	42	17.1	58

Zone E

				Temperature (°C)				Humidity (%)			
Time	Outside condition	RT (°C)	RH (%)	Upper part	Upper middle part	Lower middle part	Lower part	Upper part (Outer paint)	Upper middle part (Outer	Lower middle part (Outer	Lower part (Outer paint)
06:35	Clear sky, Light wind, Full shading	32.7	68	27.6	27.5	27.7	27.6	53.2	51	49	48.1
08:35	Clear sky, Light wind, Little shading	33	64	32.5	30.8	30.7	30.5	51	51	48	52
10:25	Light wind, Direct sunlight	38.8	49	32.6	32.8	32.1	32.1	61.9	59.4	56	59.4
12:35	Cloudy, Direct sunlight	41.2	44	36.7	36.6	35.6	34.5	50.6	52	50.6	54
14:20	Sprinkling, Dull cloud, Windy	36	56.5	32.9	32.4	32.4	31.9	63	61.9	57.5	59.9
16:35	After rain, Dull cloud, Sprinkling, Windy	32.3	69	32.4	31.8	31.8	31.7	64	63.1	57.9	62.4
18:20	Dull cloud, Windy	31.5	76	33.3	32.6	32.1	30.9	57.5	54.1	50	55.2

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