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DOSSIER

ITERATIONS AND TRANSLATIONS. THE ROLE OF PAINTING AS A DISCURSIVE TOOL FOR COLLABORATIVE COLOUR DESIGN PRACTICE IN ARCHITECTURE

ITERACIONES Y TRADUCCIONES. EL PAPEL DE LA PINTURA COMO HERRAMIENTA DISCURSIVA PARA LA PRÁCTICA COLABORATIVA DEL DISEÑO DE COLOR EN ARQUITECTURA

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PALABRAS CLAVE
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ABSTRACT

Colour design for architecture is an iterative process of research, experimentation, testing and adjustment. At every stage individual judgement plays its part in refining and resolving a design, while different opinions will need to be navigated through discussion. The paper will outline the methods, techniques and procedures involved in the evolution of a colour design for the renovation of two brutalist housing blocks from the 1960s in Edinburgh, Scotland. The research methodology for the project is rooted in the experiential, analogue methods developed by Haus der Farbe in Zurich, Switzerland. In this case however, abstract paintings and collage are used in parallel with digital tools to facilitate the development of a colour design within the conventions of contemporary architectural practice. The focus was to develop a colour strategy that would guide the decisions through subsequent iterations and translations that are an inevitable part of the design process.

RESUMEN

El diseño de color en arquitectura es un proceso de investigación iterativo, que incluye experimentación, testeo y ajuste. En cada etapa, la decisión personal juega un papel importante en el refinamiento y la resolución de un diseño, mientras que las diferentes opiniones deberán ser abordadas mediante debates. Este artículo describe los métodos, técnicas y procedimientos utilizados en la evolución del diseño de color para la renovación de dos bloques de viviendas brutalistas de la década del sesenta en Edimburgo, Escocia. La metodología de investigación para el proyecto se basa en los métodos experienciales y analógicos desarrollados por "Haus der Farbe" en Zúrich, Suiza. En este caso, sin embargo, se utilizan pinturas abstractas y collages junto con herramientas digitales para facilitar el desarrollo de un diseño de color dentro de las convenciones de la práctica arquitectónica contemporánea. El objetivo era desarrollar una estrategia de color que guiara las decisiones a través de iteraciones y traducciones posteriores que son una parte inevitable del proceso de diseño.

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Introduction

To develop a successful colour design for architecture takes time and multiple successive iterations, testing, adjusting and reviewing in the site context. Commonly in architectural practice colour decisions are made late in the design process, based on a limited choice of colour within a defined material or product range. The choice of material usually comes first, as a constellation of budget, performance, durability, construction and may be contingent on the procurement process. Uncertainty is therefore inherent in the process of choosing the colour palette, but also in the way in which we experience colour in environmental contexts as a contingent metaphysical phenomenon. With so many changeable factors during a project, it might be understandable that there is an unwillingness to invest time in developing a specific palette that will inevitably be modified. Moreover, architects, for the most part, are not educated in colour design and so there may be an opportunity for collaboration, either with an artist or a trained colour design professional. Where collaborators come from different disciplines they will bring different forms of knowledge, opinions and practices, so the discussion, development and communication of a colour design is itself an evolutionary process.

The aim of the paper is to demonstrate how collaborative practice has informed the development of a colour design strategy for the renovation of two brutalist housing blocks from the 1960s, in Edinburgh, Scotland. It will discuss the iterative methods and processes through which colour choices are made, modified and translated during the design development and will explore the role of painting to stimulate dialogue as part of the research methodology.

Colour in place-making

Consideration of the site context –physical, spatial, historical and social– is conventionally the starting point for architectural design alongside the specific brief. Colour, particularly on the exterior of buildings, is experienced by moving observers in their peripheral vision, whether it comes from building materials, such as stone, brick, concrete or timber, or through an applied finish such as a pigmented render, ceramic tiles or other contemporary cladding. As noted by Joseph A. Amato "surfaces define our location, condition, situation and position" [...] "surfaces compose the texture and horizon of extraordinary ordinary days and lives" (Amato, 2013, p. 18 & p. 224). The colour palette plays its part alongside urban forms in defining memorable places and landmarks, and may be bound to the material palette by legislation, particularly in historic environments.

The Haus der Farbe is an educational and research institute based in Zurich, Switzerland. They research and publish a series of regional guides documenting the character of selected areas through colour (Haus der Farbe, n.d.). While their observational method of gathering colour based on site observation is an established technique that echoes the work of Jean-Philippe Lenclos and Dominique Lenclos (Lenclos, 2009), the hand-mixed and hand-painted palettes that emerge from this process require skill and experienced researchers. There are deliberately no codes used and no colour system embedded. Their resistance to codification is a response to their experience of how excessive control could lead to an ossified, sterile colour environment. Clearly colour

considered in this way is fundamentally imprecise, dependent on the quality of reproduction of the painted palettes in printed form, the mixing of the paint, the texture and properties of the material surfaces to be coloured and altered by specific factors such as orientation, light conditions and weather in the site context. This acceptance of imprecision seems appropriate to the real-world of architectural practice that must negotiate between multiple complex requirements and processes.

The way these guides are then used in practice by planning authorities, architects and tradespeople is also unusual. Stefanie Wettstein and Marcella Wenger-Di Gabriele, Co-Directors of the Institute, emphasize that the guides should be the starting point for a discussion of colour rather than being prescriptive. The intention is that the regional palettes will evolve, and allow for more informed discussion and reasoning, aiming for a shared understanding of regional character. While there is a clear argument to maintain a defined colour culture in historic settings, colour can also be used "as a means for re-imagining and reinterpreting the city, [...] as a heuristic device for challenging conventional perception" (Shapins, 2011, p. 148). The character of a place will include tangible and intangible factors including the colour of materials and how they vary in changing light and weather conditions, all of which contribute to the atmosphere of a place. João Pernão offers a summary of key literature supporting a phenomenological approach to the documentation of colour in environmental contexts that takes account of such variables (Pernão, 2017). In the case of the retrofit project that is discussed in this paper, part of the argument for introducing colour on the exterior is not only as a physical manifestation of investment, but also to prompt a shift in the perception and the social memory of the place as part of an evolving identity of the area.

Methodology

The research methodology for the project is rooted in the experiential, analogue methods developed by the Haus der Farbe, however in this case also using abstract paintings and collage in parallel with conventional digital design tools used in architectural practice.

The book *Colour Strategies in Architecture* (McLachlan et al., 2015), jointly authored with Haus der Farbe, adopted a deliberately analogue method to capture the colour palettes used in the work of six architectural practices in Berlin, Zurich and Edinburgh from 1920 to the present, cataloguing around 350 colours from matched swatches observed on site by well-trained eyes then hand-mixed using acrylic paint. Only after all the observed colours were documented, could the analysis of the strategic role of the colour begin through an intersubjective and expansive discursive process, facilitated by the physical, painted samples. The book concluded that an experiential methodology, with more than one observer, is more appropriate and useful to the documentation of architectural colour than a precise scientific measurement.

The paper draws on previous publications by the author, extending this academic research to consider how a qualitative, research-led methodology might be applied and modified in support of the colour design on a live architectural project.

The principal methods can be summarised as:

- ***Contextual research.*** Site observation and documentation of existing environmental colour, a study of relevant precedents and fieldwork. Working in parallel with the architects' project briefing and concept design to establish constraints, design principles, parameters and priorities.
- ***Abstract painting and collage.*** Explorative paintings and hand painted, laser cut collages used in support of the production of initial colour strategy concepts and colour palette.
- ***Design proposals.*** Iterative design studies and discussion, digital design drawings, physical modelling and visualisations to test and develop the design. Consultation with heritage bodies and local authority to validate and review the approach.
- ***Co-design and participatory methods involving residents.*** Collaborative interaction between the author and architects from the earliest stage, working independently, and in parallel with the architects. Joint colour design workshops with the design team to review and develop design decisions and in relation to material specification and site constraints. Workshop with architecture students to test the interactive collage. Participatory resident consultation events, including a colour and painting workshop.

The opportunity to explore the role of painting to stimulate dialogue as part of the research methodology has been central to the project. This is discussed in "Visual Heuristics for Colour Design" (McLachlan, 2021), which references different painting typologies, some originating from the work with Haus der Farbe, and places these in a wider discussion of the use of visual images in humanities research. A key observation relates to the way in which painting supports abstraction, enables a looseness to composition and a way of reading an image that understands that images can never be "innocent" –rather that the viewer will experience a painting through "socially constructed codes of recognition" (Rose, 2001, p. 32). The audience anticipates being moved by artwork and may be more receptive to a discussion of meaning as well as composition in an architectural setting. As the poet Gunnar Ekelöf has observed, "in the practise of any art, it is good to leave some space at the table for the reader, the listener, the viewer –and for that space to be made their own" (McKeever & Tucker, 2005, p. XVI). Thus abstraction in painting can maintain a sense of disjunction between the image and a perceived reality. The different knowledges of colour between architects and artists can prove fruitful for collaborative practice in colour design. Artists, particularly painters, develop an understanding of colour by close observation of the interaction of colours through their practice with the physical immediacy of paint being sensed as pure colour (McLachlan, 2022). Architects, by contrast, will generally specify colour from secondary printed swatches and commonly use digital visualisations to try to predict the result. In this case, abstract paintings and collage are used in parallel with digital tools to facilitate the development of a colour design within the conventions of contemporary architectural practice.

Figures 1 & 2
Cables Wynd House in its urban context.
Source: photos ©Woolver.

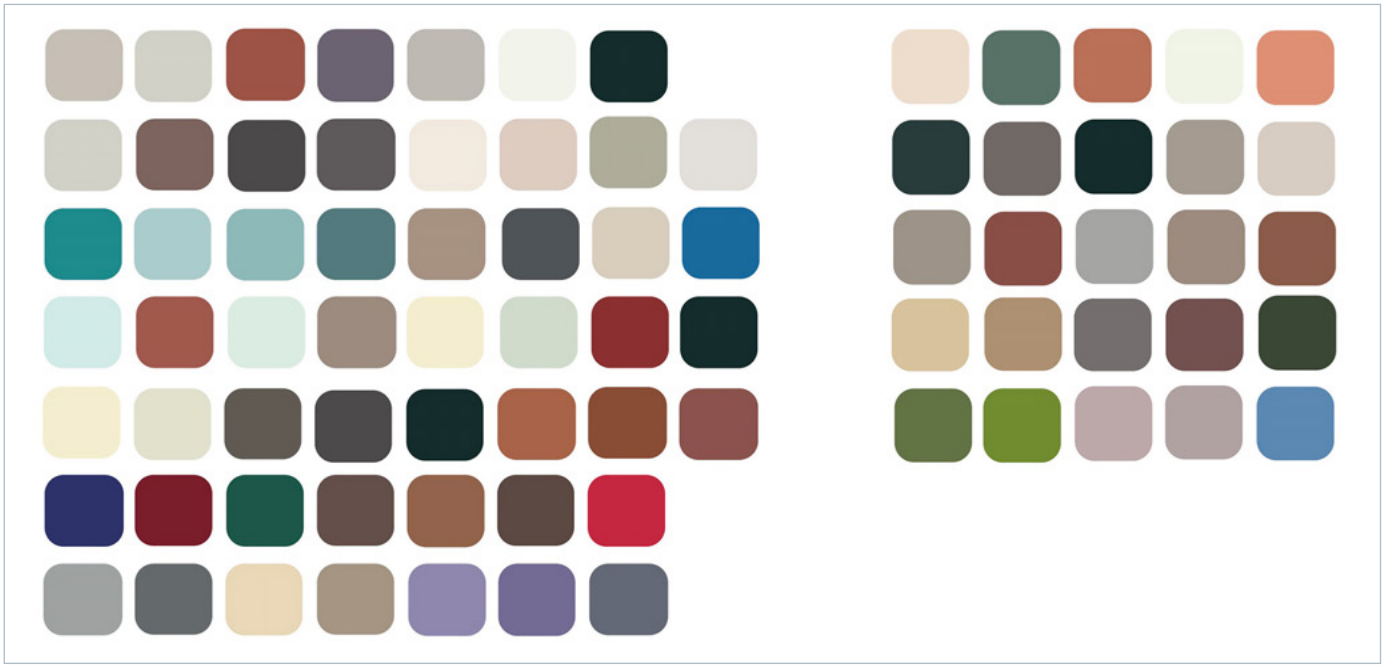


Figure 3

Observed colours on existing flats and surrounding context.

Source: prepared by the author.

Colour Design Process

The project

Collective Architecture, an architectural practice with offices in Glasgow and Edinburgh, first started to explore the potential for integrating colour into the proposals for a major energy retrofit of two housing projects in Leith, Edinburgh in 2023. These form the focus of this study. The buildings, designed by architects Alison and Hutchinson and Partners, were completed between 1963 and 1967. "Cables Wynd House" (Figures 1 & 2), has 212 flats with a total 424 bed spaces and is well known for its iconic curving form and nickname of the "banana flats". The higher block, "Linksview House", has 98 flats and 360 bed spaces and terminates the Kirkgate at the foot of a main urban artery to the old port area of the city (Figures 4 & 5). The buildings are considered as among the best examples of brutalist architecture in Scotland that has few buildings of their kind and quality remaining. In 2017 they were awarded "Category A" heritage protection status, which is the highest level of listing and means that they have been saved from demolition (Historic Environment Scotland, 2017). It also places safeguards on the way in which they can be modified –including any applied colour– all of which is subject to detailed "Listed Building Consent" (City of Edinburgh Council, 2022). The buildings are currently fully occupied, the majority being under the ownership of the City of Edinburgh Council who rent the flats as a social landlord and are responsible for care and maintenance. Over a two-year period, 2023-2025, the architects undertook detailed site survey work including the careful documentation of the condition of the precast concrete panels, some of which are in a poor state, and led a series of consultations with residents and conservation bodies. In parallel with the architects, the author observed and documented the colour palette of the surrounding site context and on the buildings themselves (Figure 3) and developed a colour design strategy and initial palette. The projects were submitted for detailed Planning and Listed Building Consent in July 2025 (Collective Architecture, n.d.). If approved, the projects will be renovated over the next few years.

Scottish Government's aim to reach zero carbon by 2045 has also now prompted a re-think on the significance of embodied energy, particularly in these system-built concrete structures (Scottish Government, 2023). If the buildings are to have longevity and continue to be relevant and useful to society, they will need to be cared for and to be allowed to evolve. This prompts questions of authenticity –of how much change is desirable or appropriate. In this case, the priority of the retrofit project is to improve the health and comfort of residents by substantially reducing the energy demand of the building using a "fabric first" approach[1].
The first question relevant to this discussion was why add colour? What could the colour do for the architecture and the community?

Site constraints and precedents

The two buildings can be considered as siblings, but have different orientations. They are experienced very differently in the urban context, which suggested that a colour design might be tailored to each block to take account of the way they are seen. The large curving mass of Cables Wynd House is glimpsed at an acute angle tucking behind pre-existing stone tenements, while Linksview House is experienced more as a slab looking face on and from below. Both buildings have one side with deeply set balconies along the full elevation, while the other elevation is a severe wall with little articulation in form. The original Cables Wynd building had small areas of a pale blue between and below the windows at the back of the balcony that would have appeared cooler in northern light and adjacent to the tone of the concrete, but the windows have since been replaced.

Figure 4
Linksview House, part south elevation as existing.
Source: photo ©Woolver.

1 The "fabric first" approach forms the core of the retrofit strategy aiming to reduce the use of energy by prioritising insulation, airtightness, and the mitigation of thermal bridges in the construction, before introducing new services or technological solutions.

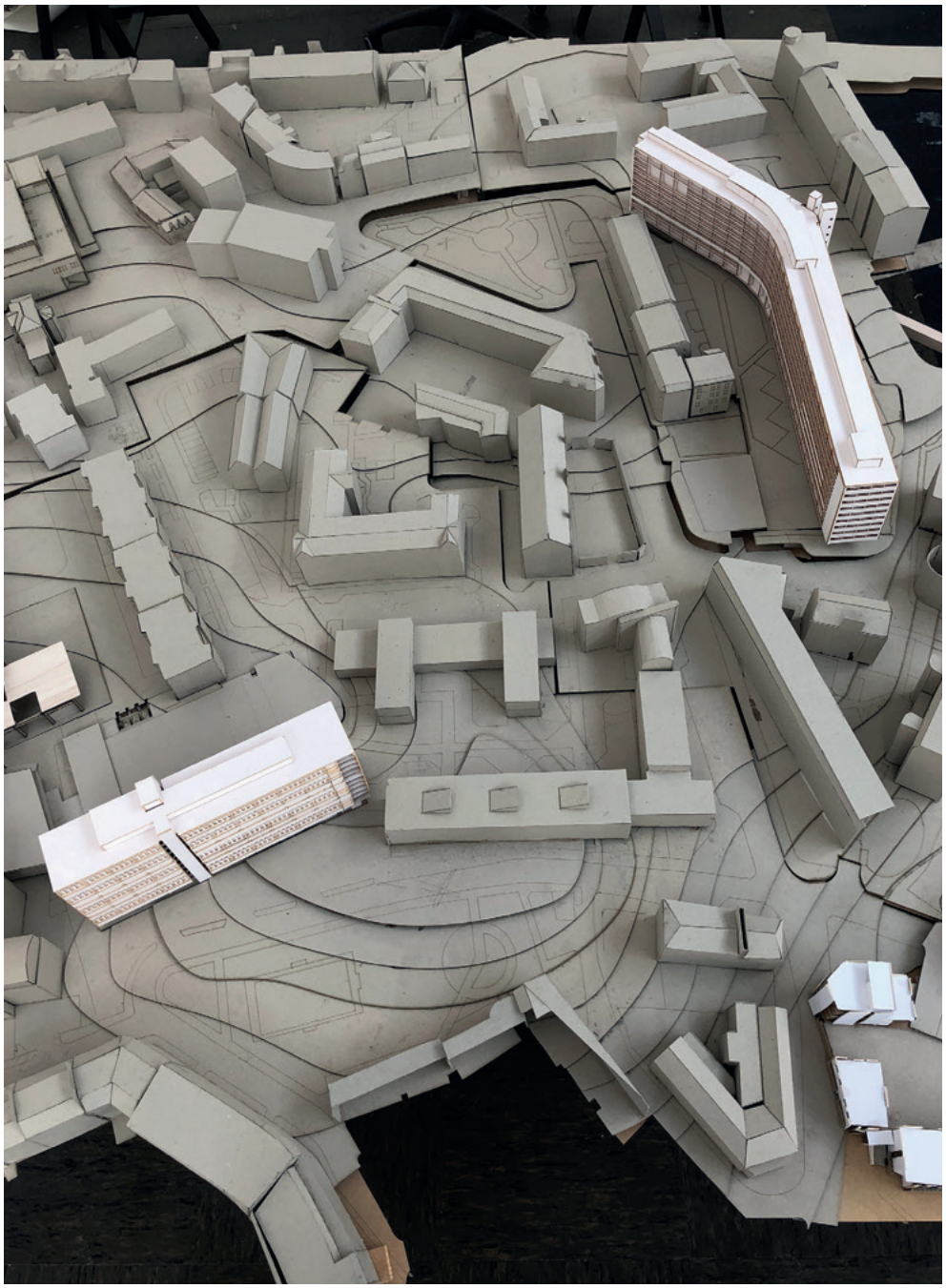


Figure 5
Model of Cables Wynd House and Linksview House in their urban context.
Source: model by students at University of Edinburgh, photo by the author.

It seemed immediately apparent that any colour strategy should be supportive of the architecture and be respectful. It was clearly not an option to overclad these buildings as the rhythms of the concrete structure and panel system are such a significant part of their identity. Architecturally, then, the aim of introducing external colour is to foreground the textured concrete, that has an exposed quartz stone aggregate and is for architects and heritage bodies, perhaps more than the general public, a significant factor in the reason to value these buildings. The intention is to line the surfaces of the balconies in insulated render and also to insulate the access galleries that run at every third floor. Pragmatically therefore, the new surfaces will require decisions on colour. To paint something white is a conscious colour decision and is also a constructed narrative. As we know, modernism was not as white as is often portrayed (Wigley, 1995). The early twentieth century saw various approaches to colour composition emerge, summarised by Juan Serra Lluch as *Purism* (espoused by Le Corbusier and Amedée Ozenfant), *Expressionism* (for example Bruno Taut) and the *Neo-Plasticism* of the de Stijl architects,

such as Gerrit Rietveld. These architects were not dogmatic in their approach to colour, although a common thread was to make a distinct "cultural break from the past" (Serra Lluch, 2019, pp. 102-114).

The original architects of the Leith flats were clearly drawing aspects of the design from European modernism, notably in the architectural form and materials used –rather than the colour– that were an outward expression of newness as part of a major post-World War II mass housing programme in the UK. By the late 1950s, Leith –the historic port district to the north of Edinburgh on the River Forth– was in decline with a major slum clearance programme and an ambitious comprehensive development plan that included the two blocks (Glendinning & Muthesius, 1994, pp. 237-239). Architects involved in similar major developments across the UK in this period, are acknowledged to have been inspired by Le Corbusier's Unité d'habitation projects in France, which is noted in the Historic Environment Scotland Listing for Cables Wynd House (Historic Environment Scotland, 2017). The earliest of these slab blocks, Unité d'habitation at Marseille (1945-52), has 330 units accessed via internal 'streets', using colour to differentiate between floors, on the balcony sides and within the apartments, while the massive block at Briey, with 339 apartments on 17 floors (1959-60) has recently been renovated to reinstate the original colour scheme for the facades, using two reds, yellow, blue, green and white (Fondation Le Corbusier, n.d). Le Corbusier's ideas on colour developed throughout his life and were initiated by the early collaborations with the artist Ozenfant and further developed in his publication *Les claviers de couleurs* for the Salubra wallpaper manufacturer, first published in 1931 (Rüegg, 2016). The second Salubra collection published in 1959 (Rüegg, 2016), coincided with the block at Briey and reflects his use of a more intense, saturated palette made possible by developments in synthetic pigments.

Figure 6
Park Hill, Sheffield. Phase 1 of renovated estate seen from city centre.
Source: photo ©Woolver.

While the brutalist examples in the UK originally had less by way of applied colour, the recently renovated Park Hill estate in Sheffield, 1961, designed by Jack Lynn and Ivor Smith, served as a useful precedent for the introduction of colour as part of an evolving identity. This sprawling development suffered from high levels of anti-social behaviour and was in a poor state of repair. Given its architectural significance it was awarded English Heritage Grade II status

in 1998 and is being retrofitted in phases. Similar to the Unité d'habitation, access to the flats is organised by decks that run every third floor in section, in this case open to the air. The architects for the first phase, Hawkins\Brown with Studio Egret used a bold, saturated palette expressing the horizontal three-storey bands in yellow, orange, and red, which are very visible from the city centre and is used as a signifier of the rehabilitation of the estate (Figure 6). The second phase, by architects Mikhail Riches kept the original three tones of brick and combined these with a subtle palette of blues and greens on the sides of the recessed balconies (Figure 7).

Figure 7
Park Hill, Sheffield. Phase 2 with coloured render in balcony recesses. Source: photo ©Woolver.

In proposing to introduce colour to the projects in Edinburgh, therefore, these precedents were seen as significant and offered different approaches in terms of a colour palette.

Figure 8
West elevation of Cables Wynd House as existing.
Source: photo ©Woolver.

Production of initial colour strategy concepts

The west elevation of Cables Wynd House (Figure 8) and the north elevation of Linksview House present themselves as anonymous, homogenous walls with little value contrast, while the sides with recessed balconies express their occupation with washing lines, furniture and a few plants. The floor plans for each block are similar, with repeating layouts on levels 1, 4 and 7 and intermediate levels 2, 5 and 8, which have single aspect flats with a double width balcony to accommodate the long access galleries (Figures 9 & 10). In section, all flats are effectively single storey, but are accessed via internal stairs either up or down from the access gallery (Figure 11).

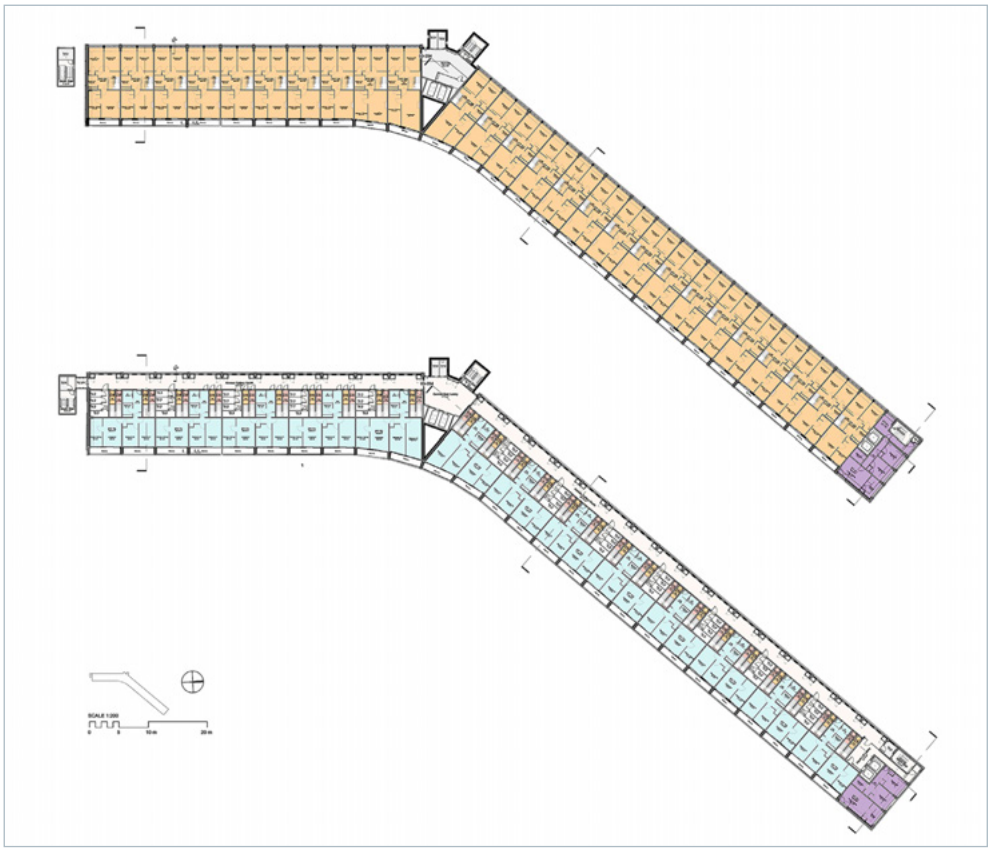


Figure 9
Cables Wynd House (left), typical plan layouts at access gallery (levels 1, 4 & 7) and intermediate levels (2, 5 & 8).
Source: Collective Architecture.

Some of the residents have painted their balcony area in an ad hoc manner, perhaps to express an individual identity or to introduce colour where there is currently an overwhelming sense of grey. The internal access galleries, that run full length, are lined with flat entrance doors and are presently monotonous, disorientating and understimulating. The aim is to introduce colour into these spaces to enhance the everyday lives of the residents and to differentiate between floors in a distinctive manner. Collective Architecture are known for their community consultation embedded in the design development process, making frequent visits to gain trust and involve the residents. Improving the lives of the residents, who can feel unseen and unheard, is central to the project. It is therefore both the tangible –the embodied energy, physical form and materials– and the intangible –the embodied community– that together generate a sense of place and support the argument to renovate these buildings.

Figure 10
Linksview House, plans at access gallery and intermediate floors. Source: Collective Architecture.

Figure 11
Linksview House, sections and diagram of typical bay arrangement, "up flats," "down flats" and "through flats" at access gallery levels. Source: Collective Architecture.

Early in the process, the author made an abstract painting *The Lives Within* (2023) (Figure 12). It was originally a method for the author to explore meaning in the use of colour. Critics of brutalist developments of this kind often refer to the lack of expression of individual dwellings as the blocks present themselves in a uniform, homogenous manner. The colour in the painting is a way to think about, and to celebrate, the diverse lives of people who have lived, are living, and will live in the blocks. The painting is an abstraction –representing neither one building nor the other– but explores the subtle rhythms of the balconies that alter in places from solid concrete to metal railings. The painting was used subsequently by the architects in a series of presentations of the project to residents, planning authorities and heritage bodies. It appears to have been useful to foreground and frame the importance of the community in the heart of the project.

Figure 12
Abstract painting, (2023) *The Lives Within*, acrylic on paper, by the author.
Source: photo ©Woolver.

For Cables Wynd House and Linksview House, it seemed important to avoid introducing a formal pattern with the colour that might undermine the architectural rhythms of the existing form. In developing a conceptual colour strategy for the project, the author turned to the work of textile designer, artist, and colourist, Bernat Klein, who was a significant figure in Scottish modernism during the period that the Leith buildings were designed and built (Bernat Klein Foundation, n.d.). He supplied textiles to the haute couture fashion industry in the 1950s to 1970s from his base in the Borders area in the south of Scotland (Schoeser & Harley, 2022). Klein would use abstract paintings of the landscape around his home to develop colour palettes, which were then used to dye the woollen yarn for the textiles. The way in which the

yarn was formed was also a significant factor. There was a deliberate intent to invite an element of randomness in both colour and texture into the final woven fabric, with an occasional fleck of discordant colour or thicker slub of yarn.

An abstract diptych collage by the author then explored a potential difference in the way the colour might be applied to the curving form of Cables Wynd House, drawing on Klein's ideas (Figure 13). Looking to the north, and experienced at an acute angle, more varied colour could be applied to the north ingoes to catch the sun moving round the site from east, south, to west over the course of the day. The low sun angle in Scotland barely reaches 11 degrees from horizontal in the winter, which tends to highlight vertical surfaces. The collage suggested that colour would thread along and down the façades, apparently appearing and disappearing as in woven fabric. The colour strategy that developed from this collage was titled "Warp and Weft". As this is the most architecturally important of the two blocks, the colour would be used in a focussed, minimal manner keeping the majority of the surfaces in a mid-ochre "straw" colour, and using the varied palette only on the soffits and sides of the recessed balconies. Noting that the approach to the two buildings is different in the urban context, the strategy for the shorter slab block of Linksview House suggested that colour could be applied to the back of the balconies, that are seen from front on and in full sun, as well as to the sides. This would give a subtle differentiation to the approach.

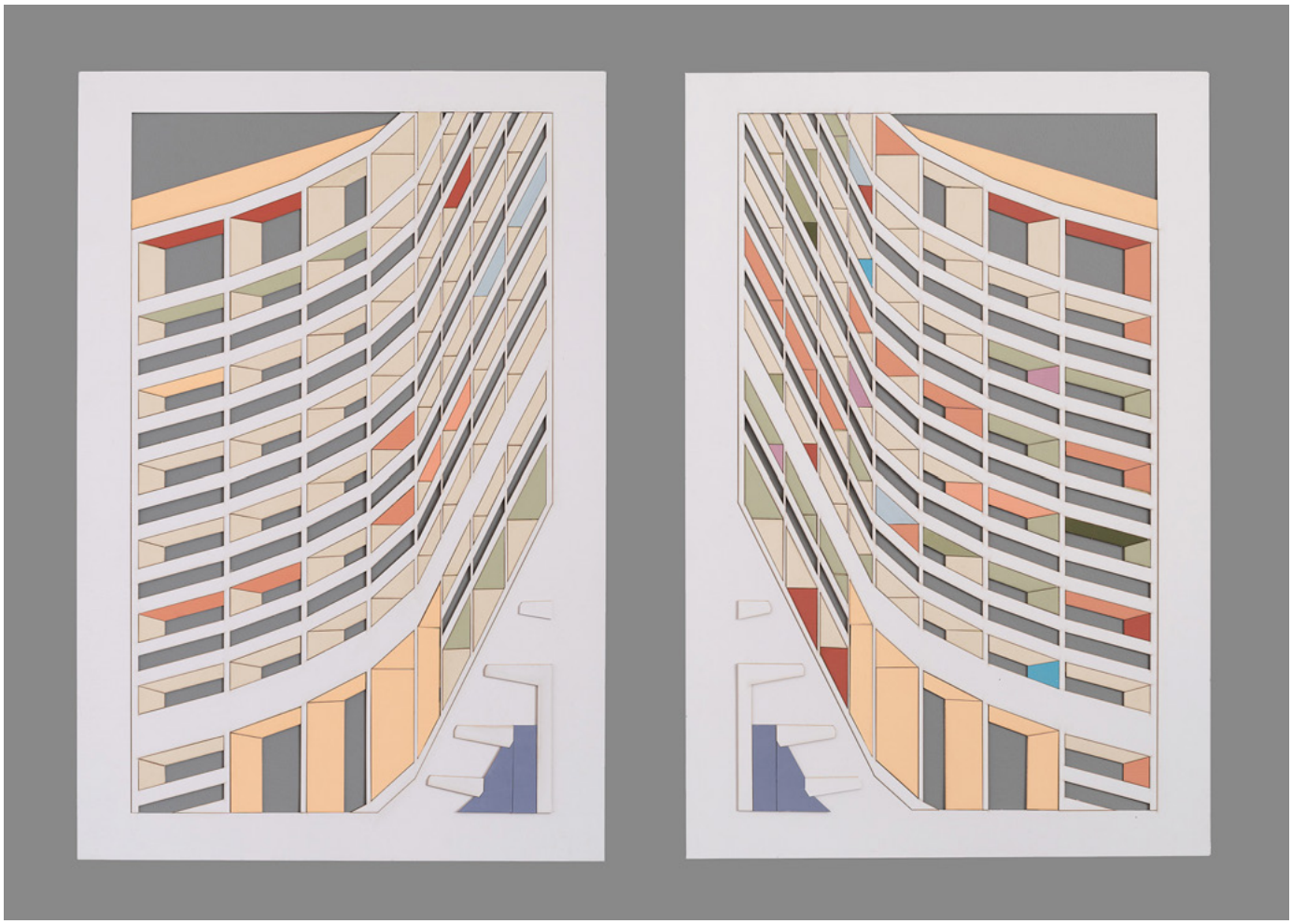


Figure 13
Abstract diptych collage painting Warp and Weft colour strategy, laser cut, hand painted card, by the author. Source: photo ©Woolver.

The relative flatness of the access gallery sides suggested an approach that further developed the theme of weaving and textiles. With the concept

of "modernist tapestry" having been established as a guiding principle, the tapestries of Anni Albers further suggested a potential movement of coloured flecks along and down the façade, creating a secondary rhythm (Figures 14 & 15). However, the horizontality and planar arrangement of these façades, in contrast to the animated balcony elevation, was considered important by the architects and to heritage bodies such as Historic Environment Scotland, prompting a simpler monochrome colour strategy for the very long, west elevation of Cables Wynd House. On Linksview House however, a slightly different approach has been developed for the north elevation that is rarely in direct sun and with the top storey being visible from a distance above the surrounding buildings. Initial studies suggested using the strong gingery orange colour on this north side, however this was considered to be too dominant. A further collaged painting suggested that a tonal gradation of grey-greens moving up the ten stories of the slab block could be developed with a warmer, pale ochre colour at the top level to give the building a more distinctive character (Figure 16).

Figures 14 & 15
Abstract study collages of a five bay partial elevation of the west side of Cables Wynd House, laser cut, hand painted card, by the author.
Source: photo ©Woolver.

Colour palette

The methodology for the initial colour design was to derive a palette that will feel familiar, enduring and will work well in the low, soft northern light of Scotland, but also be appropriate for the mid-century modern period of the buildings. The starting point was to look closely at the existing buildings and natural environment around the site, including the Water of Leith, a nearby river, documenting the predominant colours (Figure 3). The first derived palette was therefore a combination of yellow ochre, terracotta and olive green with tonal variations and a few sharper colours. A distinctive gingery-orange colour is also present in the adjacent historic fabric from "Copperas" lime render, originally made with iron sulphate, which was a by-product of the dye industry (McLachlan & Yu, 2018). The choice of colours also has some affinity

with Amedée Ozenfant and Charles-Édouard Jeanneret's (Le Corbusier) modernist concept of "constructive colours". In their case, colours including ochre yellows, reds, earths, white, black and ultramarine blue –defined as a "major scale"– have a sense of unity and stability to "hold the picture plane" while the fleck colours introduce a dynamic element (Jeanneret & Ozenfant, 1921). Through a series of small abstract paintings, using acrylic paint, the colours were tested to see how they interacted, and this established the desire for more contrast in value, to accentuate the formal modelling of the façades (Figure 17). Dark tones used in the shadows will increase contrast as will a light tone in sunlit areas. A very dark black-green is present in some of the existing windows in old warehouse buildings around the port and this was included in the palette, which was also extended to include a greyish blue-green. The author painted a set of A5 palette cards that were given to the architects as a guide.

Figure 16
Abstract study collage of colour strategy for north elevation of Linksview House, laser cut, hand painted card, by the author.
Source: photo ©Woolver.

Figure 17
Small abstract paintings using initial colour palette derived from observation, acrylic on paper, by the author.
Source: photo ©Woolver.

Co-design and participatory methods involving residents

Having established a colour strategy for the project, and with a view to developing an interactive method that could be used in discussions, a series of collages were made by developing a "kit" based on a five-bay width of the elevations. The balcony façade was abstracted to "fold out" the soffits and balcony sides, which makes the colour more apparent than it will be in reality but helped with the composition. Thousands of tiny pieces were cut with a laser cutter from large hand-painted card samples of the palette colours, using the architects' digital drawings as a base. Architecture students at Edinburgh University, undertaking a colour course taught by the author, were the first to experiment with the façade design in December 2023 (Figure 18). The residents from both blocks of flats were also invited to take part in a painting workshop, using pre-mixed colours to the proposed palette and referring to the abstract paintings and using the collage kit (Figure 19). It was useful to be able to listen into the comments on the colours and the process of painting enabled a freer discussion than might have been the case in a formal presentation. In response to comments, the use of a strong gingery-orange colour intended to draw attention to significant architectural modulations in the façade, such as the double height bays, was reconsidered. The client's representative also took part, which demonstrated the care being taken on the project and the shared investment in trying to make the project successful for all parties. Over the course of 2024 many versions of the façades were explored, the kit allowing the design team to arrange and re-arrange the way the colour palette could be used (Figure 20). The Warp and Weft colour strategy guided the discussions while principles for the application and composition were established, and the collages became central to the co-design and ongoing consultation process.

Figure 18

Students at Edinburgh University experimenting with façade collage kits (2023).

Source: photo by the author.

Figure 19

Residents colour painting workshop with author, architects and client (2024).

Source: photo by the author.

Figure 20

Collective Architecture using the collage kit to develop principles in the application of the "Warp and Weft" colour strategy (2024).

Source: photo by the author.

Preliminary design propositions: Iterations and translations

During this iterative process an idea developed that the colour might be used to hint at the plan and section of the flats that is not currently expressed or apparent from the elevations. For example, a vertical thread of colour would suggest the three-storey order of the building section and following horizontally across where some flats have a double balcony. This also meant that a single flat would have the same colour across both windows when looking outwards from the flat interior (Figure 21). For the long elevation of Cables Wynd House a secondary rhythm developed, suggestive of a repeated width of cloth. The hand-made collage studies were photographed and digitally extended to explore these effects across a full elevation while still retaining something of the imprecision and depth of the physical collage within the image (Figure 22).

The iterative process continued with analogue media used in parallel with digital tools. This helped address the inherent limitations of the flat collages in relation to the effect of light and shadow, particularly on the deeply recessed windows. Colour, in environmental contexts, is known to be experienced in very different ways to colour in other settings. Most significantly, as colour is generated by light interacting with the surfaces of materials, changing daylight conditions, orientation, latitude and the time of the day and year, these will all affect how the colour appears. Ulf Klarén observes that human perception of light and colour cannot follow simple static principles, "our visual system –and all other sensory systems– counterbalance and compensate for physical alterations in our environment, which helps us perceive the external reality as relatively constant" (Fridell Anter & Klarén, 2017, p. 15). The principles of colour constancy are much studied both in colour theory and in real world situations (Gegenfurtner, Weiss & Bloj, 2024). Although we might not notice these subtle shifts as our minds think of colour as stable rather than elastic, the play of light and shadow on material surfaces is fundamental to our experience of architectural form.

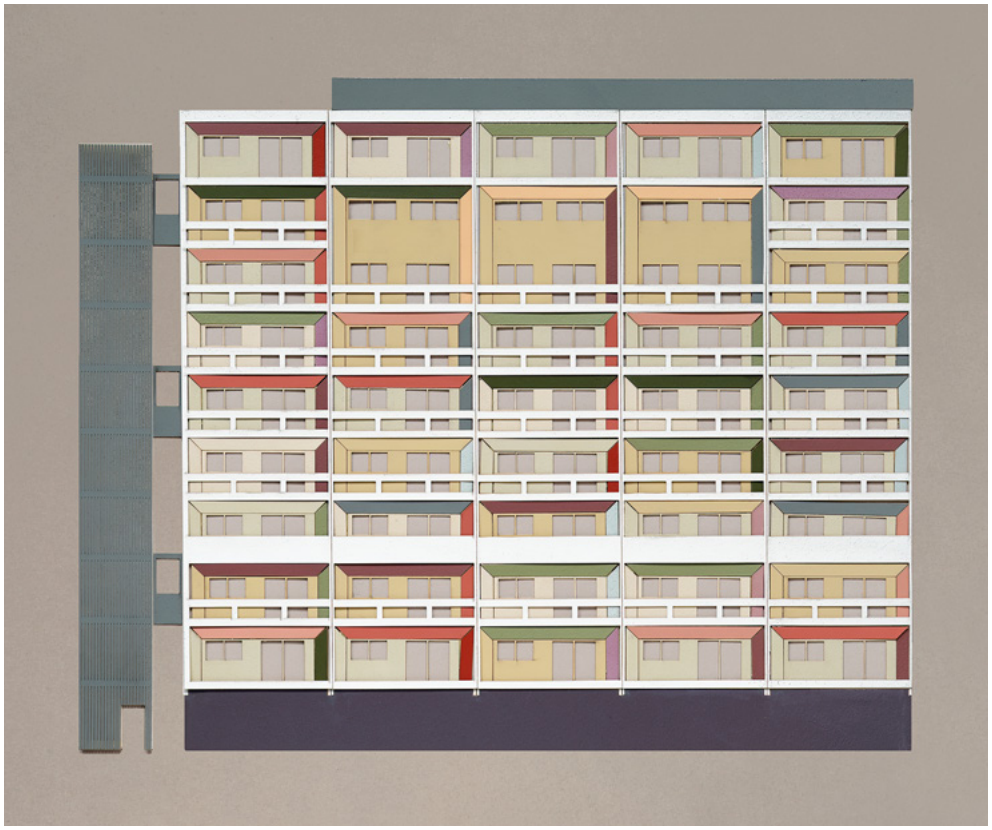


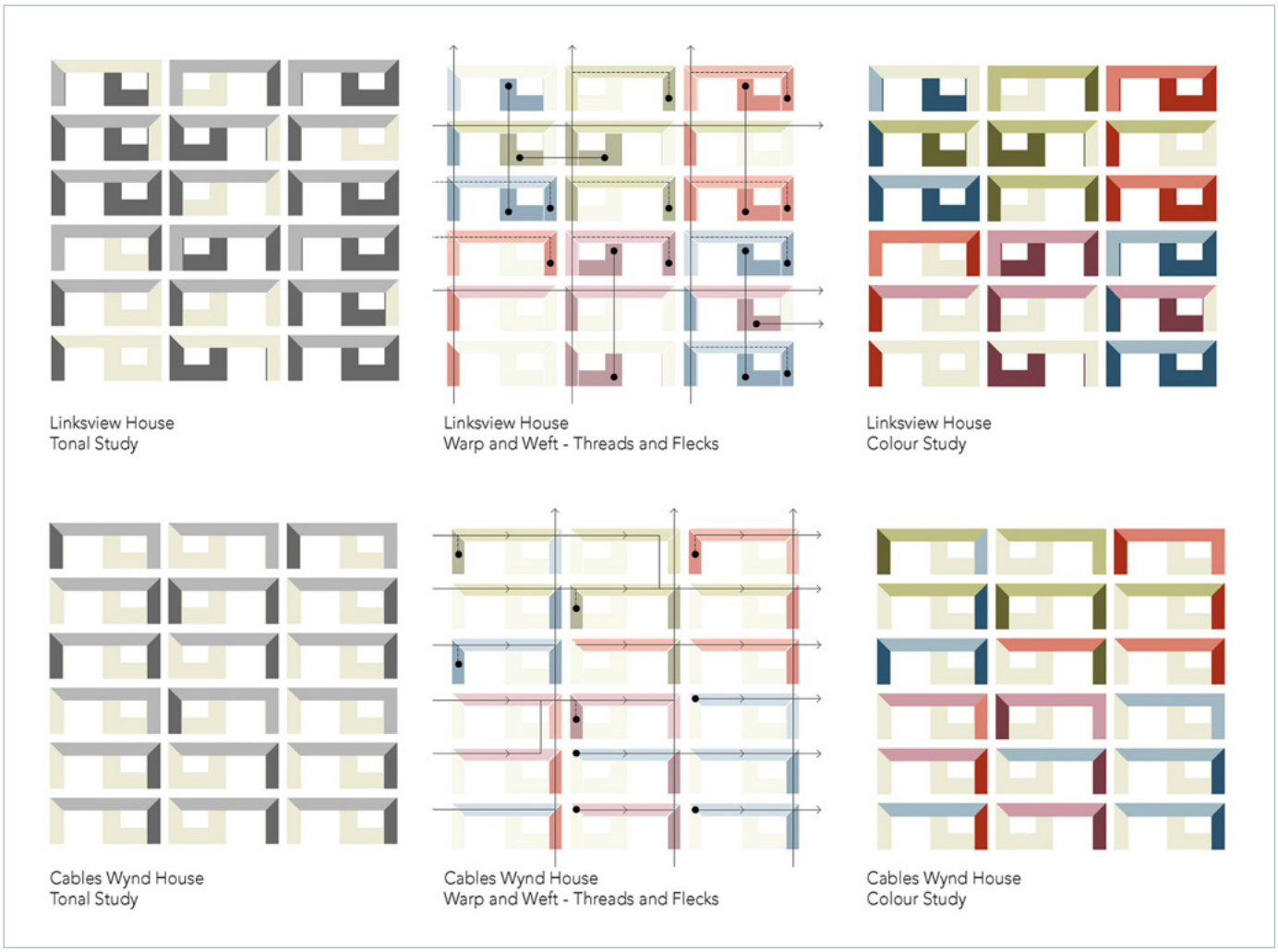
Figure 21

One of a series of abstract façade studies using the collage kits, by the author (2024)

Source: photo ©Woolver.

Figure 22
Cables Wynd House, east elevation study. (2024) Digital extension of hand painted collage study by the author, to show full elevation. Source: photo and digital image manipulation ©Woolver.

A further adjustment of the palette was informed by site observation of physical samples held on the soffits, and the north and south sides of the balcony of an unoccupied flat. In the deep shadow, the darkest tone of the colours was too dark when seen in relation to the sky and from inside. There was also a noticeable difference in the way the same colours appeared on the north side (warmer in tone) and on the south side (cooler). Hand painted physical models at 1:100 scale helped to understand the effect of light and shadow and this resulted in a further editing of the palette to reduce the number of colours, increase the saturation slightly and to adjust where the darkest tonal values could be used. The design team felt that greater contrast was needed, particularly on the south elevation of Linksview House which receives full sun for most of the day. The base neutral ochre was lightened to ensure that the flats receive sufficient reflected light into the interiors.
A further modification, led by the architects, was to adjust the colour strategy for the curving façade of Cables Wynd House as they wished to introduce a few flecks of colour on the south faces of the balconies, which the original collage had suggested would all be neutral. Rather than being entirely random, some of these flecks will signal key moments in the façade such as the entrance, as well as adding a dynamic element across the façade. In these instances the gingery orange would be used to draw attention. The effect of the colour as the viewer moves along the façade will therefore change when looking north and south, as was the original intention.
The painted collage studies and physical models fed into the digital elevations and 3D digital model by Collective Architecture (Figures 23 & 24), referring to the colour strategy to guide the application.
An inevitable consequence of these processes of exchange is that the colour becomes codified and undergoes a series of translations between systems. In the first stage palette development, the author observed on site and matched to colour fan decks from a range of systems such Natural Colour System (NCS) and Dulux (part of Akzo Nobel). The manufacturer's codes at this point were not relevant as in the actual project the external colour will be from a cement-free insulated render (stucco) product that is through-coloured and comes factory pre-mixed. There are only a few specialist suppliers of such products and during the early stage development of the palette, the colours were sourced from Sto, which has headquarters in Germany. The original hand painted palette cards were matched to the nearest Sto colours, adding a few additional tones. This resulted in an extended palette of 17 colours. As the product comes pre-mixed, it would allow for different colours to be applied to the soffit and sides of each balcony.
Using an established international product meant that a digital "plug-in" for architectural software with the full range of colours was available from the manufacturer together with digital "HEX" codes allowing for translation



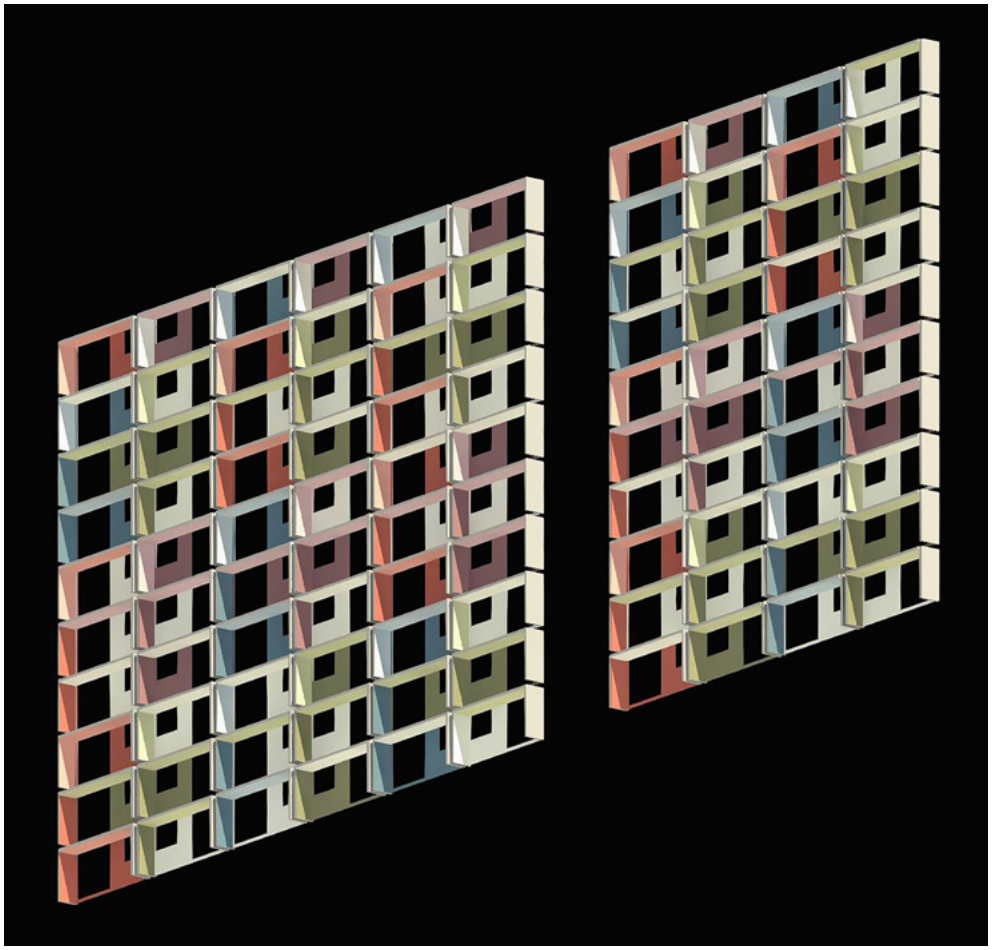


Figure 23

Digital diagram by Collective Architecture showing their interpretation of the colour strategy application adapted to each building. Source: Collective Architecture (2025).

Figure 24

Linksview House, south elevation abstracted digital up view isometric. Source: Collective Architecture (2025).

between systems. The plug-in feeds a colour swatch library within the architectural modelling software, which in theory should give more certainty in representations, particularly as the development of the presentation visualisations were outsourced to a specialist company using different software. Despite being able to share the product codes, the way the colour is seen in digital representations is dependent on the colour in each display monitor and in print media. It was evident that further on-site testing in vacant flats prior to the final construction and implementation would be vital. Unexpectedly, Sto withdrew from the UK during the design development. An alternative supplier will have a completely different set of colours and codes that must be coordinated again. With this in mind, the colours were matched against the NCS 2050 system and in the process of doing so, subtle adjustments were made, referring back to the original hand-painted palette. This translation process to the NCS coding effectively clarified the palette to a light neutral base, four hues in two tones, two accent colours as flecks to introduce a dynamic element, combined with a tonal range of a grey-green hue which will be used on the access gallery elevations.

For the planning permission stage, the architects chose to describe the colour palette with words rather than codes: terracotta, straw, mid green, etc. These more ambiguous words leave room for modification and further translations.

Figure 25

Linksview House, south elevation CAD visualisation for planning. Source: permission Collective Architecture/TOUCH3D (2025).

Discussion

The imperative to make more use of existing building stock for its embodied energy, coupled with the need for buildings to last longer and remain relevant to the needs of society, means that buildings need to be allowed to evolve. Where there is a need to renovate a significant heritage building, a change in appearance can be seen as a symbol of investment in the building and also to instigate a shift in the perception of the place. The myth of early modernist buildings being predominately colour neutral has been successfully challenged, yet architectural derivatives have perpetuated the normalisation of unadorned material, such as concrete. There was therefore an expectation that the proposed introduction of colour on two significant examples of Scottish brutalism may be controversial. It has been encouraging that consultations with the legal planning and heritage bodies have been positive. The case has been based on an understanding that while the retention of the precast concrete panels is the most vital expression of authenticity in the architecture, colour is seen as a secondary dynamic element that is capable of future change. In addition, being able to evidence a careful, informed and iterative process of the palette development and composition studies together with the use of a clearly understood colour strategy of Warp and Weft –informed by the work of a contemporaneous textile designer– has helped to foster a shared understanding of the intention. Working in collaboration with an experienced colour researcher seems to have been reassuring for the design team and client on this project and has also allowed for academic research methods to be tested and adapted to the complexities of contemporary architectural practice.

A key part of this research has been to consider how the abstract paintings and hand-painted swatches produced during the design process have complemented the digital tools. Painting offers a direct opportunity for experiential learning through an immersion in colour. The collages have a slight texture from the hand painting that is not apparent in photos and gives some sense of the materiality of the concrete. Abstraction allows time to make work without specific purpose, keeping hold of an element of ambiguity for longer. In the same way as a painting comes with an expectation of how it will be viewed by an audience, involving a colour designer or artist can facilitate discussion of the effects of colour decisions with a client or legislative authority by allowing space for human sensory experiences and conceptual thought to be considered alongside aesthetic judgement and pragmatic design considerations.

The architects have noticed that being able to hold a painted card, or manipulate a jigsaw of pieces in the collage kit, gives a very different experience to digital composition where the colour on one screen can appear radically different from the next. Even late on in the iterative process, we found ourselves returning to the first sample cards, now dog-eared through use, as the translations between systems had subtly altered the relationships in the palette. The cards also have the advantage of being seen side by side, and the slight chalkiness of the paint is very different from seeing colour represented digitally through a backlit screen. Even with sophisticated rendering software that is intended to mimic the effect of latitude, time of year and day, digital renders can appear strangely "unreal". For example, even though technically "accurate", the warmth of the sun may appear accentuated, making the

concrete façades more orange and shifting the appearance of the colour palette. To address this, the architects adopted a hand painted technique in the making of the physical models that will be exhibited alongside the digital visualisations (Figures 25 & 26).

Figure 26
Testing on a physical model, Collective Architecture (2025). Source: photo by the author.

Unlike in the Swiss example from Haus der Farbe, where it is still possible to rely on the skill of decorator to mix colours, the UK building industry is focussed on specification at tender stage, normally led by the architect. In some cases, it is possible to nominate a few paint suppliers, but each is likely to have a different trade colour range. Where a project follows a "design and build" procurement process, the contractor will have the right to alter the supplier to reduce the cost or supply time and this can again result in a need to translate from one codified colour system to another. Although change control processes limit alterations in specification for time and cost reasons, colour choices will modify through these consecutive translations and therefore the palette can never be precise. The use of an independent colour system, such as the NCS, should allow for such exchanges, however there will always be subtle differences in translation.

Conclusion

The paper has discussed the development of a colour design for a major renovation and energy retrofit project of two brutalist housing blocks from the 1960s in Leith, Edinburgh. Abstract painting and collage, used as discursive tools as part of a collaborative design process, alongside the architects' design

and representational procedures, fostered the development of a relevant and meaningful colour design through collaborative practice. The process confirmed the principle that a colour strategy can be independent of the palette, albeit that the way in which it is applied, and the character of the palette, may result in a different expression. Given that the colour appearance will vary throughout the day and season, the design team gradually developed an understanding that a degree of imprecision in the final palette is inevitable. The development of a colour strategy has been essential to hold onto a conceptual way of thinking about colour throughout a long iterative design process ■

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