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THE ARCHITECT'S DRAWING IN REVITALISATION OR RENOVATION PROJECTS AND THEIR DIGITALIZATION PROCESSES IN THE 21ST CENTURY

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Abstract. This article explores the importance of freehand drawing in the processes of architectural revitalisation and reconstruction, in the study of historical buildings and in the development of restoration strategies. The Latin verb revidere means 'to see again', 'to re-examine', or 'to review'. In this study, drawing is understood as a means of 'seeing again' and 're-examining' architectural heritage. One of the practices of the 21st century is adapting modern functional and technological requirements in reconstruction and renovation projects while simultaneously preserving cultural heritage. Architects redraw former project drawings with freehand sketches, generate ideas, study the historical context, apply new functions to existing elements and apply technologies to improve buildings.

The study is based on a case study of two revitalisation projects and used observation and comparison methods in the project documentation of the Hanza perons and Riga Castle, and participatory observations in the development of ideas for an international revitalisation project BIP ReUso2025. The cultural and historical objects were selected because they were visited in person during the restoration process and during the architects' excursions with direct experience stories in both cases. In order to gain a deeper understanding of the role of drawing in both objects, in September and October 2025, the Riga Construction Board studied the drawings of the Riga Castle and the Hanzas Perons, freehand drawings, site surveys and restoration documentation, BIM and CAD materials, historical photographs and digital models, and the oldest drawings of the Riga Castle in the Latvian State Archives, interpretations after J. K. Brotze (18 Century). The reliability of the study is based on direct semi-structured interviews with architects who were responsible for the restoration projects. To ensure the reliability of the results, methodological triangulation was used, comparing archival, interview, observation and project documentation data. The case study confirms the value of the architect's sketch in conceptual design, development of restoration details and interpretation of the historical presence. The aim of the article is to show how freehand drawing contributes to the preservation of authenticity, interdisciplinary collaboration and design quality. At the same time, it should be noted that the analysed projects represent two samples of Latvian restoration practice, and the interpretation of the sketch is to some extent influenced by the professional experience of the researcher and the context of the project. The discussion emphasizes that freehand drawing retains its significance in the digital design environment when the architect conducts in-depth research. The results indicate that it is advisable to systematically integrate it into the design process as a means of linking historical heritage with contemporary architectural solutions.

Keywords: freehand drawing, renovation, reconstruction, revitalisation, cultural heritage, architectural research

Introduction

The preservation and sustainability of cultural heritage is a topical topic, and with growing interest in the role of heritage in revitalization and renovation processes, freehand drawing is an active element in practice as a means of spatial [18] exploration, creative ideas, and effective design communication. This study examines the impact of hand drawing on 2D and 3D project drawings, BIM software, and the creation of artistic visualizations in virtual environments. The trend toward principles of sustainable spatial design is reinforced by European-level initiatives, including the New European Bauhaus, which defines aesthetics not as formal visual quality but as the depth of human experience and the culturally inspired quality of space. This perspective raises the question of the architect's creative methods, particularly the role of freehand drawing, which helps capture the atmosphere of a space, the authenticity of materials, and the nuances of the historical environment.

A renovation and revitalisation project can be considered sustainable when it complies with these principles while respecting history [10] adapts hand-drawing skills and successfully implements digital processes, while maintaining a balance between the principles of sustainability and the current value of cultural heritage for visual aesthetic enjoyment throughout the project's workflow - from sketching to visualisation in a virtual environment. In recent years, discussions on architectural theory and practice have increasingly focused on the interplay between cultural heritage preservation, sustainable development, and digital transformation. In the processes of restoring and renewing Historic buildings, the question of the role of traditional design methods in today's digital environment - particularly the significance of the architect's freehand drawing - has come to the forefront. Although CAD and BIM technologies offer high precision and extensive data processing capabilities, it is increasingly emphasized in professional circles that sketching is not merely a method of representation, but rather a tool for spatial thinking, analysis, and creative interpretation. In the study of historic sites, where an understanding of authentic details, materials, proportions, and the character of the site is essential, freehand drawing continues to play a significant role. It allows architects to establish a direct connection with the object under study, document their observations, and interpret the cultural-historical environment in a way that digital design tools cannot fully replace. Research from the 21st century confirms that sketching is an essential part of an architect's cognitive process. In his work "Sketching as a Thinking Tool", Goldschmidt (2014) emphasizes that sketching stimulates visual thinking and promotes creative problem-solving. Lawson (2017), in the book "The Design Student's Journey", notes that freehand drawing helps architects interpret complex spaces [5], particularly in historic buildings, where digital data is often incomplete. Studies on cultural heritage restoration, such as Pallasmaa's (2012) "The Thinking Hand", underline that manual work and sketching provide a "tactile understanding" of materials and details, which is critical to the quality of restoration. In contemporary conservation practice [15], sketches are employed not only during the conceptual phases but also

during on-site construction supervision, where the architects are often required to respond to unforeseen discoveries and conditions. De Jonge & Nordin (2020) write about this in the Journal of Architectural Conservation, noting that freehand drawing is the fastest way to document and interpret newly discovered historical elements.

Taking these aspects into account, the relevance of this study stems from the need to systematically identify and analyze how an architect's hand-drawn sketches influence the quality of historic building restoration projects, decision-making, and the graphic documentation of revitalisation efforts. This topic is particularly significant in Latvia, where several large-scale restoration projects have been carried out in recent years. The drawing, as the object of study, is examined within the context of local and international collaborative projects.

Research Process and Methods Used

The study was conducted over a two-year period (2024–2026), with the work structured into several sequential phases that provided both a theoretical foundation and the collection and analysis of empirical data. The research process began with a literature review that identified 21st-century studies on the role of freehand drawing in architectural practice, including Goldschmidt (2014), Pallasmaa (2012) and (2025), Lawson (2017), De Jonge & Nordin (2020). Archival research was conducted, including the analysis of measurements of historic buildings, restoration documentation, and graphic materials in Latvian archives and the repositories of architectural offices (Sudraba Arhitektūra and AIG). During the second phase of the study, a detailed analysis of the renovated sites was conducted by visiting the buildings and documenting the use of freehand drawings in the design and construction process. On-site architect-led tours of the Hanzas Perons and Riga Castle [30] provided qualitative insights and generated quantitative data on the frequency, functions, and integration of sketching into project workflows.

In the third phase, interviews and surveys were conducted, and data was compiled using a graphical analytical approach to analyze the stylistics of architects' sketches, their thought patterns, and the function of drawing in the design process. Interviews with practicing architects provided an empirical basis for the importance of sketches in resolving unforeseen situations on the construction site, including the decision to design the bar layout in the shape of a train, reffering to the freight station's previous function at the Hanzas Perons [14]. The methods used and their application in this study are clearly analysed.

1. Literature Review and Analysis of Archival Documents. Scientific articles, monographs, and archival materials were analyzed to understand the theoretical foundations and historical practice of freehand drawing. For example, the "thinking hand" emphasized by Pallasmaa (2012) was used as a theoretical basis for analyzing restoration processes. Pallasmaa and Gimeno (2025) emphasize that freehand drawing is essential to an architect's senses, sense of space, and understanding of materials. They write that freehand drawing provides "an interaction between sensations, play, and careful observation," which is often lost in the digital environment [25]. This work is particularly significant because it examines drawing in the context of the digital age, emphasizing that aesthetic experience and the perception of space arise precisely through hand movement and the sense of materials. Leblanc, T. (2015) [16] and Goldschmidt (2017) argues that freehand sketching is a cognitive tool that stimulates idea generation and design thinking. She writes that sketching is essential in the "front-end" design phase because "it offers cognitive benefits that digital tools cannot replace" [12]. This study is one of the most frequently cited works on the importance of sketching in architecture.
2. Empirical Methods. Quantitative Data Analysis: The number of sketches in the Vidzeme market revitalization projects as of June 2025 was analyzed, along with their types, functions, and frequency of use at various stages of project development; surveys were conducted among project participants representing 8 countries, and the data was compiled for further research. Qualitative analysis: Interviews with architects, the content of sketches, and design situations in which sketches played a critical role were interpreted; the role of freehand drawing in the idea-generation stages and in historical research materials was analyzed.
3. Comparative Method. Various renovation projects were compared by analyzing how freehand drawings are used in the restoration of industrial, residential, and cultural sites. For example, the use of sketches of the Hanza Perons was compared with the contents of the construction project and, later, with the completed structure, while the restoration process of the Riga Castle Convent was characterized by drawings, measurements, and detailed drawings created over several years through the observations and research of various architectural firms, which could be compared and interpreted in light of the results of the restoration process.
4. The Semiotic Method. The sketches were analyzed as visual signs, interpreting their symbolic and communicative functions in design. The study examined how the language of sketches helps architects communicate with restorers, clients, representatives of national and local governments, contractors, craftsmen, and engineers.
5. Morphological Method. The formal structure of the sketches lines, proportions, and spatial accents and their impact on design decisions were analyzed.
6. Graphical Analysis Method. The data from the interviews and surveys were analyzed, focusing on the architects' drawing styles, the characteristics of their handwriting, and how these relate to their design thinking.

Drawing in the Graphic Design process for Architectural Renovation and Reconstruction Projects

Within the contemporary architectural research community, increasing attention is being devoted to the coexistence and complementarity of analogue and digital design methods in design practice and in architectural education [1]. Renovation and reconstruction projects for historic buildings have become a significant platform for these debates, as they require balancing the preservation of authenticity, the principles of sustainable development, and the opportunities offered by digital technologies. In this context, there is growing interest in the role of freehand drawing as a method of architectural research and thinking. Architectural researchers and practitioners note that sketching fosters a deeper understanding of space, materials, and the cultural-historical context, while also serving as a vital tool for formulating ideas and professional communication. Thus, freehand drawing has maintained its relevance in contemporary architectural practice, evolving into a complementary methodology that supports analytical, creative, and communicative processes within digitally [2] supported design environments.

Freehand drawings are based on graphic representations. The process begins with identifying historical data, cultural-historical materials, and related documentation and drawings, followed by conducting repeat measurements, archaeological research, and data comparison. The study of details encompasses artistic and architectural analysis, conceptual planning, and the depiction of engineering details. Project visualizations illustrate objects within their setting. Authors will examine some of these types in this article. An architect's drawing is primarily a means of communication with the client. In renovation projects, this involves processing historical data and creating reconstruction drawings, as well as planning outdoor spaces, sketching floor plans, and communicating engineering solutions.

Indicators in the study:

- Perceptual: How Drawing Influences (the Perception of Space) in a Project's Graphic Identity.
- Social: How Design Can Promote an Inclusive Environment (solutions for environmental accessibility, ergonomic research).
- Functionality: How Design Structures Usability and Accessibility.

The study is based on the analysis of a range of drawings and freehand sketches relevant to the research topic:

Riga Castle Reconstruction Project: Lead architects of the project: Reinis Liepiņš, "Sudraba arhitektūra" SIA, "MARK arhitekti", and architect Artūrs Lapiņš, "Arhitektoniskās izpētes grupa" SIA; historical reconstruction (interpretation) [6] drawings by Johann Christoph Brotze (Brotze; 1742–1823), Reinhold Guleke (Guleke: 1834–1927); research and modern-era reconstructions (20th and 21st centuries) by architects Pēteris Blūms and Ilmārs Dirveiks. (Chief Engineer: Jānis Prauliņš ("Būve forma" SIA)). Architect I. Dirveiks notes that over the centuries, researchers have interpreted the reconstructions, and the most recent cultural-historical [21] building drawings were created by historians, architects, and artists Archaeological excavations and drawings of lost or restorable sites are carried out by architectural research teams and artists, who, together with historians and conservators, take photographs and create reconstruction drawings of the site. In recent times, digital measurements photometry and laser scanning have also been employed. After compiling the data, architects create drawings and develop reconstruction proposals in site plans, floor plans, longitudinal sections, and details [13], and evaluate the physical properties of the site's components based on the architectural research and the restorers' recommendations. The construction project takes shape in drawings that depict building volumes, exterior spaces, interior elements, and details of historical features. This article examines the development processes of sketches and drawings, while also providing insight into the role played by the visualization of the building.

Authors of the Hanzas perons reconstruction project: Architecture, Restoration: Reinis Liepiņš, Ilze Liepiņa, Ainārs Plankājs, Ieva Landmane, Mārtiņš Ostaņēvičs, Jurģis Prikulis, "Sudraba arhitektūra" SIA, Landscape design: Madara Lezdiņa, Ģirts Runis, et al.

Case study in specific focus groups within the framework of a revitalization project was used in July 2025, RTU ADI organized an international blended intensive training program, BIP ReUso2025, during which proposals for a revitalization project were developed. As part of the projec t, an international group of students and faculty members, working in teams, surveyed the historic building complex of the Vidzeme (Matīsa, formerly Aleksandra) Market, designed by Reinholds Šmēlings (1840-1917), and developed revitalization proposals in two phases first by sketching freehand and mapping out ideas on paper, and then by digitally developing the revitalization proposals. The authors conducted observations and, following the successful completion of the project, surveyed the participants about the usefulness of their drawing skills in the project. 85% of those surveyed confirmed that drawing skills were very useful during the idea-generation phase and that freehand drawing skills were very useful for capturing details on-site while creating measurement drawings.

It is concluded that an architect's hand-drawing skills and experience enable them to achieve the goals set for renovation projects in a respectful, aesthetic, and resourceful manner, while taking sustainability into account. The use of freehand drawing skills and techniques is essential in the processes of preserving cultural heritage, renovating buildings, and seeking aesthetic solutions.

Results and Discussion

1. Types of Drawings in Historical Documents.

For architectural objects, regardless of the century of construction, primary sources are sought, which are the original drawings of the site. In Latvia, drawings and objects are stored in the State Historical Archives, the Riga Construction Board Archive, the Latvian Museum of Architecture and are available at the Museum of History and Navigation. Historical data is compiled by a team of researchers, which includes architects, historians and artists. Historical data can be found in state or other country archives [27], collection repositories and private collections. Sketches, measurement notes, long-term visual graphics in graphite pencil, watercolor, ink graphics on paper are reconstructions by other researchers, interpretative drawings (see Fig. 1 and 2) and descriptions. These are engravings, woodcuts, paintings and other types of artwork by artists. In the 20th century, there are surveys conducted by students or architects with measurements of the objects at that time. Surveys provide in-depth insight into a specific period in detailed drawings,

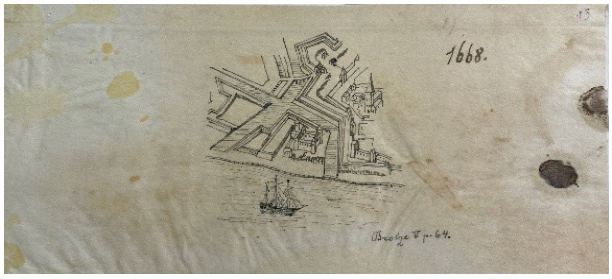


Fig. 1. J. F. Brotze. Site plan of Riga Castle; drawing of the 1668 reconstruction, graphite pencil on tracing paper. LVAA-2748-1-61 [photo: E. Vatuļina]

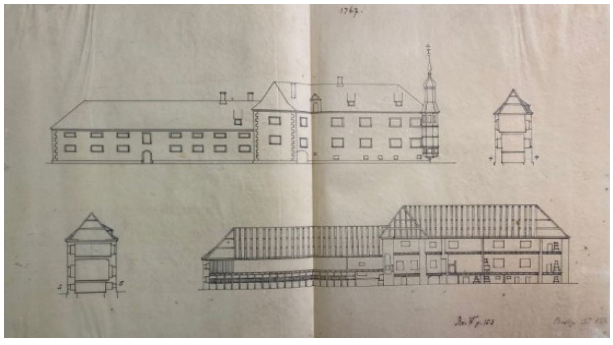
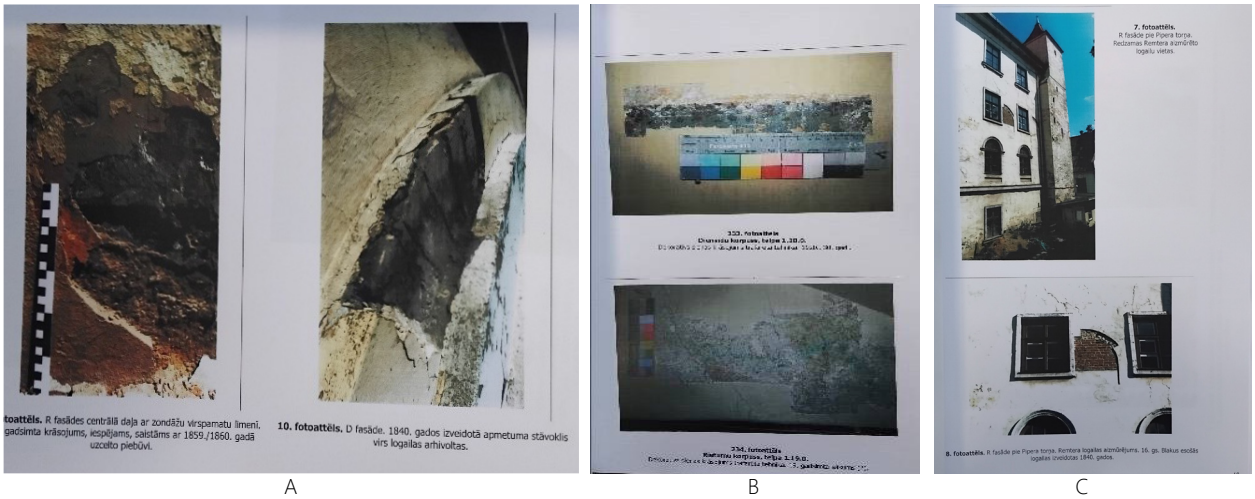


Fig. 2. J. F. Brotze. Site plan of Riga Castle; drawing of the 1763 reconstruction, graphite pencil on tracing paper. LVAA-2748-1-61 [photo: E. Vatuļina]



A B C

Fig. 3. Sections A, B, and C. Riga Building Board Archives. Doc. No.: 1.5.2.a. Restoration and reconstruction of the Riga Castle Convent at 3 Pils Square, 18. 19. 20. p. Phase II: Architectural and Artistic Survey [photographic documentation, 2016]

including archaeological research and photo documentation. Survey materials from the RTU Institute of Architecture and Design collection, scanned by the National Cultural Heritage Board, were identified. The collection includes site plans, facade and section surveys, detail drawings, graphic representations of flooring and ornamentation, as well as environmental visualizations. Survey drawings from the Cultural Heritage Board and the digital collection were examined, comprising nearly 18,000 scanned document pages with detailed metadata descriptions. Data from the Latvian Museum of Architecture's digital collection were also identified. The collections can be viewed in the digital image repository, which is partially accessible to the public in accordance with copyright regulations. The Riga Castle survey drawings section [23] contains 469 images. The volume of numerous interpretive markings indicates the stages of conservation, and for architects, the drawing often reveals new details, which are then verified in the building under the guidance of an architectural research team.

1.1. Environmental Studies Using Site Visits.

The architect visits the site and develops sketches on site, documenting the spatial structure, materials, proportions, building construction and details. In addition, the architect photographs the exposed historical frescoes and other relevant information and compares the actual data with the historical data (see Fig. 3). This helps to fix the current situation and predict the possibilities of restoration or reconstruction.

Documented measurements with numerical data and other notes are measurement documentation [16]. For historic buildings, if they have survived, they are used as a basis for renovation and reconstruction projects, determining the state of preservation of individual details or for the creation of replicas. Environmental sketches help to understand the existing context, for example, how the building fits into the urban environment or natural landscape, and when planning new visions or revitalisation recommendations. A real-life example: by sketching the facade of a building in the old city, an architect can highlight historical elements that should be integrated into the new project.

1.2. Environmental Studies Using Photogrammetry and Digital Documentation.

In modern reconstruction and renovation projects, digital methods photogrammetry and/or 3D laser scanning are used to capture the volumes of buildings, in addition to hand-drawn sketches [6]. The obtained data are compared with historical drawings and notes of architects and historians, which allows to assess the possibilities of preservation and conservation (see Fig. 4 and 5 - Pietro Azzola, 3D Surveying for Landscape Architecture and Engineering: Integrating Laser Scanning and Photogrammetry Technologies* - Examples of photogrammetric sketches from the BIP ReUso lecture on June 16, 2025).

Historically, freehand drawings were created based on sketches, using rulers to scale on glass plates or tracing paper to see through multiple layers. Today, these methods are combined by digitally layering the drawings and ensuring accuracy by visually adapting the historical drawings to the digital environment. The combined image with the historical allows for reconstruction and editing in the virtual and digital environment from all angles, both inside and out. A digitally created virtual model of a building is called

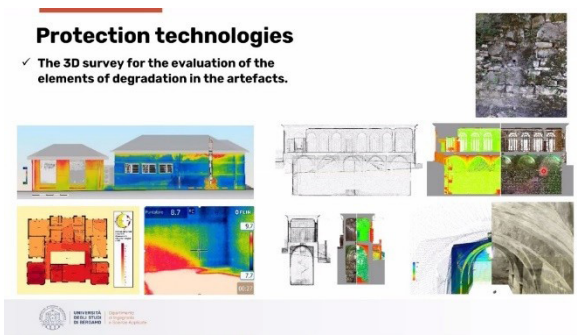


Fig. 4. Pjetro Azzola, 3D Surveying for Landscape Architecture and Engineering: Integrating Laser-Scanning and Photogrammetry Technologies, Protection technologies [20]

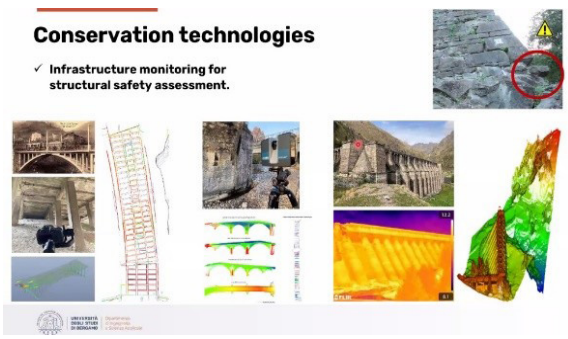


Fig. 5. Pjetro Azzola, 3D Surveying for Landscape Architecture and Engineering: Integrating Laser-Scanning and Photogrammetry Conservation Technologies [20]

a digital twin. Recent international studies increasingly describe digital twins as dynamic digital copies of physical heritage values that integrate geometric, historical, technical and monitoring data throughout the life cycle of the building [22]. Unlike analog three-dimensional models, digital twins allow for data updates, condition monitoring, simulation of interventions and long-term conservation planning.

2. Idea Development and Conceptual Sketching.

Architects and researchers in renovation projects study and determine the volume and appearance of buildings and details based on specific historical descriptions or archaeological finds. In revitalisation projects, changes or additions are proposed by consulting with restorers and researchers to develop aesthetically and effectively technical drawings that include engineering proposals. These initial ideas are subsequently developed into CAD drawings. In interviews, architects admit that in revitalisation projects they sketch conceptual maps of new solutions on copies of existing floor plans. The observations compared examples from two stages of the conceptual sketching process of Vidzeme Market conceptual ideas and actual drawings on site. When conceptualizing the visual proposal, the architects rarely used previously created hand drawings in digital visualisations; in some cases, they were included as an attractive addition to the digital collage. The findings suggest [29] that hand-drawn designs played a significant role in the formation and development of several architectural movements throughout the twentieth century, when drawing was used and, with the advent of copying techniques, photo collages. Observations of current practice show that even today, architects use the digital collage method in their visualisations but no longer draw or sketch by hand. Hand-drawn elements include complement the vector-based presentation, creating a more engaging and artistic aesthetic. Trends in research methodology in the last decade have been marked by efforts to combine artistic and scientific-analytical approaches to visual modeling in both art [29] and architecture and urban planning. This integrated research approach is called architectural modeling methodology [24].

3. Drawing as a Means of Communication.

Freehand sketches serve as an effective means of communication, allowing clients and stakeholders to understand design ideas without requiring specialized technical knowledge in the early stages of a project. Freehand sketches are also useful in the design process when it is necessary to quickly draw an idea – be it a specific detail or an overall view, the location of the building on the plot, the materials to be used or their cooperation. Architects often must defend their design solutions in construction meetings and illustrate them using simple sketches, often on unsuitable types of paper, such as napkins or newspaper edges, but later, historically, these drawings have survived and even ended up in museum collections.

Free hand drawing enables the rapid development of new engineering solutions or the adaptation of existing concepts. When translating initial sketches into vector-based technical drawings, students in the BIP ReUso program were required to respect the existing spatial structure and develop a user-oriented design, while simultaneously addressing wayfinding, noise levels, and lighting management to tailor the cultural space primarily to the needs of the local community. The digital drawings produced during the process facilitated communication and collaboration among all participants. The result was compiled and presented as a digital presentation outlining the proposed concept.

4. Drawings of Restoration Details.

Historic buildings require precise sketches of ornaments, windows and doors, which are used in restoration [1]. Freehand drawings help to document and interpret original architectural details that are difficult to perceive with conventional measurement methods alone. AIG lead researcher A. Lapiņš created visual interpretations using watercolor technique, using colors to create a sense of space and details of Riga Castle I. Dirveiks created interpretations (2023) of plans and sections by Bortze drawings in 1590.

In an interview and on-site tour (2025), the architect stated that Hanza Perons sketches were used to combine the new function (e.g., a concert hall) with the existing architecture, respecting the historical structure. A conceptual drawing of a carriage was realized as a spatial structure, organically linking it with the existing architecture and respecting the historical. The architect used a creative approach to revitalize the historical environment, transforming the industrial heritage into a modern cultural space. The architectural studio "Sudraba arhitektūra" and Reinis Liepiņš demonstrated in this project several ways in which freehand sketches, conceptual thinking images, and detailed restoration survey drawings are used in the reconstruction [14].

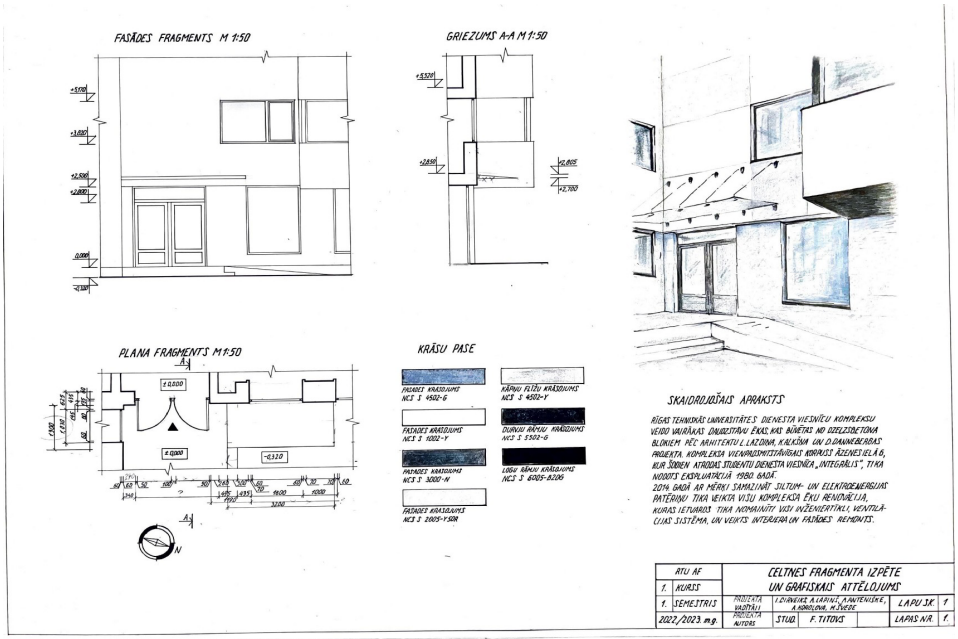


Fig. 6. Types of measurements and explanations; drawing of a building's entrance area. F. Titovs, RTU, AF 2022.

5. Measurement Drawing of Building.
Creating a building model in CAD programs or drawings, measurements (see Fig. 6) and all methods described in 1.1, 1.2, 1.3 are used, which are then transferred to the digital environment [11] for submitting projects to the Building Board for approval or when applying for tenders.
6. Visualizations of Cultural Heritage Preservation Projects.
Documenting cultural and historical objects [17] and introducing the working group to the architectural heritage [16], freehand drawings are a tool for exploring the place in a spatial sense and determining historical facts and boundaries. The graphite imprint on the site allows you to preserve the silhouettes and material structures of details and interpret the correspondence to certain historical periods, to study historical prototypes [21]. The drawing can also be used to perform objective interpretive and emotionally subjective visualization or to create a style appropriate to the era. However, for historically older buildings, there are several such interpretations, and therefore, without a deeper understanding of the evidence of the era in chronological order, they can be misleading. Digital visualizations are dominated by vector graphics or technical precision with photorealism, for example, CAD models or digital photo collages, which are often works that may lack the expressive qualities associated with freehand representation, with the help of which the identity, atmosphere and contextual relationships of the place can be effectively conveyed (see Fig. 7 and 8). An example of this approach can be seen in the watercolor drawings of the Riga Castle complex by architect and painter Artūrs Lapiņš, in which the architectural object is not depicted merely as a building. The drawings reveal the palace's historical atmosphere, the character of the Daugava riverbank landscape, the interplay of light and shadow, seasonal changes, and the human presence in space. These works demonstrate that watercolor can combine documentary information with an emotional message, creating a multi-layered interpretation of the cultural-historical environment. A. Lapiņš's watercolors of Riga Castle confirm that freehand architectural drawing is much more than a means of representation. It is simultaneously a research method, a tool for documenting cultural heritage, a form of creative interpretation, and a means of public education. An empirical approach demonstrates that such drawings foster a deeper understanding of cultural-historical sites, strengthen the emotional connection to the cultural landscape, and make a valuable contribution to both renovation processes and the development of cultural life.
The architect's freehand visualisation reveals several key aspects that digital modeling cannot always fully reflect:

1. *Deeper understanding of the place*. The drawing process requires prolonged observation before the drawing begins. The architect analyzes the object [10], its proportions, perspective, material textures, landscape elements, and the object's relationship to its surroundings. This leads to a deeper understanding of the identity and technical quality of the cultural and historical object.
2. *Reflection of atmosphere and emotions*. Freehand drawing has the ability to convey the atmosphere of a place, its historical character, and the empirical properties of space. The viewer perceives not only the form of the object, but also its emotional message. In the context of Old Riga, this is especially important, as Riga Castle is not only a cultural symbol of Old Riga, but also a fortress of the Livonian Order, one of the main centers of political and military power in the city, which developed into a significant [3] cultural center of the Hanzas Perons.
3. *Author's interpretation*. Each drawing also reflects the artist's own skills and individual perspective. By choosing a specific angle, lighting or emphasis on certain details, the architect creates his own story about the object. In this context, drawing skills are crucial, and the artist's mastery in depicting the historical patina, light and shadow, as well as materials, provides insight into the state of the historical building (see Fig. 7). Both drawings should be considered imaginative representations [19] based on the artist's interpretation. Also, the bird's-eye view of the Riga Castle complex with the designations of the main sections (see Fig. 8) provides more precise information about the complex spatial arrangement of the building, in which the bird's-eye view highlights the structure of only one section.
4. *Documentation of intangible cultural heritage values*. In addition to the properties of materials, drawings document the atmosphere of the place, human activities and expressions of cultural life – elements that often cannot be accurately depicted in technical drawings. The drawings of Riga Castle depict the landscape as it looked in 2012. As the quality of greenery changes in later years or the spatial structure of streets develops in the future, this landscape will serve as documentary evidence of a specific historical period, while also functioning as a work of art, rather than a technologically perfect aerial photograph. Fostering creative thinking.
5. *Freehand drawings* also play an important role in renovation and restoration processes. Their primary function documentation is the one most actively utilized. A visual survey of the site is conducted prior to the design phase. Sketches help capture architectural details, damage, spatial relationships, and the scenic context. The next most important function is the analytical one. Through drawing, the architect identifies elements to be preserved during restoration and determines the most valuable cultural and historical qualities by analyzing and selecting what is valuable from the layers of less valuable material that have accumulated over time. By analyzing historical documents, decisions are made whether to return to the original design (or its specific details) or to preserve more recent changes. For significant cultural and historical sites, approvals are sought from the State Agency for Cultural and Historical Heritage. In analyzing A. Lapiņš's watercolors of Riga Castle, the following serve as perceptual indicators: compositional balance, the depiction of scenic depth, color tonality in the watercolor technique, a sense of historical atmosphere, and people's emotional reaction to the depicted environment. The communication function, where an architect's drawing skills are crucial for making quick decisions on-site or when communicating with the public and presenting detailed drawings. Freehand visualisations are frequently more accessible to non-specialist audiences than technical drawings or complex digital models. They facilitate discussions with the public, clients, and cultural heritage experts.
6. *Design function*. In the early stages of design, sketches are used to test ideas and evaluate solution options without creating strict technological limitations that tend to arise when working directly in a digital environment. Hand drawing as a symbol of the cooperation of thought and hand and precise detailing was professionally necessary until the end of the 20th century, when architectural projects were developed freehand and

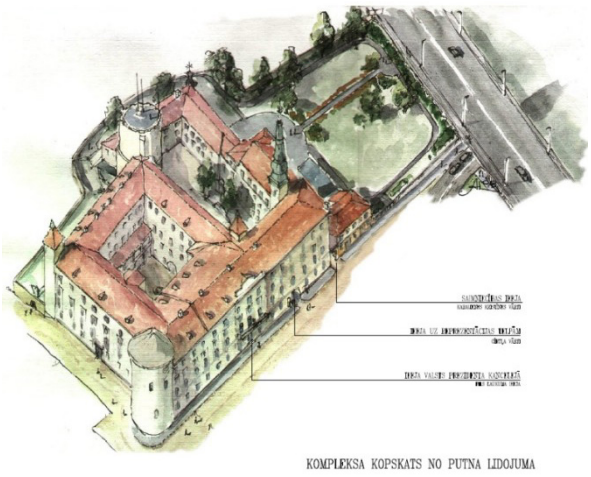


Fig. 7. Drawing created by the Architectural Research Group (AIG) for visualization drawing by architect A. Lapiņš,2012. [19]

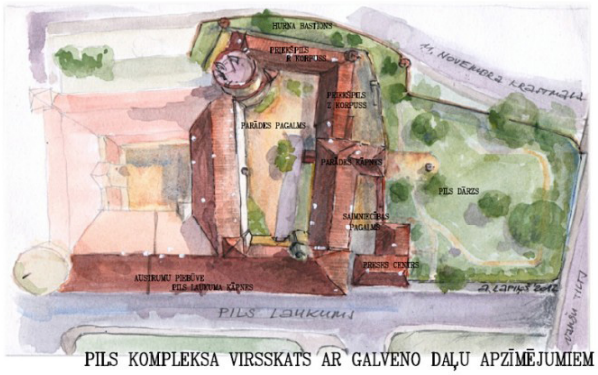


Fig. 8. Aerial view of the Riga Castle complex created by AIG. A. Lapiņš, 2012. [19]

with various tools such as a ruler, compass, stencils, T-protractor and others. Today, architectural design software allows for very precise, clean and fast professional design work, while maintaining sketching as a cognitive process in the early stages of a project or reviewing the development of specific nodes or parts, but losing the direct emphasis of the hand in the final work.

7. *Drawings*. Architectural design drawings of the 20th century were not merely technical documentation but also a form of individual professional thought and artistic expression. Until the widespread adoption of computer-aided design (CAD) in the late 20th century, an architect's primary tools were the pencil, technical pen, ruler, tracing paper, heavy drawing paper, India ink, and watercolor. Design drawings simultaneously served as vehicles for developing ideas, communication, and construction documentation, revealing the author 's personal style, graphic sensibility, and professional experience.

20th-century architectural design drawings were not only technical documentation, but also a form of individual professional thought and artistic expression [30]. Until the widespread introduction of computer-aided design (CAD) in the late 20th century, the main tools of the architect were pencil, ink pen, ruler, tracing paper, thick drawing paper, ink and watercolor. Design drawings simultaneously served as a means of developing ideas, communication and documentation of construction, revealing the author 's personal style, graphic sense and professional experience. During the design process, sketches, perspective views or axonometric drawings, sections, floor plans, facades and roof plans were developed in a sequential creative process. The drawing was not just the result of the project, but a reflection of the architect's thought process [16]. Each line, strikethrough or addition, documented the development of ideas and provided insight into the project's progress, changes, variations and scale. The architect's handwriting style was clearly recognizable, for example, in projects of the functionalist, modernist, and later postmodernist periods, it is possible to identify a graphic language characteristic of the particular author, which included: line thickness and rhythm, composition, and expression of drawing as shading techniques; watercolor tonality; depiction of human figures and landscape elements, and their relative proportions; the relationship between text and graphics; text typefaces and drawing layout.

Drawings reflected not only the object itself, but also the architect's interpretation of space, environment, and human interaction with architecture [26]. Today, 20th-century drawings have become important cultural heritage evidence. They allow researchers to analyze design methodology, the evolution of architectural styles, the architect's professional thinking, and sometimes unrealized architectural ideas or even entire projects, as well as the impact of technology on the design process. Unlike digital files, historical drawings contain a lot of additional information – notes, corrections, analysis of color relationships, for example, in facade color passports or visualisations of objects in the urban landscape. Although contemporary architectural practice is predominantly shaped by digital design environments, including CAD (Computer-Aided Design) and BIM (Building Information Modelling) technologies freehand drawing remains an important methodological tool. Its value is particularly evident in renovation and heritage conservation projects, where direct observation, the interpretation of historical fabric, and the exploration of design interventions often benefit from sketch-based analysis and visual thinking. The advantages of CAD drafting in renovation and restoration projects are undeniable, as these projects demand exceptional precision and involve working with existing historic structures (see Fig. 9) where the values to be preserved cannot be exposed to the risk of errors inherent in the human factor.

Precise documentation of the existing condition of historical sites requires integration into a CAD or BIM environment to create an accurate digital model. This enables the recording of even minor deformations, structural settlements, and historical details that might otherwise go unnoticed during manual surveying. In restoration projects, modifications are frequently made whether based on directives from cultural heritage authorities, expert assessments by structural engineers or conservators, or new information emerging from fresh archival research. CAD systems allow for the rapid adjustment of drawings while maintaining the consistency of all associated plans, sections (see Fig. 10), and elevation drawings. Digital platforms facilitate the coordination of work among all specialists within a unified environment [4] and enable the timely identification of potential points of conflict. The benefits revealed through the analysis of cultural-historical layers are particularly noteworthy.

In a BIM environment, it is possible to model various stages of a building's development starting with its initial massing

and to quickly incorporate layers representing historical alterations and later modifications by toggling layers within the software [24]. This enables the modeling of different restoration scenarios or proposals for functional solutions. This approach is particularly significant for castles, manors, historic public buildings, and industrial heritage sites.

Digital tools enable the creation of high-quality photorealistic visualisations and facilitate, for instance, virtual tours for public engagement during the public consultation phases of a project, as well as for use in museum exhibitions and educational processes. This significantly improves public understanding of the planned changes.

Despite the dominance of digital technologies, freehand drawing retains several unique functions in architectural practice. When studying a site or building, architects often produce sketches of details and structural junctions, record decorative elements, document landscape views [18], and take spatial measurements of interiors. This process yields a much deeper understanding of the subject than photography alone. The next stage, as previously discussed, involves developing the project concept; in the initial design phase, ideas most frequently emerge through sketching.

Freehand drawing allows for the rapid testing of spatial ideas, free and confident experimentation, the exploration of various options, and the avoidance of becoming constrained by technical limitations too early in the process. When making restoration decisions regarding specific architectural details such as window profiles, door portals, decorative elements (columns, windowsills, trim, ceiling cornices or moldings), or stair structures and their historic railings analytical sketches are still produced, enabling a focus on the most essential characteristics.

Through public consultations, the authors concluded that freehand perspective drawings often inspire greater public trust than computer-generated images, as they are perceived as interpretations rather than definitive promises regarding the outcome.

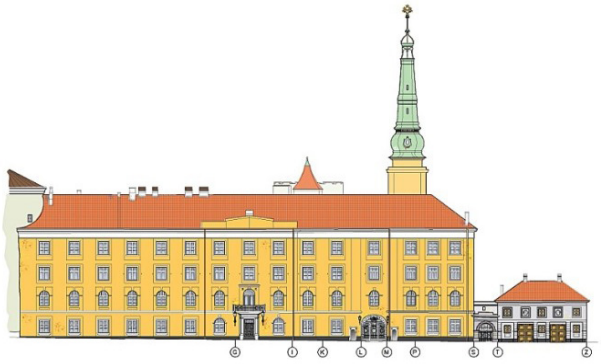


Fig. 9. Digital drawing of the Riga Castle facade. P/S Pils Projekts; Lead Architect for Research: Artūrs Lapiņš the Architectural Research Group (AIG); Chief Engineer: Jānis Prauliņš (Būve forma SIA) [15]



Fig. 10. Detailed digital drawings for the restoration of Riga Castle. Drawings by the architectural firm "Sudraba arhitektūra", lead Architect: Reinis Liepiņš [14]

Comparative analysis of findings and international context

The results show that freehand drawing is present in all the projects studied. Sketches functioned as cognitive tools that support observation, interpretation, communication and decision-making. This finding is consistent with Goldschmidt's understanding of sketching as a cognitive mechanism for design and confirms recent [11] international studies that emphasize the continuing importance of analog thought processes in digital design environments. A comparison of the case studies reveals significant differences in the use of sketches. In the Hanzas Perons project, sketches mainly supported conceptual development and the integration of contemporary functions into the industrial heritage structure. In contrast, the restoration of the Riga Castle Monastery relied heavily on analytical and documentary drawings to interpret historical evidence, archaeological finds and architectural stratification. These differences indicate that the role of sketches varies depending on the project objectives, the significance of the heritage and the available documentation. The findings also suggest that sketching improves interdisciplinary communication when digital drawings could not sufficiently explain complex spatial situations, as indicated by the architects interviewed. Similar observations have been reported in recent studies on heritage conservation and BIM-supported restoration [11] workflows. When compared with recent international studies, the results confirm several common trends. Choi et al. (2023) demonstrate that historical architectural sketches still have practical value and are increasingly becoming the subject of digital restoration and machine learning applications. Ferro et al. (2023) emphasize the importance of scan-to-BIM workflows in heritage documentation, while Cascone et al. (2024) highlight BIM-based approaches [8] as essential tools for building restoration and building management. The current study complements these findings by showing that freehand drawing remains an important source of information even before digitisation and BIM integration.

Conclusions

The comparative analysis shows that the methods used in Latvian Cultural Heritage restoration and revitalisation projects are in line with international trends in Italy, Portugal, France and the United Kingdom. In all the studied examples, an integration of analog and digital methods is observed, where freehand sketching serves as an initial research, interpretation and communication tool, while BIM, CAD, photogrammetry ensures precise technical implementation. The study complements scientific literature in several aspects. First, it demonstrates that freehand drawing is a design tradition and an important tool in restoration decision-making and interpretation of cultural and historical information also in the 21st century. Second, the study confirms the role of sketching in communication with partners and the public in technical solutions and in strengthening the sense of community belonging. Third, it shows that even in highly digitalised work

processes, analog visual thinking retains its importance as a cognitive mechanism that helps identify cultural and historical values and develop sustainable restoration solutions in the 21. century urban [28] landscape. Thus, the results of the study expand on the conclusions of international research, emphasizing that successful cultural heritage preservation is based not on the competition between analog and digital methods, but on their mutual complementarity.

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Kopsavilkums
Šajā rakstā tiek pētīts brīvrokas zīmējums arhitektūras revitalizācijas un rekonstrukcijas procesos, vēsturisko ēku izpētē un restaurācijas stratēģiju izstrādē 21. gadsimtā un to transformācijā digitālajās projektēšanas metodēs. Pētījuma mērķis ir noskaidrot rokas zīmējuma lomu kultūrvēsturiskā mantojuma saglabāšanas, arhitektoniskās izpētes, projektēšanas un digitālās modelēšanas procesos, kā arī izvērtēt tā nozīmi mūsdienu BIM, CAD, fotogrammetrijas un lāzerskenēšanas tehnoloģiju kontekstā.
Pētījums balstās uz divu revitalizācijas projektu analīzi; tajā izmantotas novērošanas un salīdzināšanas metodes, analizējot "Hanza perona" un Rīgas pils projekta dokumentāciju, kā arī līdzdalības novērojums studiju procesā izstrādājot idejas starptautiskā revitalizācijas projektā BIP ReUso2025, kuros novēroti brīvrokas zīmējumi, objektu apsekojumu materiāli, restaurācijas dokumentācija, BIM un CAD faili, vēsturiskās fotogrāfijas un digitālie modeļi, kā arī senākie Rīgas pils zīmējumi Latvijas Valsts arhīvā un J. K. Broces (18. gs.) interpretācijas. Pētījuma ticamība balstās uz tiešām daļēji strukturētām intervijām ar arhitektiem, kuri bija atbildīgi par restaurācijas projektiem. Rezultātu ticamības nodrošināšanai tika izmantota metodoloģiskā triangulācija, salīdzinot datus no arhīviem, intervijām, novērojumiem un projekta dokumentācijas. Gadījumu izpēte apliecina arhitekta skices vērtību konceptuālajā projektēšanā, restaurācijas detaļu izstrādē un vēsturiskās klātbūtnes interpretācijā. Raksta mērķis ir parādīt, kā brīvrokas zīmējums veicina autentiskuma saglabāšanu, starpdisciplināru sadarbību un projektēšanas kvalitāti. Vienlaikus jāatzīmē, ka analizētie projekti pārstāv divus Latvijas restaurācijas prakses piemērus un skices interpretāciju zināmā mērā ietekmē pētnieka profesionālā pieredze un projekta konteksts. Diskusijā tiek uzsvērts, ka brīvrokas zīmējums saglabā savu nozīmi digitālajā projektēšanas vidē, ja arhitekts veic padziļinātu izpēti. Tādēļ ieteicams to sistemātiski integrēt projektēšanas procesā kā līdzekli vēsturiskā mantojuma un mūsdienu arhitektūras risinājumu sasaistei.
Pētījums ļauj secināt, ka ilgtspējīgā renovācijas un revitalizācijas praksē efektīvākais risinājums ir tradicionālo zīmēšanas prasmju un digitālo tehnoloģiju integrācija. Arhitekta rokas zīmējums saglabā būtisku lomu kultūras mantojuma interpretācijā, estētisko risinājumu veidošanā un projektēšanas kvalitātes nodrošināšanā, veicinot Jaunā Eiropas Bauhaus principiem atbilstošu līdzsvaru starp ilgtspēju, estētiku un kultūrvēsturisko vērtību saglabāšanu.