Thermal bridge:

Conflating the flatbed picture:production plane

Rasmus Strange Thue Tobiasen

Foldable cardboard boxes perform everyday magic, *transferring* from flat sheet to three-dimensional enclosure through a single operation: cuts, creases, and folds executed on the production bed. This conflates drawing and making—disrupting architecture's conventional *spatial contract* between representation and built form.

The translation between drawing and building is a problematic yet potential bridge.[1] The convention of architectural drawings (plan, section, elevation, perspective) rests on a notational "separation" between design and making—a distinction underlying post-Renaissance architectural discourse.[2] While premised on this separation, these drawings also rely on the illusion of depth—not just in perspective, but in the apparent depth of sections and elevations. They bridge the gap through a *spatial contract*: a resemblance tricking three-dimensionality from two dimensions.

These drawing types prioritize architecture as space, sidelining production and manufacturing processes. The typical architectural sequence elevates space over production during conception, as spatial construction drawings precede fabrication and shop drawings. The latter—produced after the *spatial contract* is sealed—function as post-spatial representations: cut lists and material schedules emphasizing specifications, quantities, and dimensions. These break the *spatial contract* by deconstructing the building into disparate parts, unfolding and splaying them flat across the drawing plane. Fabrication drawings thus mirror how many building elements (prefabricated or on-site) are manufactured or assembled on a flat horizontal surface before erection.

I propose inverting this sequence: prioritizing a *contract of flatness* between production and representation over spatial illusion, by reorienting attention toward a materialization of the drawing. This inversion would disrupt established hierarchies, loosening architecture's control of space to better bridge drawing and building through their conjoined horizontal working surface.

—

In his essay section *The Flatbed Picture Plane,* Leo Steinberg identifies a *tilt* in the conventional picture plane around 1950, evident in work *developed surface interior* of Robert Rauschenberg.

This tilt reorients the picture plane conceived as a window—a premise of pre-1950 painting, aligned with the verticality of human posture and naturalistic "worldspace"—to "any *receptor surface* on which objects are scattered, on which data is entered, on which information may be received, printed, impressed—whether coherently or in confusion."[3]

Upon these "tabletops" (Figure 1), objects float freely, breaking top/down hierarchies—evoking equalisation between representational surface and real material objects. Steinberg notes how Rauschenberg's pictures *tilts* by referring back to horizontals—like a chair ingrown with the painting (*Pilgrim*, 1960)—or evoke horizontal operations as when he erased a Willem de Kooning drawing by "pressing down on a desk" he tilted de Kooning's worldspace. It marks "a radically new orientation, in which the painted surface is no longer the analogue of a visual experience of nature but of operational processes."[4]

Expanding on this reorientation, Rosalind Krauss reads Rauschenberg's *Combines* as gaining "material thickness" through "transferring"—not transforming—real objects onto the picture plane, sustaining their materiality. [5] Rauschenberg thus conflates medium and matter: the resistance of real objects meets the flat picture plane not via representation, but by absorbing their traces and marks.

—

Conventional architectural representations sustain the *spatial contract*—planar correlation in plans or vertical worldspace in sections, elevations, and perspectives, demarcating top/bottom hierarchies. By contrast, the *developed surface* projection (famously used in Earth maps) breaks the *spatial contract* by unfolding three-dimensional objects onto a two-dimensional surface.

Architectural historian Robin Evans explores its adaptation to interior space—the room—in his essay *The Developed Surface*. The *developed surface interior,* named by Evans, was a way of turning architecture "inside-out". "The plan is shown in the middle in a group of four elevations which look as if they had been folded out from their upright position and flattened into the same plane as the plan."[6]

With the ground plan centered, walls splay flat, hinged around the floor joint, generated multiple reading horizons. The consistently absent ceiling in these drawings reinforces a floor-centric focus: adding the ceiling would likely fracture its already weak *spatial contract*.

Like all architectural drawings, the *developed surface interior* is no "neutral vehicle" but "a medium that carries and distributes information in a particular mode." Evans notes its limitations: concealing

“wall thickness”, "fractures space," and "destroys continuity," rendering "everything flat and resistant to interpretation." [7]

Thus, it ruptures the *spatial contract*, distancing representation from object. While the *spatial contract* is broken, other aspect seems supported by these flat working surfaces. Steinberg observes how Rauschenberg's working surface allows data and information "to be mapped in an overcharged field,"[8] a condition Evans similarly identifies as the *developed surface interior* and “its derivates offered an opportunity to saturate interior surfaces with ornament.” Evans further notes how the surface supported flatness over depth: "It is painterly architecture that compares with the developed surface, intent on illusion, but it is not the illusion of depth that is sought, it is the illusion of flatness."[9]
The *developed surface interior* hints at spatial representation through its preserved topological relations, while its unfolded layout gestures toward flat fabrication—forming a *flat worldspace* across planetary and room-sized scales.

—

To render this flat architecture, the *Thermal bridge* structure—based on the foldable cardboard box diagram—explores how to keep the integrity of the flat medium, through “horizontal” strategies: objects, symbols and signs, saturations, overworking, forms of organising, as it erects into the realm of built form. The cardboard box's two-to-three-dimensional transformation, enabled by flatbed die-cutting, offers architecture a horizontal *receptor surface* and production model. The production technique entails laying a flat cardboard sheet upon a bed, against which a die is pressed to cut, perforate, and crease the material into a form that folds into a box. The physical die tool is fabricated from a *die line*; a blueprint drawing delineating cut lines, perforations, fold lines, bleeds, and safety margins. In relation to the developed interior surface, the *die line* encompasses all surfaces of its room, further equalising the depiction of space while rendering it production-ready. Like fabrication drawings, the *die line* functions as a cut list, yet it avoids fragmenting space into discrete, 'floating' components. It enables a structure to oscillate between dual spatial conditions—unfolded/folded, open/closed, uninsulated/insulated, flat/spatial— while preserving the intrinsic properties of the drawing/production surface—its connectivity, adjacency, and neighbourhood relation; its topological relations are kept intact, keeping the *integrity* of the *picture/production plane*. See (Figure 2).

—

While this research reveals the aesthetic, material, and tectonic qualities of flat architecture, *Thermal bridge* also engages building transformation under climatic imperatives—specifically re-insulation. Robin Evans observes how the *developed surface* technique transformed domestic spatial organization from "fundamentally hierarchical arrangements" toward "equalisation of territory," paradoxically producing an “orgy” of distinctively shaped rooms within this equalization.[10]
This logic challenges conventional re-insulation preserving spatial organization by adding insulation to the existing exterior walls. *Thermal bridge* instead rethinks domestic spatiality through flat architecture, extending the *developed surface*'s historic disruption of spatial hierarchies.
Inspired by removable secondary glazing panes—which add adaptive thermal layers for winter and retract in summer—*Thermal bridge* becomes a speculative adaptive secondary room: enveloped enclosure in winter, unfolded floor in summer, enabling seasonal reorganization of living space.

—

The *Thermal bridge* structure measures 111 × 245 × 238 cm when folded (enveloped) and expands to 303 × 574 cm when unfolded, calibrated to fit the Sum exhibition space in Copenhagen in both flat and spatial conditions.
It comprises 12 prefabricated stud-wall elements arranged around a hexagonal core derived from the tangram dissection puzzle—enacting the *developed surface*'s reorientation toward room distinction. When erected from its continuous floor layout, *Thermal bridge* reveals an *open crease* between elements—a nontectonic joint and indexical sign questioning depth and materiality between drawing and building (Figure 3). Studs are tilted 5° (Figure 2) to evoke how gift wrap retains its printed image integrity when wrapped, creating a double reading that simultaneously flattens and tilts spatial perception.
Leveling feet (Figure 3), distributed evenly across the elements' backsides, creates ventilated air gaps—breathable construction detail essential for older walls without plastic vapor barriers[11] This prevents condensation while maintaining moisture diffusion, aligning with traditional wall physics rather than modern sealed systems. When tilted, these levelling feet become ornamental features, oscillating between object and image, function and ornament.

Blue UV masking tape serves as fake shadow and semiotic nod to UV mapping—a digital technique analogous to the *developed surface*. It renders the studs' illusory depth, seen from *die line* perspective revealing its "shadow line."[12]As a component straddling representation and built form, it emphasizes this in-between transformation.
Reused foldable cardboard boxes from Danish POLYGON DB (sourced via DBA.dk peer-to-peer marketplace) line the interior as wallpaper. The company's name evokes polyform concepts, while its Reuleaux triangle logo recalls octant projection—flattening Earth's octants into triangles. Distributed as continuous pattern across the flat *die line* layout (Figure 2), these boxes eliminate top/bottom hierarchy as they fold around corners, unifying the interior (Figure 4). Seen from the outside, the reading of handle holes starts to float and transform into peepholes.

—

Rethinking re-insulation by '*reusing'* the foldable cardboard boxes (its media and materiality) is not an entirely strange 'combine', given newspapers' history as improvised insulation.[13] As an abundant and readily available material, newspaper has prompted alternative DIY re-insulation approaches, and direct models of materializing media. Today, the foldable cardboard box has supplanted newspaper as a similarly ubiquitous household resource, potentially inspiring novel models for thinking about environmental issues through the flatness of media, a flat architecture.
Jane Rendell captures this attitude of bricolage:

> Combining objects derived from many sources compares to postmodern intertextuality, the weaving of quotations. Placing found objects in new context encourages us to make connections we would not normally make. Everyday items become lively, animate and communicate in new ways. (…) The imagination creates these fluid relationships, rejecting the constraints imposed by rules of domestic order where 'everything has its place'. The diving line between messiness and tidiness is blurred. Inside is outside. The seams are the décor. (…) Placing things and bodies in unusual combinations, positions us in new uncharted territory. Lost in space, our cognitive mapping devices de-stabilised, we imagine a new poetics of space and time.[14]

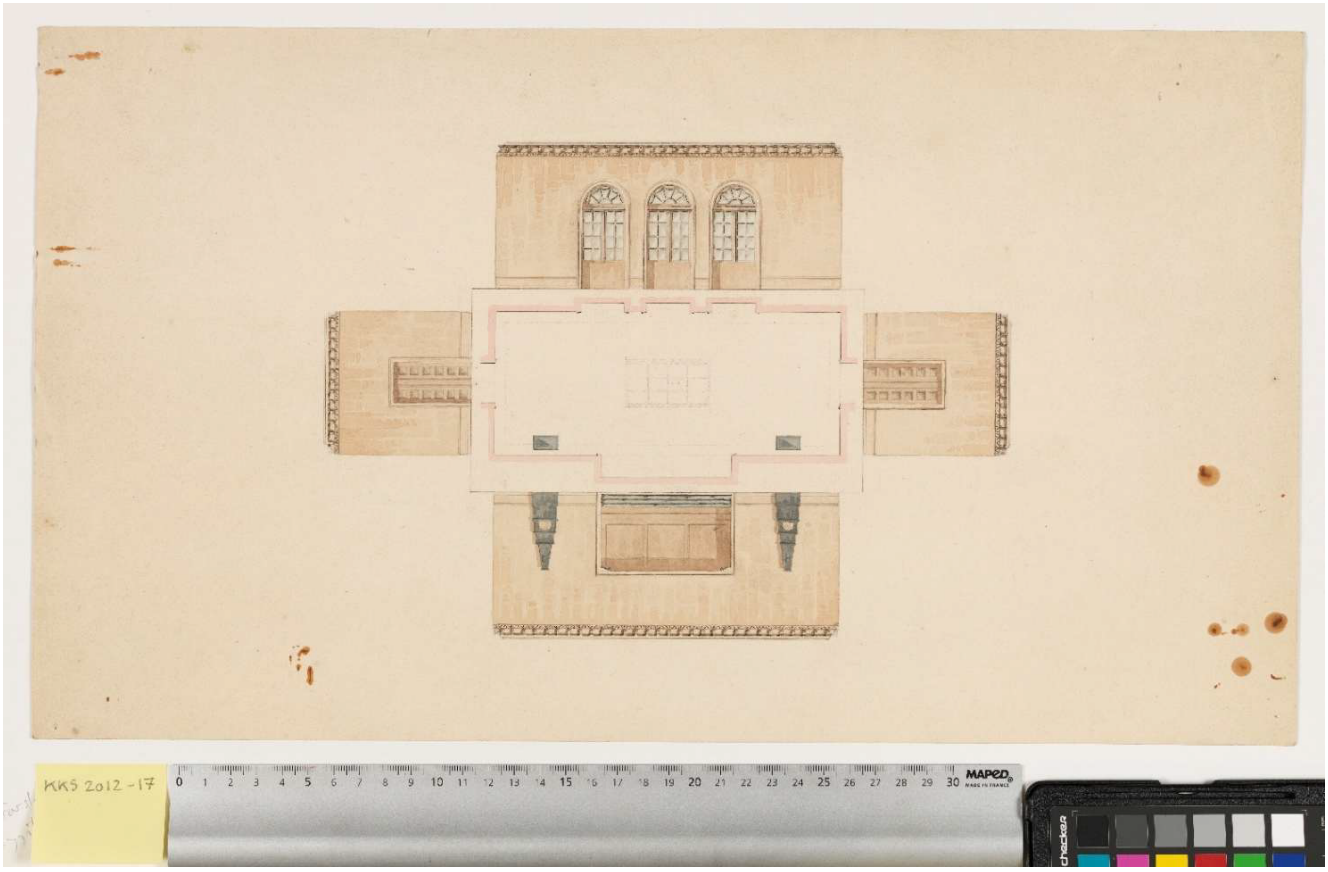

Figure 1. Photograph of a *developed surface interior* drawing placed on a tabletop with post-it notes, metal ruler, and colour tests. This staging positions it between Evans's *developed surface interior* and Rauschenberg's *receptor surface*—evoking the flatbed's "unswept floor" through mundane informality. Photographer unknown. Jørgen Koch Hansen (1787-1860). *København, Kongens Nytorv, Det Kgl. Teater - Skuespilfoyer*. n.d. Arkitekturtegning. (7678 x 5031 pixels). (The material is free of copyright) https://digitalesamlinger.kb.dk/images/billed/2010/okt/billeder/object1721939/da/.

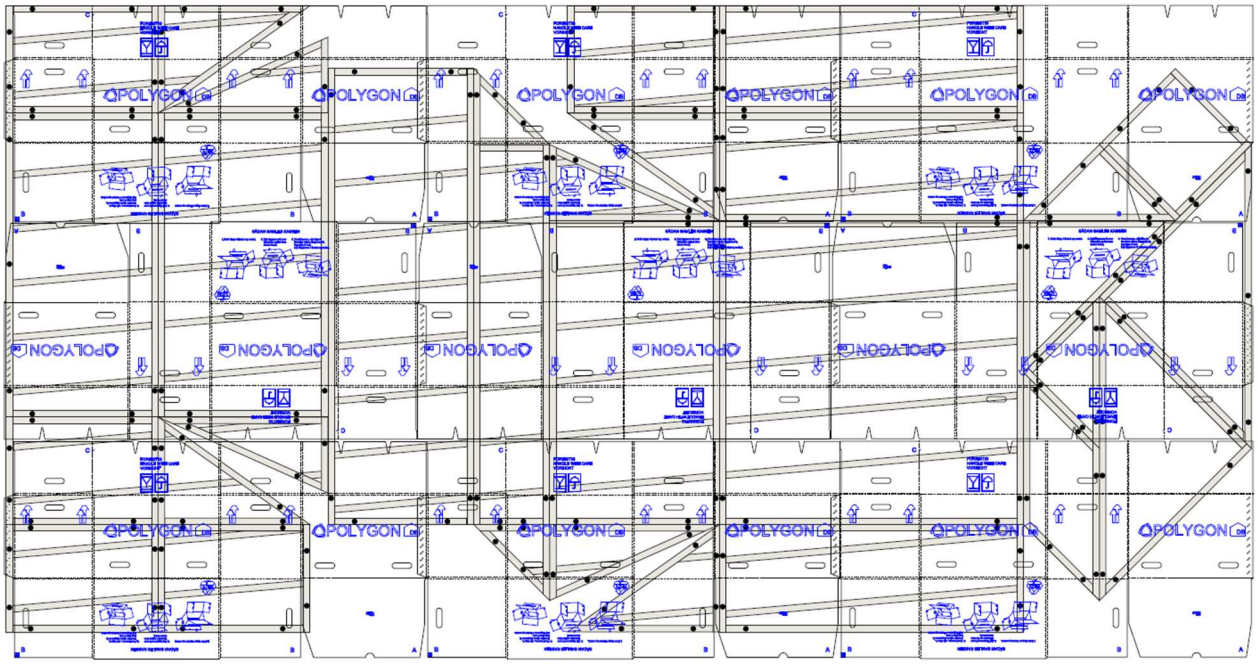

Figure 2. Conflated interior-exterior *die line* drawing. (Drawing by author.)

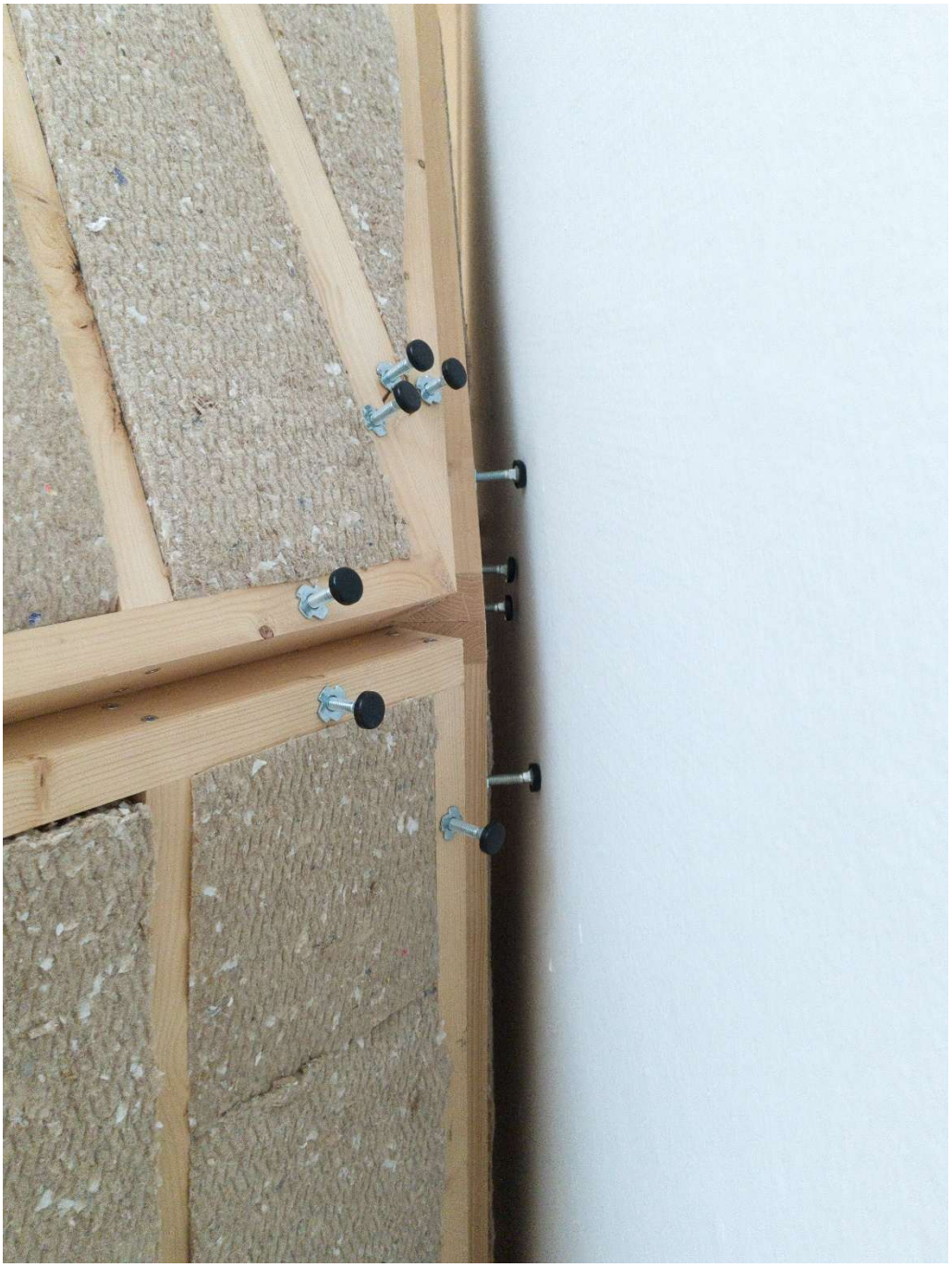

Figure 3. ‘Outside’: *Thermal bridge* offset from the existing wall by levelling feet, revealing their dual role as functional spacers and ornamental images as they *tilt* into space. (Photography by author)

Figure 4. 'Inside': *Thermal bridge* interior with reused POLYGON DB cardboard. (Photography by author)

Bibliography

Carpo, Mario. *The Alphabet and the Algorithm*. Writing Architecture. MIT press, 2011.

Evans, Robin. "The Developed Surface - An Enquiry into the Bried Life of an Eighteenth-Century Drawing Technique" (orig. pub. 1989). In *Translations from Drawing to Buildings and Other Essays: Robin Evans*. Architectural Association, 1997. Reprint, AA Publications, 2023.

Evans, Robin. "Translations from Drawing to Buildings" (orig. pub. 1986). In *Translations from Drawing to Buildings and Other Essays: Robin Evans*. Architectural Association, 1997. Reprint, AA Publications, 2023.

Krauss, Rosalind. 'Rauschenberg and the Materialized Image'. *Artforum* 13, no. 4 (December 1974): 36-43

Pérez-Gómez, Alberto. "The Historical Context of Contemporary Architectural Representation." In *Persistent Modelling: Extending the Role of Architectural Representation*, edited by Phil Ayres. Routledge, 2012.

Rendell, Jane. "Doing It, (Un)Doing It, (over)Doing It Yourself - Rhetorics of Architectural Abuse." In *Occupying Architecture - Between the Architect and The User*, edited by Jonathan Hill. Routledge, 1998.

Leo Steinberg. "Other Criteria: "The Flatbed Picture Plane"'. In *Other Criteria: Confrontations with Twentieth-Century Art*, by Leo Steinberg. Oxford University Press, 1972. 82-91

Vadstrup, Søren. *Bevaringsværdige Bygninger – Gode Løsninger Til Energiforbedring Og Indeklimaforhold*. Center for Bygningsbevaring i Raadvad, 2017. https://www.bygningsbevaring.dk/uploads/files/litteratur/bevaringsvaerdige_byg_energi_nov_2017_ver2.pdf

Bio

Rasmus Strange Thue Tobiasen is an architect and Teaching Associate Professor at the Institute of Architecture, Urbanism & Landscape at *The Royal Danish Academy – Architecture, Design, Conservation*. Stranges artistic research centres on the production of space at the intersection of architecture, fabrication, and use. It engages critically with representation and production techniques, abstraction, and material semiotics in order to question disciplinary conventions in architecture and to address the built environment under conditions of new environmental consciousness.

Notes

[1] Alberto Pérez-Gómez. “The Historical Context of Contemporary Architectural Representation”. In *Persistent Modelling: Extending the Role of Architectural Representation*, Ed. By Phil Ayres. Routledge, 2012.
[2] This is the “Albertian paradigm”, where the distinction between design and making, reached its theoretical climax, through the invention notational systems and where architecture became primarily allographic. See Mario Carpo. *The Alphabet and the Algorithm*. Writing Architecture. MIT press, 2011.12-26
[3] Leo Steinberg. “Other Criteria: “The Flatbed Picture Plane”’. In *Other Criteria: Confrontations with Twentieth-Century Art*, by Leo Steinberg. Oxford University Press, 1972. 82-84
[4] Leo Steinberg. “Other Criteria,” 86-87
[5] Rosalind Krauss, “Rauschenberg and the Materialized Image.” In *Artforum* 13, no. 4 (December 1974): 36-43
[6] Robin Evans. “The Developed Surface - An Enquiry into the Bried Life of an Eighteenth-Century Drawing Technique”. In *Robin Evans: Translations from Drawing to Buildings and Other Essays*. Architectural Association, 1997. Reprint, AA Publications, 2023.176-177
[7] Evans, “The Developed Surface,” 175-178
[8] Leo Steinberg. “Other Criteria,” 88
[9] Evans, “The Developed Surface,” 182-183.
[10] Evans, “The Developed Surface,” 179-180.
[11] Vadstrup, Søren. Bevaringsværdige Bygninger – Gode Løsninger Til Energiforbedring Og Indeklimaforhold. 2017. 30-36.
[12] Robin Evans, “Translations from Drawing to Buildings”. In *Robin Evans: Translations from Drawing to Buildings and Other Essays*. 1986. 144.
[13] In her DIY essay, Jane Rendell observes how the “the roof was lined with newspaper” as it was cheaper and less pollutant. See Jane Rendell, ‘Doing It, (Un)Doing It, (over)Doing It Yourself - Rhetorics of Architectural Abuse’. In *Occupying Architecture - Between the Architect and The User*. edited by Jonathan Hill. Routledge, 1998. 244.
[14] Rendell, ‘Doing It, (Un)Doing It, (over)Doing It Yourself’. 1998. 245.