A STUDY INTO SCAFFOLDING

BINDER 2
CONTEXT AND PROCESS

Karina Tang
AHO, Diploma, Fall 2021

A STUDY INTO SCAFFOLDING

Karina Tang
Master Architecture Diploma
AHO, fall 2021

OVERVIEW

INTRODUCTION

CAN SCAFFOLDING BECOME ARCHITECTURE?

This is A Study into Scaffolding, an architecture diploma exploring ideas of maintenance and value through the secondary structures that facilitate this process - scaffolding. In its assembled form it separates the built from its environment. It is a visual indicator of maintenance, perceived in everyday life often as an inconvenience - or not at all.

Scaffolding is supportive, temporary, and secondary to the object / event. And yet, in the built environment, scaffolding is essential to any sort of maintenance (or construction) - without it, humans would not be able to reach anywhere higher than they are tall.

The diploma suggests that this reliance makes scaffolding worthy of architectural investigation. It examines existing relationships between scaffolding and architecture, testing small changes and new approaches that architects might consider to better anticipate future maintenance.

The approach used in the diploma is framed around values, adapted from conceptual models used in architectural preservation. Each chapter explores a value using a similar method:

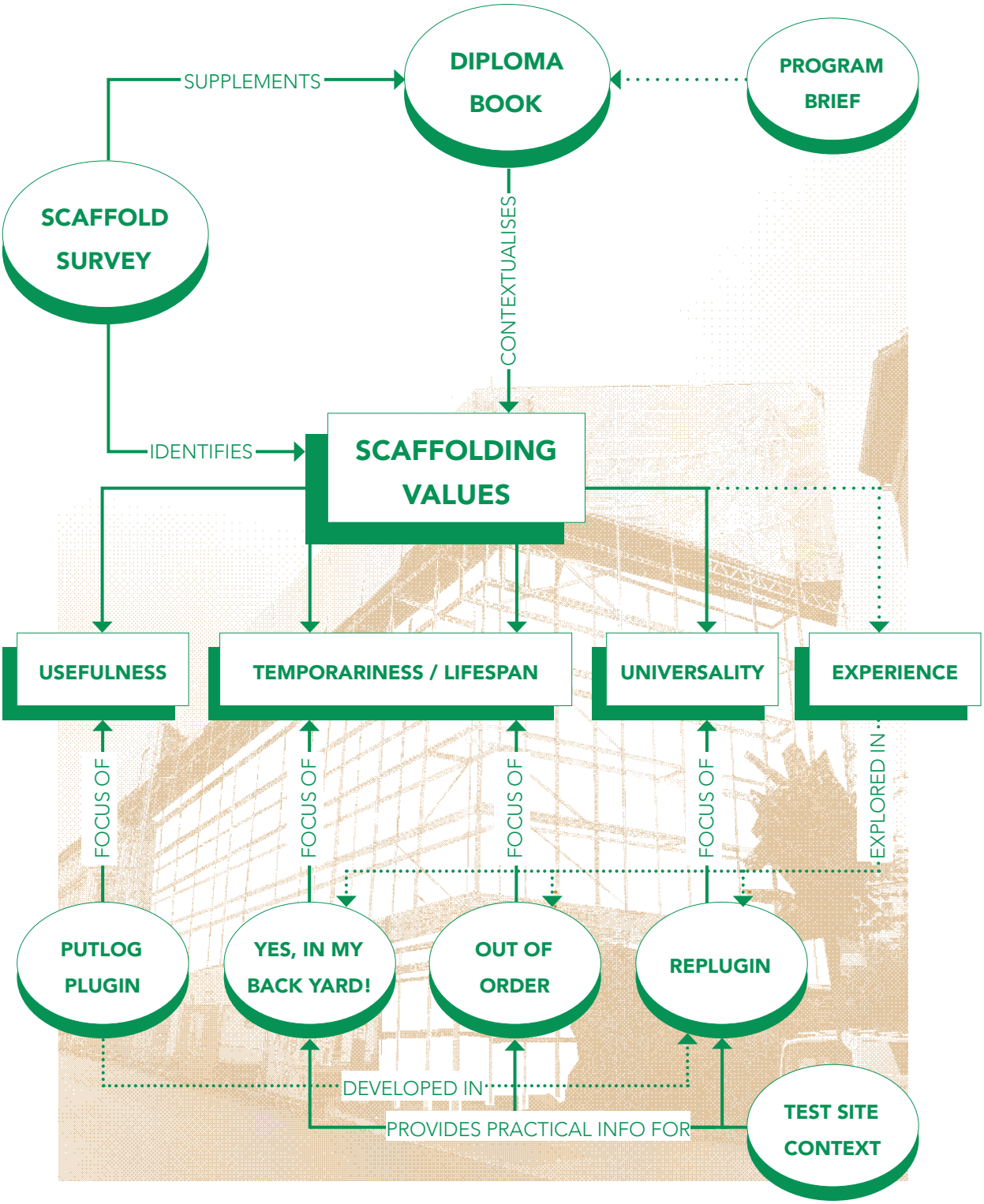
1. Value is contextualised through observations and research
2. A quality / variable is identified for testing
3. Design work around the variable is tested on existing sites selected for their specific conditions.

The brief outlines the aims of the diploma in more detail.

The design work explores four values - usefulness, lifespans (in short and long cycles) and universality. Experience value is present in all projects, and forms a factor in assessing the 'success' of a test. The intention of the diploma is to speculate towards a more holistic understanding towards thinking about maintenance and possibilites of scaffolding, particularly in relation to architectural preservation and adaptive re-use.[1]

Supplementing this diploma book and the project material is a scaffolding survey.

[1]The diploma in a broader context is situated in the part of architecture that believes 'good' buildings are 'long life, loose fit, and low energy' (See Gordon, Alex. "Architects and Resource Conservation" in RIBA Journal January 1974). New builds and, where possible, retrofit / re-use projects should be enduring and designed to anticipate functional obsolescence. My suggestion is that an awareness of future maintenance means scaffolding is worth investigating.

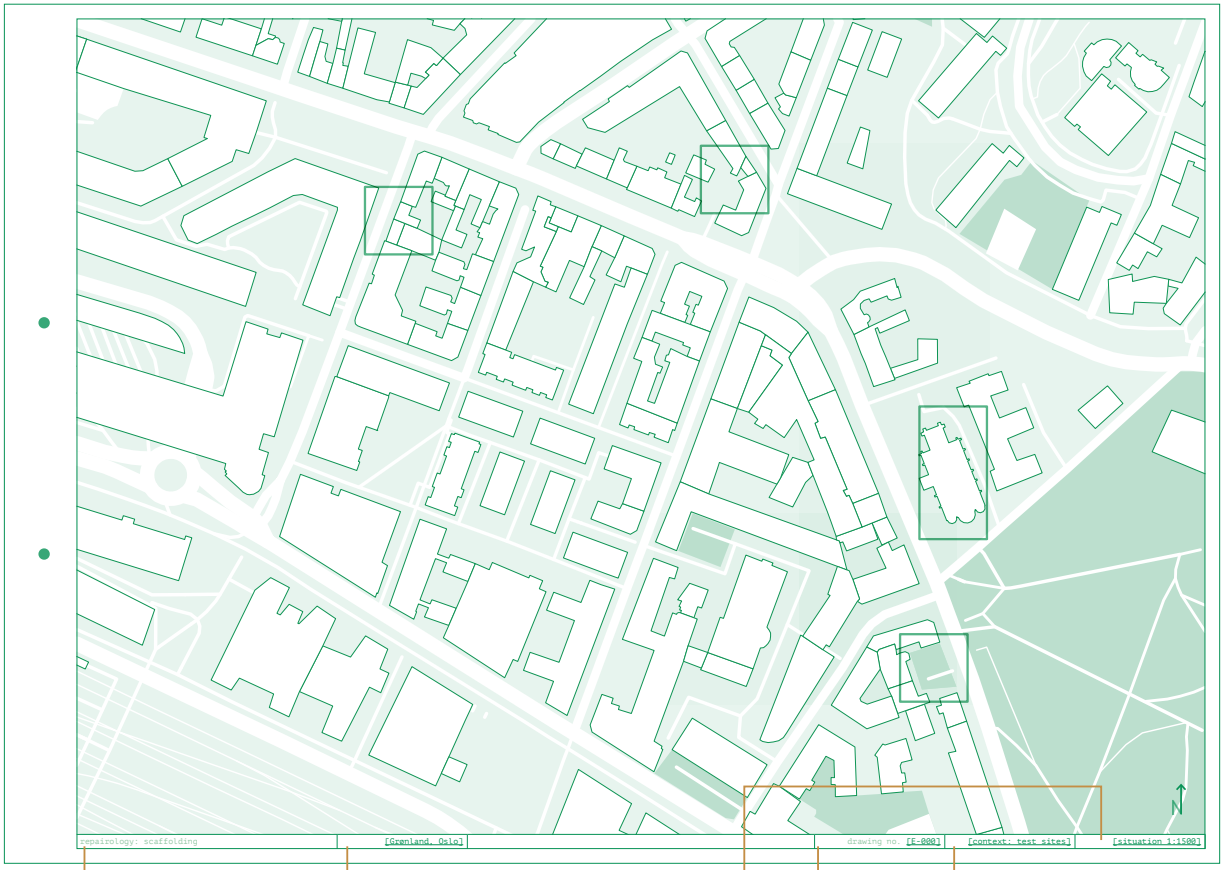


Supplementary diagram showing how the diploma is organised around identified values.

HOW THE DRAWINGS ARE NUMBERED

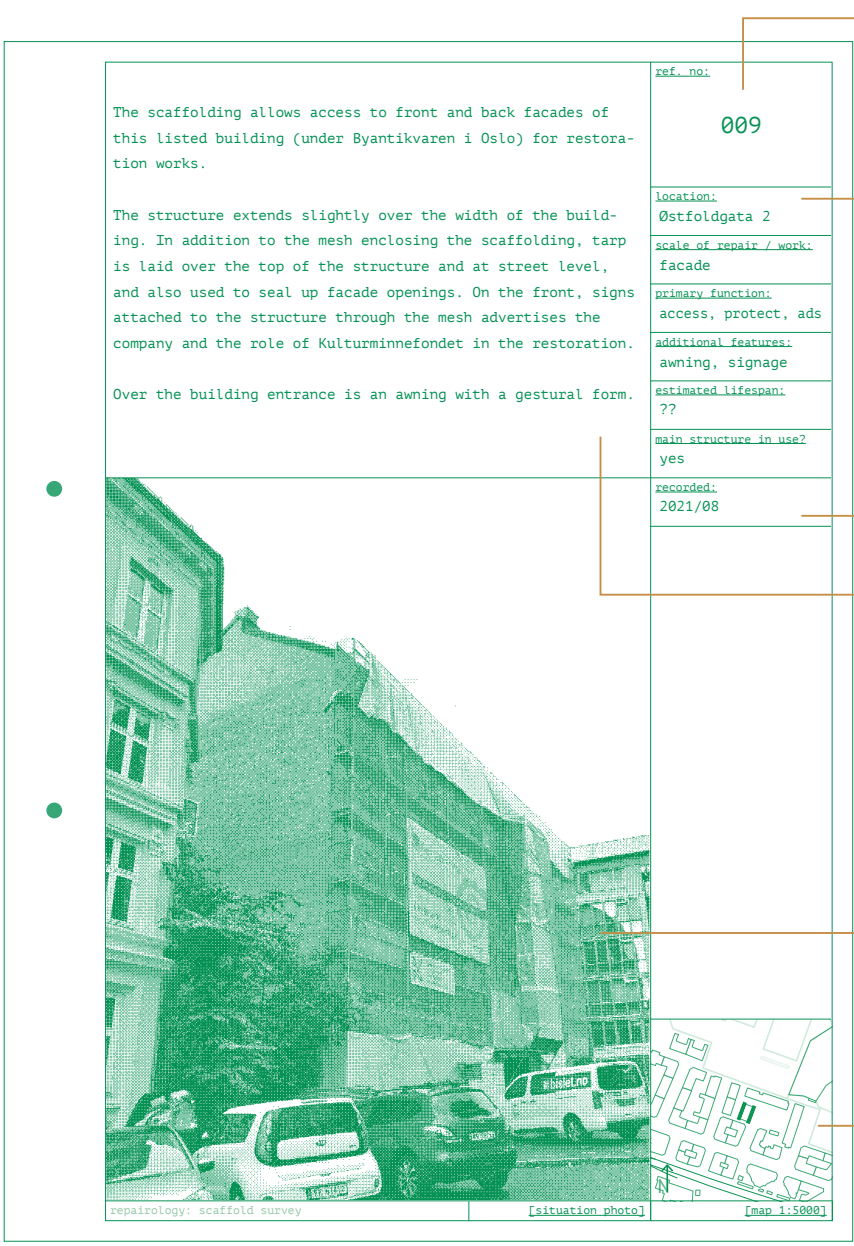
The design components of this diploma comprise of 4 sets of drawings, each exploring a different aspect of scaffolding. To help understand which drawings belong to which set, the organisation system is outlined below for reference.

A drawing register is included in Binder 1.



HOW TO READ THE SCAFFOLDING SURVEY

The scaffolding survey documents instances of scaffolding in / outside of Oslo, and also throughout history, showing the range of use of scaffolding as a support structure. From these studies, preliminary typologies of scaffolding in terms of form and function were developed.



Reference numbering:
000 series - in Oslo
100 series - outside Oslo
200 series - historical

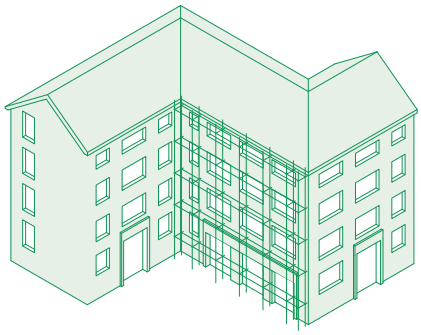
Summary, including possible ways of organisation

Pragmatic description of building / site, scaffolding features, and architectural points of interest

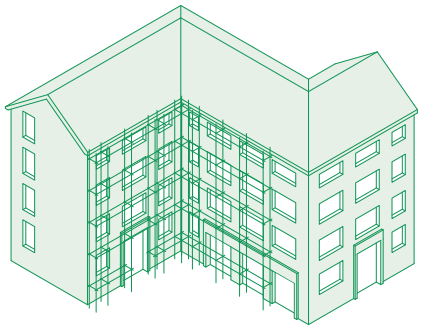
Site photo

Situation map to show extent of scaffolding

EXTERIOR SCAFFOLDING



exterior 1: perimeter (surface)

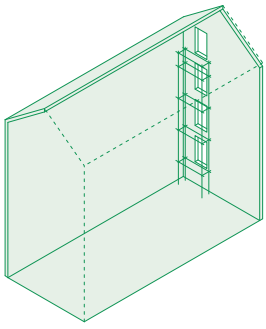


exterior 2: perimeter

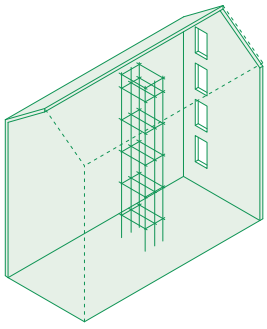
exterior 4 1: boarding

exterior 5: free-standing

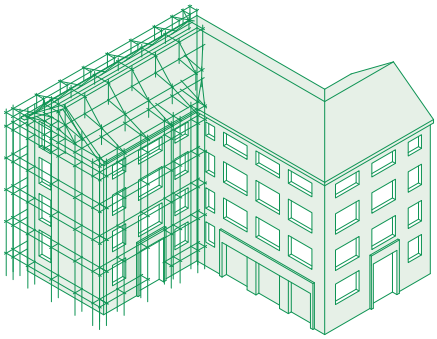
INTERIOR SCAFFOLDING



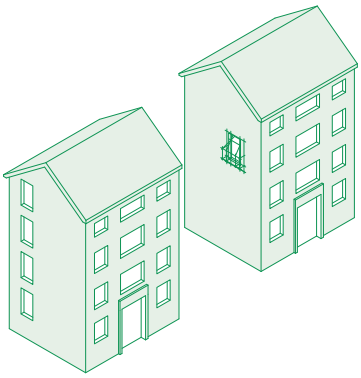
interior 1: perimeter



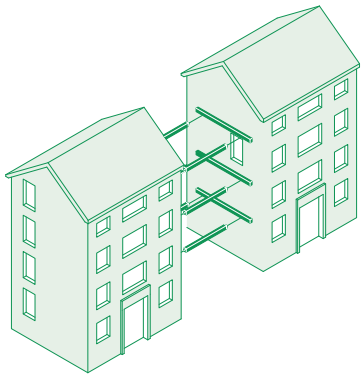
interior 2: free-standing



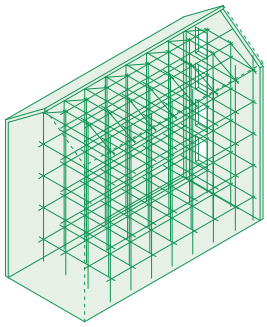
exterior 3: enclosure



exterior 6: parasitic



exterior 7: structural



interior 3: volume (structural)

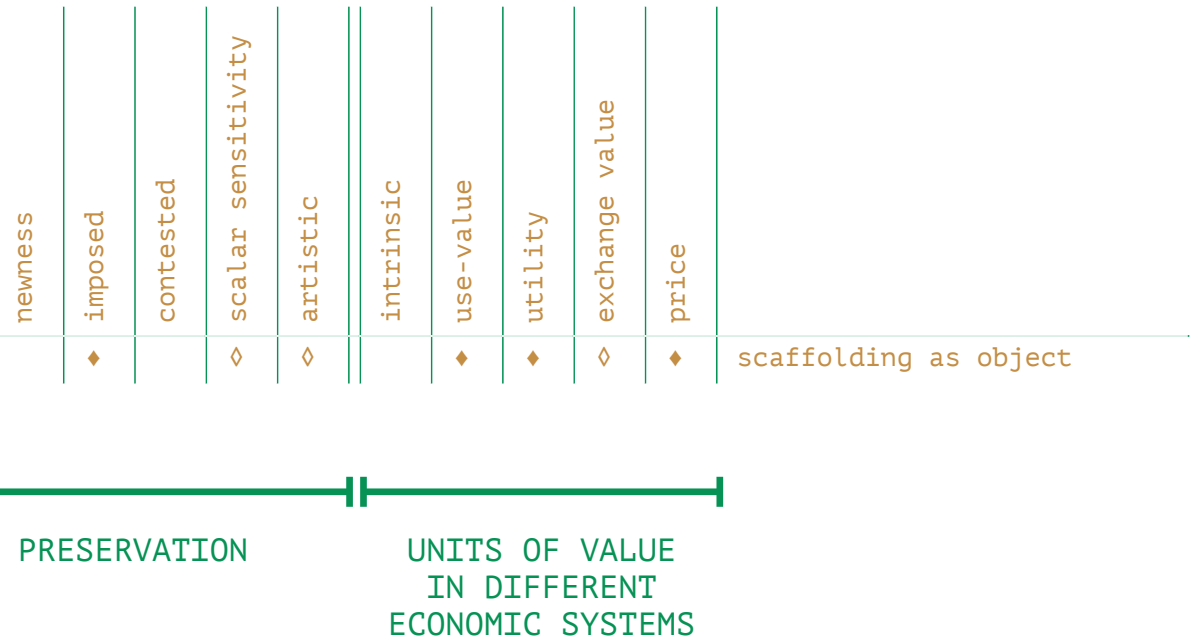
ESTABLISHING VALUES WH

	age	authenticity	use	uniqueness	pedagogical	symbolic	representative	anecdotal	exchange	labour cost
scaffolding as architecture			♦		◇					♦

FRAMEWORK FOR ASSESSING VALUE IN

Diagram marking relevant values for assessing scaffolding.

AT IS THE VALUE OF SCAFFOLDING?



ESTABLISHING VALUES

WHAT IS THE VALUE OF SCAFFOLDING?

Unlike buildings and monuments, which only become what they are when they are built - scaffolding refers to both the unbuilt components and built structures. The lack of distinction between the two raises a line of investigation - how should the value of scaffolding be assessed?

This section briefly evaluates scaffolding under architectural and economic value systems, reflecting on the dual qualities of scaffolding as both a habitable structure and portable tool for facilitating building works and maintenance. By situating the role of scaffolding in both, it is hoped that its relevance to architecture (and the diploma) can be pointed out.

In both these systems usefulness, lifespans / temporariness and universality are understood as scaffolding's main values. They are secondary to the main building / monument despite the neccessity of (or reliance on) scaffolding for access, protection and structural support. The scaffolding survey that forms part of the diploma, provides empirical grounding for these observations.

Despite this reliance, scaffolding is understood culturally as a nuisance in that it is more preferable to not have scaffolding around a building / monument than to have it - we lament seeing monuments cocooned in scaffolding during a maintenance period, implicitly understanding that is not the 'best' state of seeing it.

On iconic buildings or longer projects, some cases documented in the scaffolding survey also consider appearance during the maintenance period, pointing at experience value, which in turn aligns it closer with architecture.

It should also be noted that in recent years, the architectural qualities of scaffolding have already been brought forward and explored as a architectural material. The traditional functions of scaffolding are present, together with architectural values in both a tangible (viability of construction) and ephermeral (impermanence, experiential) way. Further examples can be found in Repairology #2: Scaffolding, produced during the pre-diploma.

Right, photo from the the British Monarchy's flickr. Available online at https://www.flickr.com/photos/britishmonarchy/9605236945/in/photostream/

[1] WIPO. "Access to International Patent Classification". (Accessed 2021). Available online at https://www.wipo.int/classifications/ipc/ipcpub/ under E04G.

SECTION E — FIXED CONSTRUCTIONS

E04 BUILDING

E04G SCAFFOLDING; FORMS, SHUTTERING; BUILDING IMPLEMENTS OR AIDS, OR THEIR USE; HANDLING BUILDING MATERIALS ON THE SITE; REPAIRING, BREAKING-UP OR OTHER WORK ON EXISTING BUILDINGS

Note(s)

In this subclass, the following term is used with the meaning indicated:
- "scaffolding" includes other supports for like purposes.

Subclass Indexes

Workmen's or safety scaffolds

1/00 Scaffolds primarily resting on the ground [1, 2006.01]

1/02 . composed essentially of members elongated in one dimension only, e.g. poles, lattice masts, with or without end portions of special form, connected together by any means [1, 2006.01]

1/04 . . the members being exclusively poles, rods, beams, or other members of similar form and simple cross-section [1, 2006.01]

1/06 . . . comprising members with rod-like or tubular portions fitting together end to end, with or without separate connecting pieces [1, 2006.01]

1/08 . . . secured together by bolts or the like penetrating the members [1, 2006.01]

1/10 . . . . Timber-work constructions [1, 2006.01]

1/12 . . comprising members of special, e.g. composite, cross-section, or with legs or the like of lateral apertures for supporting or attaching other members [1, 2006.01]

1/14 . Comprising essentially pre-assembled two-dimensional frame-like elements, e.g. of rods in L- or H-shape, with or without bracing (E04G 1/15 takes precedence) [1, 2006.01]

1/15 . essentially comprising special means for supporting or forming platforms (E04G 1/20 takes precedence); Platforms therefor or planks therefor E04G 5/08) [1, 2006.01]

1/17 . Comprising essentially pre-assembled three-dimensional elements, e.g. cubic elements [2006.01]

1/18 . adjustable in height [1, 2006.01]

1/20 . . Scaffolds comprising upright members and provision for supporting cross-members or platforms at different positions therealong [1, 2006.01]

1/22 . . Scaffolds having a platform on an extensible sub-structure, e.g. of telescopic type or with lazy-tongs mechanism [1, 2006.01]

1/24 . comprising essentially special base constructions; comprising essentially special ground-engaging parts, e.g. inclined struts, wheels (components parts E04G 5/00) [1, 2006.01]

1/28 . designed to provide support only at a low height [1, 2006.01]

1/30 . . Ladder scaffolds [1, 2006.01]

1/32 . . Other free-standing supports, e.g. using trestles (stands or trestles in general F16M 11/00) [1, 2006.01]

1/34 . Scaffold constructions able to be folded in prismatic or flat parts or able to be turned down [1, 2006.01]

1/36 . Scaffolds for particular parts of buildings or buildings of particular shape, e.g. for stairs, cupolas, domes [1, 2006.01]

1/38 . Scaffolds partly supported by the building (ladders attachable to staircases E06C 1/54) [2006.01]

3/00 Scaffolds essentially supported by building constructions, e.g. adjustable in height (E04G 1/30 takes precedence) [1, 2006.01]

3/18 . supported by cantilevers or other provisions mounted in openings in the building, e.g. window openings (E04G 3/28 takes precedence) [2006.01]

3/20 . supported by walls (E04G 3/28 takes precedence; wall-anchors for supporting scaffolds E04G 5/04; consoles E04G 5/06) [2006.01]

3/22 . supported by seats or ceilings (E04G 3/28 takes precedence) [2006.01]

3/24 . specially adapted for particular parts of buildings or for buildings of particular shape, e.g. chimney stacks or pylons (E04G 3/28 takes precedence) [2006.01]

3/26 . . specially adapted for working on roofs [2006.01]

3/28 . Mobile scaffolds; Scaffolds with mobile platforms [2006.01]

3/30 . . suspended by flexible supporting elements, e.g. cables [2006.01]

3/32 . . . Hoisting devices; Safety devices [2006.01]

3/34 . . characterised by supporting structures provided on the roofs [2006.01]

5/00 Component parts or accessories for scaffolds (connections E04G 7/00) [1, 2006.01]

5/02 . Scaffold feet, e.g. with arrangements for adjustment [1, 2006.01]

5/04 . Means for fastening, supporting, or bracing scaffolds on or against building constructions (fastenings in general F16B) [1, 2006.01]

5/06 . Consoles; Brackets [1, 2006.01]

5/08 . Scaffold boards or planks [1, 2006.01]

5/10 . Steps or ladders specially adapted for scaffolds [2006.01]

5/12 . Canopies [2006.01]

5/14 . Railings [2006.01]

5/16 . Struts or stiffening rods, e.g. diagonal rods [2006.01]

7/00 Connections between parts of the scaffold (for building structures in general E04B 1/58; connections in general F16B) [1, 2006.01]

7/02 . with separate coupling elements [1, 2006.01]

7/04 . . Flexible elements, with or without brackets, e.g. ropes, cables, chains (in general F16G) [1, 2006.01]

7/06 . . Self-supporting clamps for connecting scaffold members of constant shape [1, 2006.01]

7/08 . . . Clamps for parallelly-arranged members [1, 2006.01]

7/10 . . . . Self-tightening clamps, e.g. slotted wedges [1, 2006.01]

7/12 . . . . Clamps or clips for crossing members (E04G 7/22 takes precedence) [1, 2006.01]

7/14 . . . . for clamping the members independently [1, 2006.01]

7/16 . . . . . of which the clamping parts for the different members are rotatable with respect to one another [1, 2006.01]

7/18 . . . . for clamping the members against one another or against a separate constructing piece between them [1, 2006.01]

7/20 . . for ends of members only, e.g. for connecting members in end-to-end relation [1, 2006.01]

7/22 . . . for scaffold members in end-to-side relation [1, 2006.01]

7/24 . . . Couplings involving arrangements covered by more than one of the groups E04G 7/08, E04G 7/12, E04G 7/20, E04G 7/22 [1, 2006.01]

7/26 . . for use with specially-shaped scaffold members [1, 2006.01]

7/28 . . . Clips or connections for securing boards (brackets E04G 5/06) [1, 2006.01]

7/30 . Scaffolding bars or members with non-detachably fixed coupling elements [1, 2006.01]

7/32 . . with coupling elements using wedges [2006.01]

7/34 . . . with coupling elements using positive engagement, e.g. hooks or pins [2006.01]

Falsework; forms or shutterings for shaping of building parts in situ [8]

9/00 Forming or shuttering elements for general use [1, 2006.01]

9/02 . Forming boards or similar elements (E04G 9/08, E04G 9/10 take precedence) [1, 2006.01]

9/04 . . the form surface being of wood [1, 2, 2006.01]

9/05 . . . the form surface being of plastics [3, 2006.01]

9/06 . . . the form surface being of metal [1, 2, 2006.01]

9/08 . Forming boards or similar elements, which are collapsible, foldable, or able to be rolled up [1, 2006.01]

9/10 . with additional peculiarities such as surface shaping, insulating or heating, permeability to water or air [1, 2006.01]

11/00 Forms, shutterings, or falsework for making walls, floors, ceilings, or roofs [1, 2006.01]

11/02 . for rooms as a whole, whole storeys, or whole buildings [1, 2006.01]

11/04 . for structures of spherical, spheroid or similar shape, or for cupola structures of circular or polygonal horizontal or vertical section; Inflatable forms (construction of valves to inflatable elastic bodies B60C 29/00) [1, 2006.01]

11/06 . for walls, e.g. curved (E04G 11/04 takes precedence) [1, 2006.01]

11/08 . . Forms which are completely dismantled after setting of the concrete and re-built for the next pouring (connecting or supporting means for forms E04G 17/00) [1, 2006.01]

11/10 . . . of elements without beams (E04G 11/18 takes precedence) [1, 2006.01]

11/12 . . . of elements and beams (E04G 11/18 takes precedence) [1, 2006.01]

11/14 . . . . with beams arranged in alignment with, and between the, elements [1, 2006.01]

11/16 . . . . with beams placed within the wall [1, 2006.01]

11/18 . . . for double walls [1, 2006.01]

11/20 . . Movable forms; Movable forms for moulding cylindrical, conical, or hyperboloid structures; Templates serving as forms for positioning blocks or the like (E04G 11/04 takes precedence) [1, 2006.01]

11/22 . . . Sliding forms raised continuously or step-by-step in correct with the poured concrete during raising; Arrangements of lifting means therefor [1, 2006.01]

11/24 . . . . Construction of lifting jacks or climbing rods for sliding forms (climbing-type hoisting units in general B66F) [1, 2006.01]

11/26 . . . the sheathing of which consists of ribbons, endless aprons, or the like, guided by driven rollers [1, 2006.01]

11/28 . . . Climbing forms, i.e. forms which are not in contact with the poured concrete during lifting from layer to layer [1, 2006.01]

11/30 . . . . which are lifted from layer to layer by turning, tilting, or similar moving upwards about a horizontal axis [1, 2006.01]

11/32 . . . Tilttable forms or tilting tables for making walls as a whole or in parts [8, 2006.01]

11/34 . . . Reciprocally-travelling moulds for making walls block-wise or section-wise (E04G 11/26 takes precedence) [1, 2006.01]

11/36 . for floors, ceilings, or roofs of plane or curved surfaces [1, 2006.01]

11/38 . . for plane ceilings of concrete [1, 2006.01]

11/40 . . for suffered or ribbed ceilings [1, 2006.01]

11/42 . . . with beams of metal or prefabricated concrete [1, 2006.01]

11/44 . . . . with supporting beams for the shuttering used simultaneously as permanent reinforcement of the ribs [1, 2006.01]

11/46 . . . . of hat-like or trough-like shape encasing a rib or the section between two ribs or encasing one rib and its adjacent flat floor or ceiling section [1, 2006.01]

11/48 . . Supporting structures for shutterings or frames for floors or roofs (struts E04G 25/00) [1, 2006.01]

11/50 . . . Girders, beams, or the like as supporting members for forms (members, e.g. consoles, for attachment to the wall E04G 17/14; girders intended to form part of the construction E04C 3/42) [1, 2006.01]

11/52 . . . . of several units arranged one after another [1, 2006.01]

11/54 . . . . of extensible type, with or without adjustable supporting shoes, footplates, or the like [1, 2006.01]

11/56 . . . . . of telescopic type [1, 2006.01]

13/00 Falsework, forms or shutterings for particular parts of buildings, e.g. stairs, steps, corridors or balconies (moulds for making stairs for prefabricated buildings or prefabricated stair units B28B 7/22) [1, 2006.01]

13/02 . for columns or like pillars; Special tying or clamping means therefor [1, 2006.01]

13/04 . for fillets, beams, or transoms to be encased separately; Special tying or clamping means therefor (members, e.g. consoles, for attachment to the wall E04G 17/16) [1, 2006.01]

13/06 . for stairs, steps, cornices, balconies, or other parts corbelled out of the wall [1, 2006.01]

15/00 Forms or shutterings for making openings, cavities, slits, or channels (forming part of shuttering for walls E04G 11/06) [1, 2006.01]

15/02 . for windows, doors, or the like [1, 2006.01]

15/04 . Cores for sunken holes or the like [1, 2006.01]

15/06 . for sunken or channels in walls or floors, e.g. for making chimneys [1, 2006.01]

17/00 Connecting or other auxiliary members for forms, falsework structures, or shutterings [1, 2006.01]

17/02 . Connecting or fastening means for non-metallic forming or stiffening elements [1, 2006.01]

17/04 . Connecting or fastening means for metallic forming or stiffening elements [1, 2006.01]

17/06 . Tying means; Spacers [1, 2006.01]

17/063 . . Tying means, the tensional elements of which are threaded to enable their fastening or tensioning [5, 2006.01]

17/07 . . Tying means, the tensional elements of which are fastened or tensioned by means of wedge-shaped members [5, 2006.01]

17/073 . . Tying means, the tensional elements of which are fastened or tensioned by other means [5, 2006.01]

17/12 . . with arms engaging the forms [1, 2006.01]

17/14 . Bracing or strutting arrangements for formwalls; Devices for aligning forms (E04G 23/00 takes precedence) [1, 2006.01]

17/16 . Members, e.g. consoles, for attachment to the wall to support girders, beams, or the like carrying forms or moulds for floors, lintels, or transoms [1, 2006.01]

17/18 . Devices for suspending or anchoring form elements or girders placed in ceilings, e.g. hangers [1, 2006.01]

19/00 Auxiliary treatment of forms, e.g. dismantling; Cleaning devices (lubricating compositions C10M) [1, 2006.01]

21/00 Preparing, conveying, or working-up building materials or building elements in situ; Other devices or measures for constructional work (working stone-like materials B28D; conveying in general B65G; lifting devices B66, measuring instruments G01) [1, 2006.01]

21/02 . Conveying or working-up concrete or similar masses able to be heaped or cast (working concrete in general, e.g. mixing machines, B28C; compaction of concrete C04B; construction and surfacing of floorings made of similar material to roads or pavements E01C; in connection with barrages E02B 7/00; in connection with foundations E02D 15/00; in connection with finishing work E04F) [1, 2006.01]

21/04 . . Devices for both conveying and distributing (concrete pumps F04) [1, 2006.01]

21/06 . . Compacting concrete, e.g. by application of vacuum before hardening (for road buildings E01C 19/50; devices for compacting also soil E02D 3/02) [1, 2006.01]

21/08 . . . Internal vibrators [1, 2006.01]

21/10 . . Devices for levelling, e.g. templates or boards (smoothing tools E04F 21/16, E04F 21/24) [1, 2006.01]

21/12 . Mounting of reinforcing inserts; Prestressing (shell tubes for prestressing members E04C 5/10; anchoring means E04C 5/12; connections of reinforcing elements and spacers E04C 5/16) [1, 2006.01]

21/14 . Conveying or assembling building elements (cooling E04D; finishing work E04F) [1, 2006.01]

21/16 . . Tools or apparatus (devices for erecting fences E04H 17/20) [1, 2006.01]

21/18 . . . Adjusting tools; Templates [1, 2006.01]

21/20 . . . for applying mortar [1, 2006.01]

21/22 . . . for setting building elements with mortar, e.g. brick-laying machines [1, 2006.01]

21/24 . Safety or protective measures preventing damage to building parts or finishing work during construction (as auxiliary structures for scaffolds E04G 5/08) [1, 2006.01]

21/26 . . Shuttering means for wall parts; Supports or the like, e.g. for holding in position prefabricated walls (E04G 25/00 takes precedence; or existing buildings E04G 23/04) [1, 2006.01]

21/28 . . against unfavourable weather influence [1, 2006.01]

21/30 . . against mechanical damage or dirt, e.g. guard covers of stairs [1, 2006.01]

21/32 . Safety or protective measures for persons during the construction of buildings (related to scaffolds E04G 5/00, ropes or belts for life-saving A62B 1/16, A62B 35/00; climbing tools, e.g. climbing irons for trees, A63B 27/00) [1, 2006.01]

Photo of scaffolding around Buckingham Palace in 1913. Highlighted in the IPC document[1] are the modern corresponding patent subclasses which together formed Daniel Palmer-Jones's scaffolding system.

Plates 2 and 8 from John Ruskin's 7 Lamps of Architecture[3], recording building elements and deterioration as they were. Calling photographs of architecture 'precious historical documents', he encouraged photographers to seize 'every opportunity afforded by scaffolding to approach it closely'[4].

THEORIES OF VALUE: RIEGL'S CULT OF MONUMENTS

In architectural preservation, decisions on what to do with a heritage building / monument first requires an assessment of what is considered valuable. Many frameworks for value assessment exist today, often with a degree of overlap and mutual influence. Some principles in use today in modern (western) preservation theory come from Riegl's The Modern Cult of Monuments[1], which introduced the idea that the value of a heritage building / monument was not inherent, but dependent on the relationship between object and observer. Consequently, everything can potentially have value. However, Riegl acknowledges that some values - such as age, historic, commemorative, use and newness - appear more frequently.

As a starting point, these values are briefly assessed below in their relevance to scaffolding [2]:

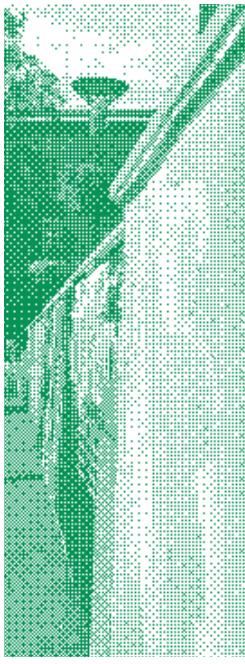
- Age value: Mostly irrelevant, scaffolding is intended to be temporary. Its value (non-cost-wise) does not increase with lifespan as buildings do.
- Historic value: Mostly irrelevant, scaffolding is intended to be temporary. It does not have historical value by itself, though its presence can indicate the main building / monument does. Though the absence of scaffolding has resulted in lost technologies (eg. how were Egyptian obelisks actually raised?).
- Commemorative value: Somewhat relevant. Although scaffolding is not intended for commemoration, as a visible indicator for building works it can be read as an 'event' in the life of the main building / monument. Signage hung on the scaffolding itself can also convey commemorative value to the main building / monument.
- Use value: Always relevant, scaffolding's value is in its function as a support structure for facilitating building works,
- Newness value: Mostly irrelevant, scaffolding is intended to be temporary. Though historically, adoption of technological improvements (eg. from tie to coupler in 1900s) have helped standardise and spread scaffolding systems, which has value in its universality.

[1]Riegl, Alois. "The Modern Cult of Monuments: Its Essence and Its Development." (1903).

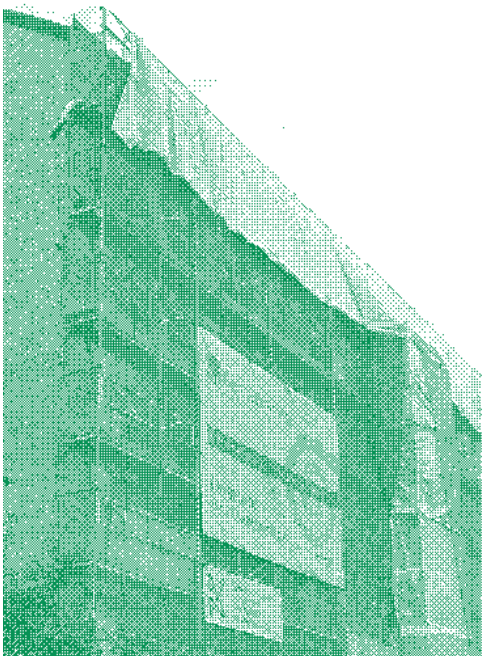
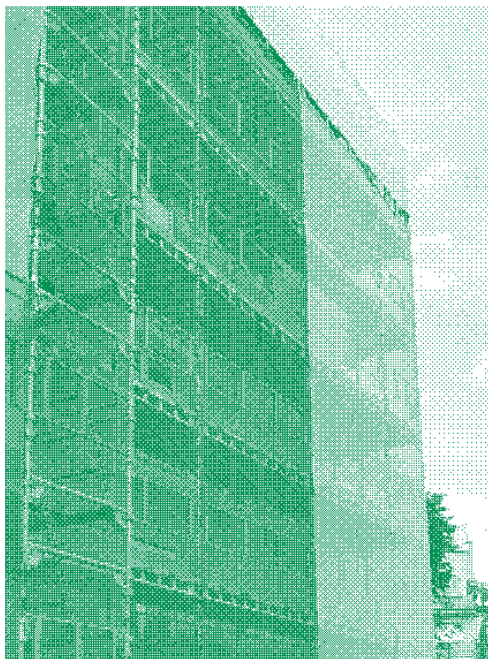
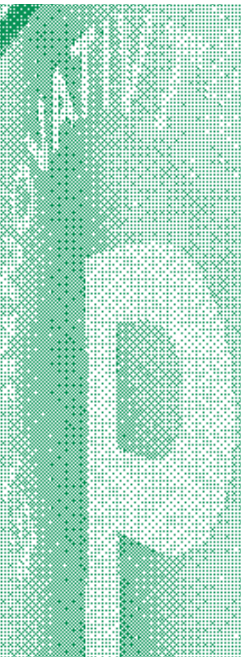
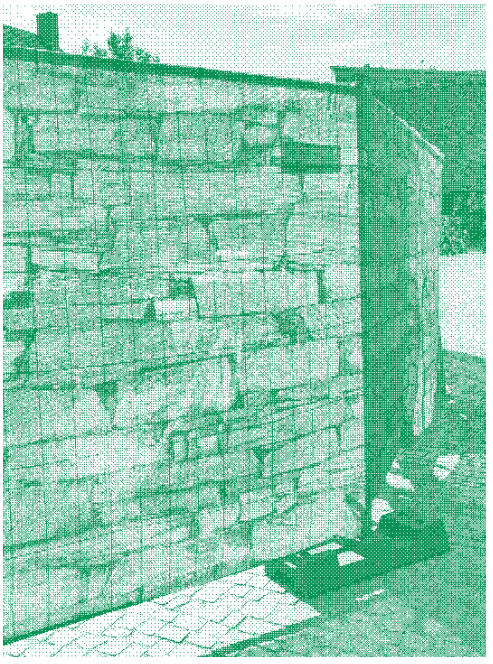
[2]In this case, the irrelevance of age and historic value to scaffolding structures is why other notable value systems like Ruskin's and Viollet-le-Duc's are unsuitable for reference.

[3]Ruskin, John. "The Seven Lamps of Architecture." (1849). Available online at https://archive.org/details/1920sevenlampsof00ruskuoft/page/xviii/mode/2up.

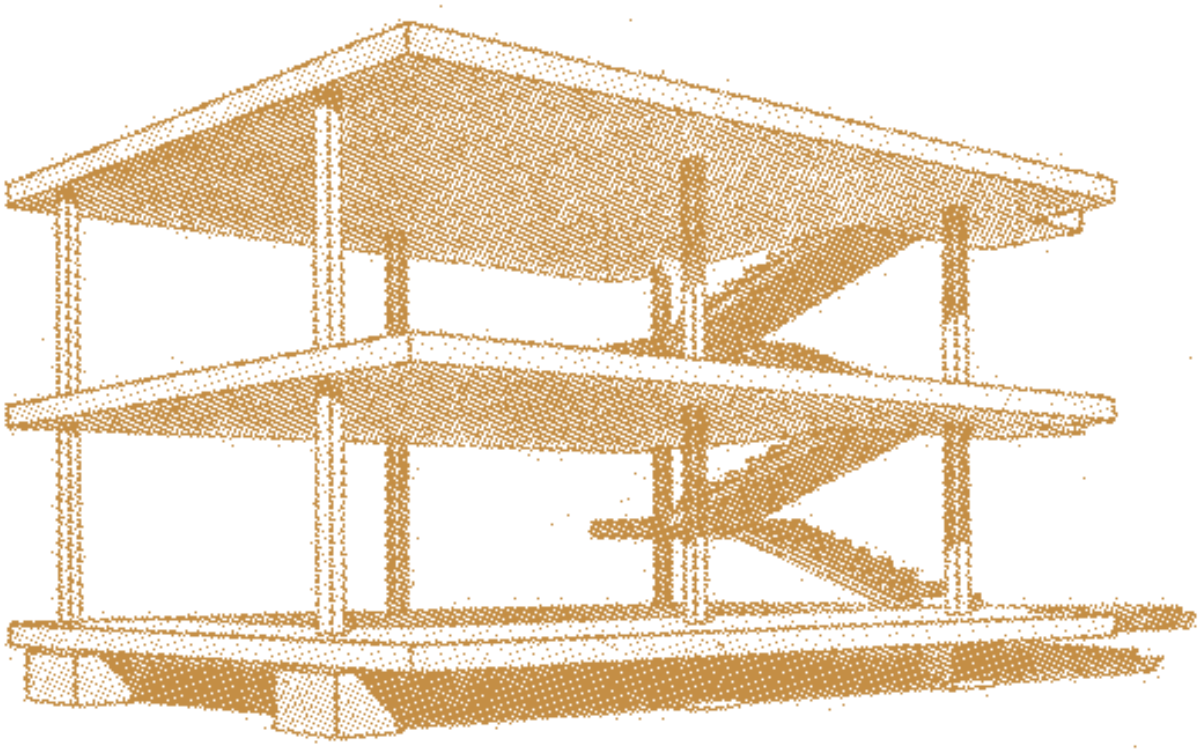
[4]Lending, Mari. "Scaffolded Visibility" from "Plaster Monuments." (2017).



Photos from the scaffolding survey showing the existing variety of materials and textures used in scaffolding, Clockwise from top left, ref. 001, 100, 021, 009, 011, 028, 025, 026, 019, 014.


Coverings are frequently required for protection. Its transparent quality has been used in architectural contexts to convey temporariness and ephemerality (see Repairology #2: Scaffolding). After a certain size, the scale and prominence of these surfaces can become profitable as a surface for signage, giving it a market value.



Dom-Ino, developed alongside engineer Max du Bois (whose name was removed by Le Corbusier in the application), was not granted. Image from Le Corbusier. “Oeuvre complète 1910-1929” (1967).

ARCHITECTURE AND OBJECT : LE CORBUSIER'S DOM-INO

Dom-Ino was a proposed structural system that could be repeated and finished in any style. Its perspective drawing has become emblematic of modernism, drawn to convey that it is a piece of equipment[1]. Although catchy, the idea of the built environment as 'machines for living' was used more figuratively than literally.

[1]Frampton, Kenneth. "Modern Architecture: A Critical History". (1985).

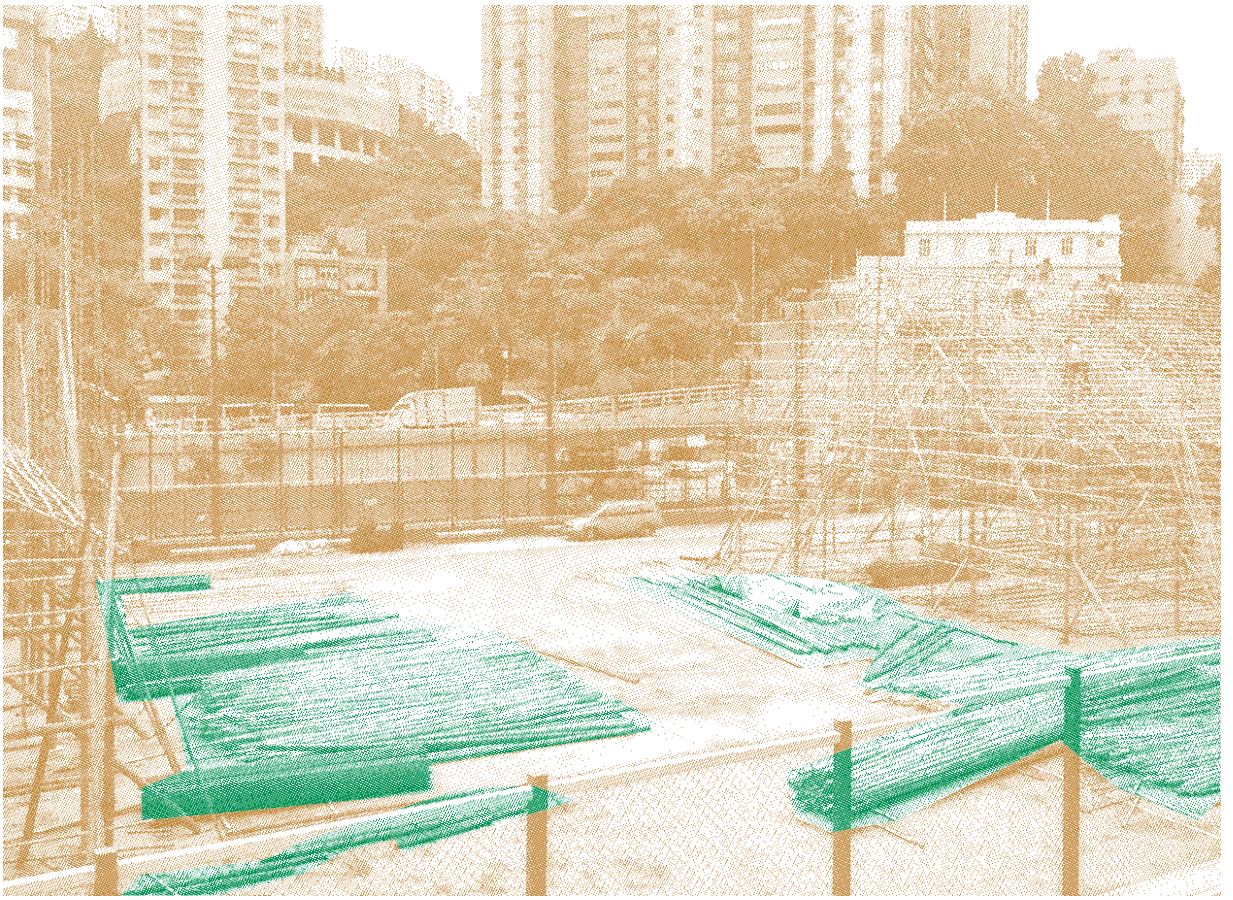
Le Corbusier was involved with a number of business ventures and worked towards patenting some of his products. In the accompanying catalogue for the exhibition Le Corbusier before Le Corbusier, Francesco Passanti writes:

> *There are several reasons why Le Corbusier, so committed to art, would involve himself so deeply in business. He wished to make money and thus gain artistic independence...In addition... he shared Herman Muthesius' belief that industrially based types could further cultural unity - hence his interest in technical solutions that could anchor a type, in business and licencing arrangements that could ensure control over it, and in catchy names that could insure brand recognition. Finally, Le Corbusier clearly saw these...as ways to seive the initiative, to provoke and control large-scale commisions, and to bypass the dependent position vis-à-vis the client that is inherent in the traditional role of the architect.*[2]

[2]Passanti, Francesco."Le Corbusier before Le Corbusier". (2002). Chapter 25. "Everite".

The vision of Dom-Ino - and modernism in general - proposed universality as a value, which in terms of aesthetics and feasibility, has become a point of criticism. In contrast, scaffolding's values of pragmatism and usefulness have given it universality[3] - it can be patented, and even has its own sub-category under E04G[4]. In this sense, scaffolding's acceptance as intellectual property has given it an attributable authorship in a way Le Corbusier's buildings have not attained.

[4]Read as:
E - Fixed constructions
04 - Buildings
G - Scaffolding



Bamboo theatre under construction in Hong Kong (see scaffolding survey ref. 105). Building materials are laid out on the ground and sorted by type. The materials used in these theatres are the same as in traditional Hong Kong bamboo scaffolding.

THEORIES OF VALUE: ECONOMICS

Unlike architecture, value assessment has different priorities in different economic systems. However, as a service that produces the built environment, architecture - and its values - are influenced by the market. In the case of scaffolding, which can be understood as a commodity, but which also has a specialised service industry for its use, situating scaffolding's value in economic terms can enrich an architectural understanding.

Here, scaffolding is briefly assessed against theories of value[1]:

- Intrinsic value: Mostly irrelevant, scaffolding is generally intended to be secondary to the main building / monument. A support tool without something that needs support doesn't really have value. Extrinsic value, where value is determined by external factors, is more relevant to scaffolding.
- Use-value / utility: Always relevant, scaffolding is a commodity that is situationally useful. The built environment's reliance on scaffolding for maintenance and building works means that by extension, the specialisation of scaffolding services (required for handling project specifics but also as a complex and high-risk profession) also gives it high labour value that is not interchangeable / replacable.
- Exchange value: Relevant. Standardisation of components means scaffolding systems can meet global requirements for building works / maintenance.
- Price value: Always relevant. As mentioned, not only is scaffolding a specialised profession, but the structures themselves are specific to each project. Its reusability between sites is linked to the cost of rental, where cost of a rental increases the longer it stands on one site.

[1] I have tried to be succinct with these definitions since this project is an architecture diploma, so it might be a bit generalised.

EXPERIENCE AND SURVEY: MONUMENT CLIMBING

Popularised in the 17th century, the Grand Tour was - simply put - a journey afforded to the rich and educated (often architects by trade) through Europe, as a way to be exposed and study the classical and renaissance worlds, with the intention to bring ideas and inspiration back home and into their architectural practice.[1] Surveying was an important task for these Grand Tourists. As there were limits to what was possible to see from ground level, ladders often came in handy. Whereever possible, John Ruskin encouraged those with cameras to seize 'every opportunity afforded by scaffolding to approach it closely'.[2]

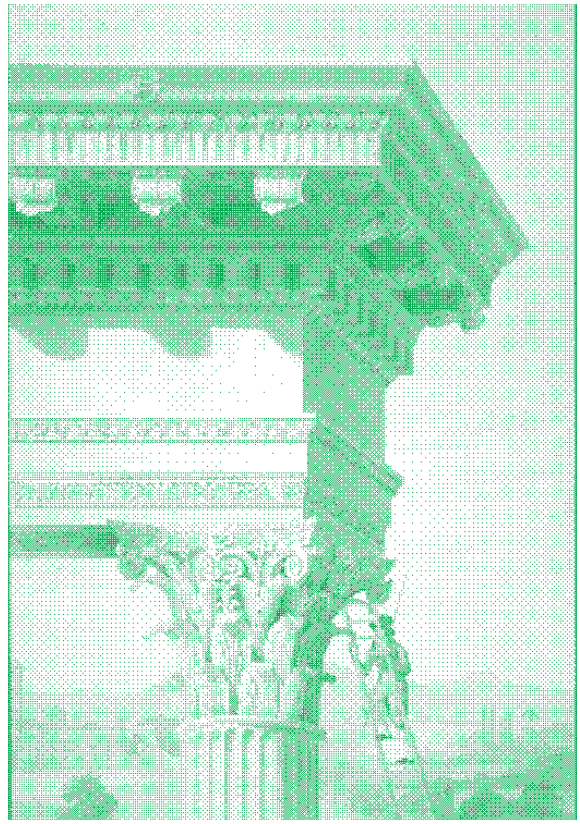
Although usually meant for maintenance or support, scaffolding's role in accessing inaccessible parts of architecture has historical precedence as a way to experience that which would otherwise be very difficult.

[1]Darley, Gillian. "Wonderful Things: The Experience of the Grand Tour." (2008). Available online at http://www.jstor.org/stable/40482307.

[2]Lending, Mari."Travels in the Province of Reproductions" and "Scaffolded Visibility" from "Plaster Monuments." (2017).

Left, "Pupil at work in Dulwich Mausoleum." (1812). Available online at https://www.soane.org/collections-research/key-stories/understanding-architectural-drawings.

Right, "Young Architect Measuring the Templs of Jupitor Stator, Rome." (1801). Available online at https://www.soane.org/collections-research/key-stories/understanding-architectural-drawings.



EXPERIENCE AND ACCESS: STAIRS TO KRITERION, MVRDV

For 1 month outside Rotterdam's train station in 2016, the Stairs[3] stood as part of a celebration for the city's 75-years of rebuilding. The project consisted of a huge staircase, built from scaffolding up to the roof of Groot Handelsbouw, providing direct access to Kriterion, a defunct cinema temporarily reopened for the occasion. The commercial building beneath remained in use throughout the event.

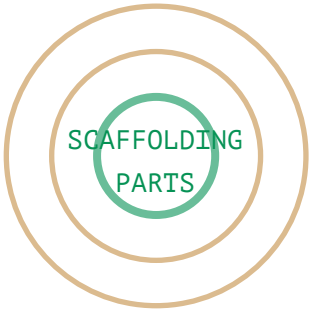
While the typical functions of scaffolding are present (use, access), architectural values are also imposed as both tangible (visible construction, minimum shelter) and ephermeral experiences.

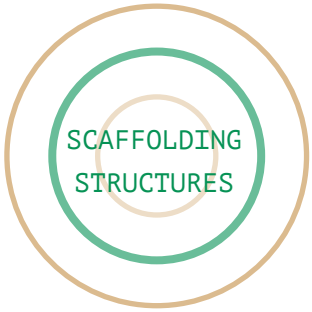
[3]MVRDV. "Stairs to Kriterion." (Accessed 2021). Available online at https://mvrdv.nl/projects/238/the-stairs-to-kriterion. Note that aparently West8 - another Dutch office - had also built temporary stairs to a rooftop in Rotterdam some years before.

SCAFFOLDING'S VALUE

This page summarises the diploma's chapters / values and their context for the design work presented in the drawings.

SCALE EXPLORED





USEFULNESS VALUE

Usefulness value comes from our reliance on scaffolding as a pragmatic system in facilitating maintenance and construction.

The techology and standardised components of scaffolding are identified as the quality to explore. Considering the comparable processes of looking through scaffolding catalogues to select the best system, and looking through material catalogues in selecting building components in construction, a component that is relevant to both is suggested to bridge the gap between the two industries: Putlog Plugin.

FIXED LIFESPAN VALUE

In most situations, scaffolding on a site has a fixed start and end date. Fixed lifespan value is read in two ways in this diploma - temporariness and recurrence.

Temporariness value is about the finite lifespan of one iteration of a scaffolding (or other temporary) structure. The dependence on function in detemining the lifespan of a scaffold structure is identified as the quality to explore. YIOBY explores non-maintenance typologies whose lifespans might be tied to their function.

Recurrence value contextualises the repeated periods of scaffolding on a site throughout the site's lifetime. The mutual support between scaffolding and building operation is identified as the quality to explore. Out of Order explores the idea of support through an imagined scenario of increasing deterioration and increasing reliance on scaffolding of a cultural building - a church.

ES

UNIVERSALITY VALUE

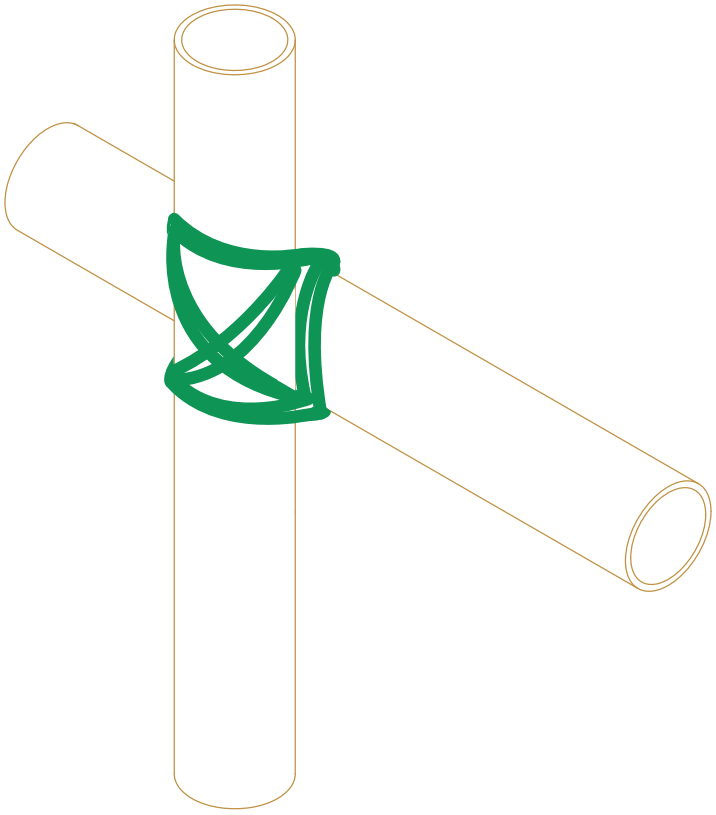
Universality value comes from the successful standardisation of metal scaffolding components, which is now used all over the world. This development largely took place in the 20th century onwards, accelerated first by industrialisation, then by the need for new buildings, as populations grew and the rebuilding after the wars of the 20th century.

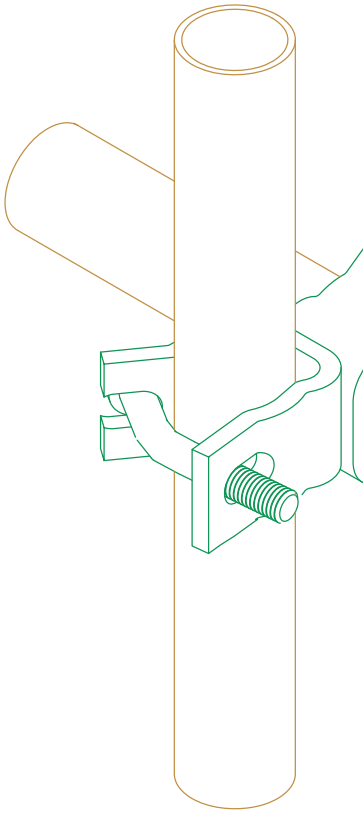
Flexibility is identified as the quality to explore. Replugin tests the apparent ability of scaffolding to meet certain needs, with how it affects its environment, through imagined events in which scaffolding might be required on a street with many different buildings and programs in Grønland, Oslo.

EXPERIENCE VALUE

Experience value is the quality of looking at, through, or from a scaffolding structure, and the experience it might evoke. Scaffolding is not generally valued (and used) in this way, but it can provide a new vantage point, or a close look at something usually inaccessible, which is very precious to architects as a way to evoke a feeling. This value of seeing things from a new perspective is brought forward in all the tests and used as a factor in assessing the 'success' of a test.

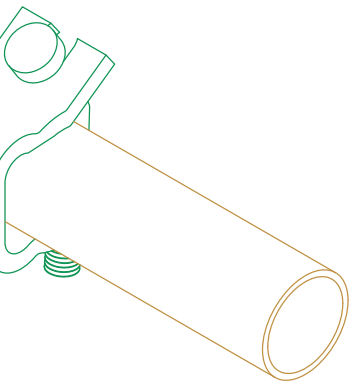
USEFULNESS VALUE HOW CAN BUI

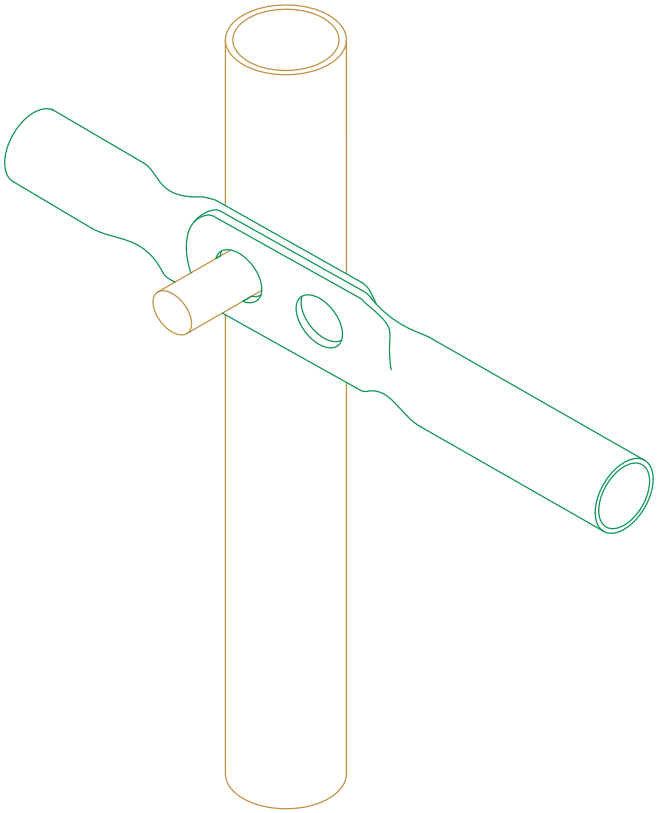




Axonometric drawing of three types of connection in scaffolding assembly - tie, coupler and integrate

LDINGS FACILITATE SCAFFOLDING?





ed connection

(MAINTENANCE)
USEFULNESS VALUE

HOW CAN BUILDINGS FACILITATE SCAFFOLDING?

Scaffolding has been around as long as humans have been building, from (the proposed) scaffolding sockets found in the walls of the Lascaux caves[1], to the suspended system used by Michaelangelo in the Sistine Chapel[2]. In parallel, a tradition of bamboo scaffolding persists in South and East Asia.[3]

Scaffolding has value because it is functionally useful. It fulfills three key requirements of maintaining the built environment: access to places otherwise inaccessible, structural support while things are being modified or replaced, and protection of the building from its environment as well as people from the construction works. It stands only for as long as it has a practical use - tying its lifespan directly to its neccessity (further explored in the short-cycle lifespans chapters)

Because it is temporary, scaffolding can take on additional, complementary functions. For instance, the large, visible and uninterrupted surface area of enclosing a building in scaffolding is equally useful for signage, from advertising to printed replica facades. This gives scaffolding another type of usefulness value in commercial terms (and further explored in the long-cycle lifespans chapter).

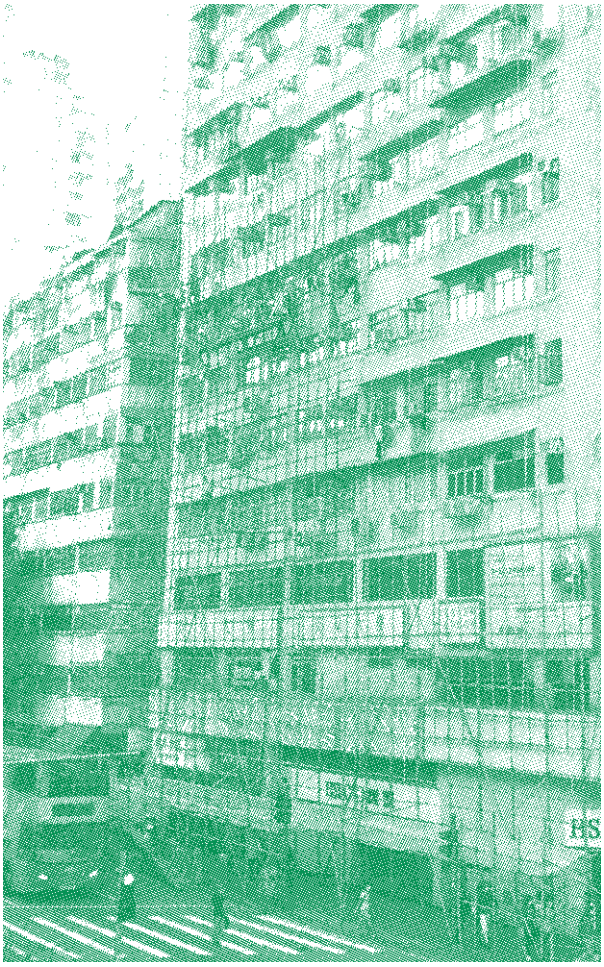
This chapter focuses on the pragmatic usefulness of scaffolding, outlining its structural logic and tracing its technological development into the different types in use today.

It is observed that while scaffolding often depends on existing structures for support, structures depend on scaffolding for maintenance. This co-dependence suggests there is potential in examining the actual connection between the scaffold and the wall it envelops, and is the premise for the first test: Putlog Plugin.

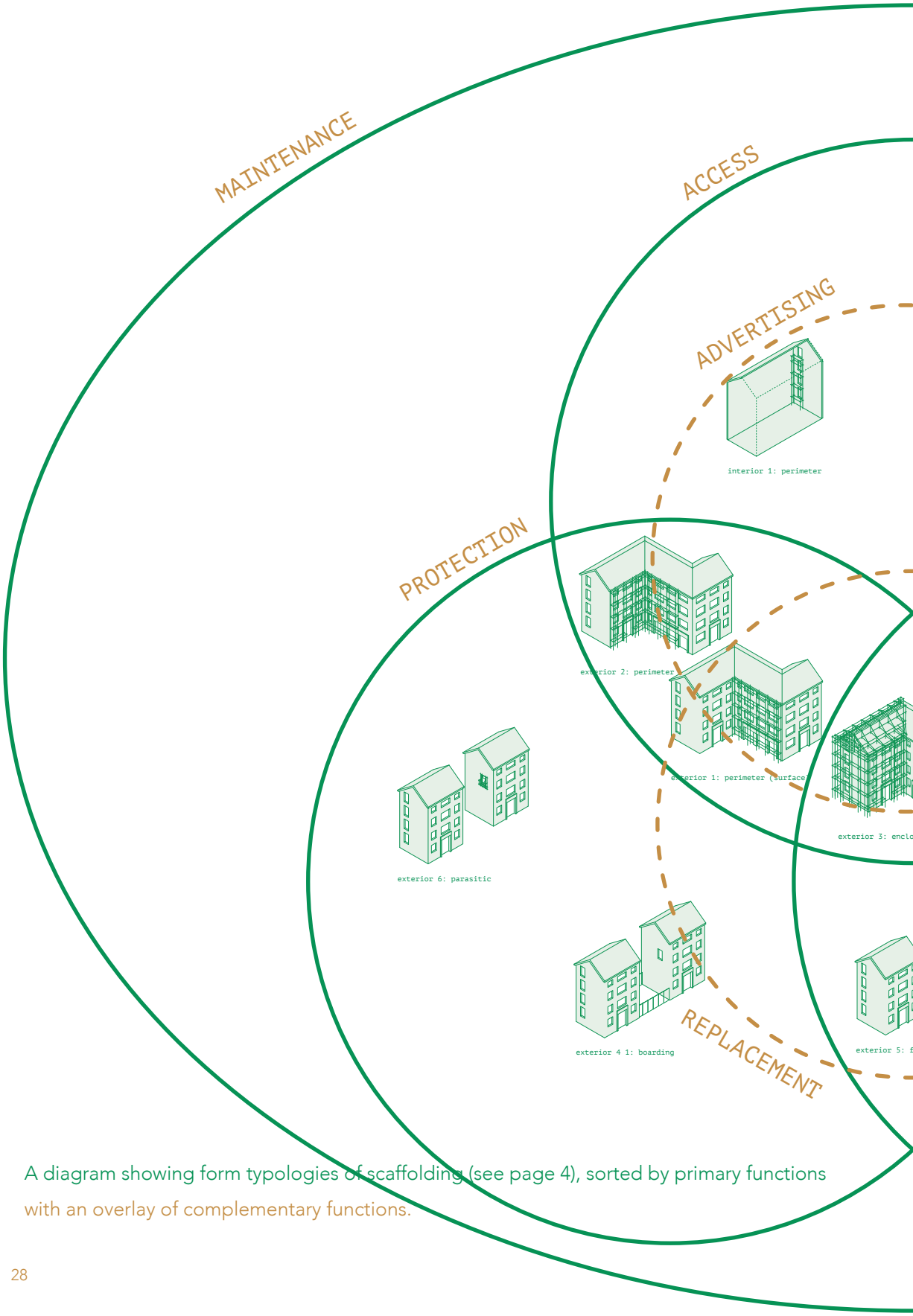
[1]Ministère de la Culture. "Access to the Walls." (Accessed 2021). Available online at https://archeologie.culture.fr/lascaux/en/access-walls.

[2]The Sistine Chapel. "Michelangelo." (Accessed 2021). Available online at https://www.thesistinechapel.org/michelangelo.

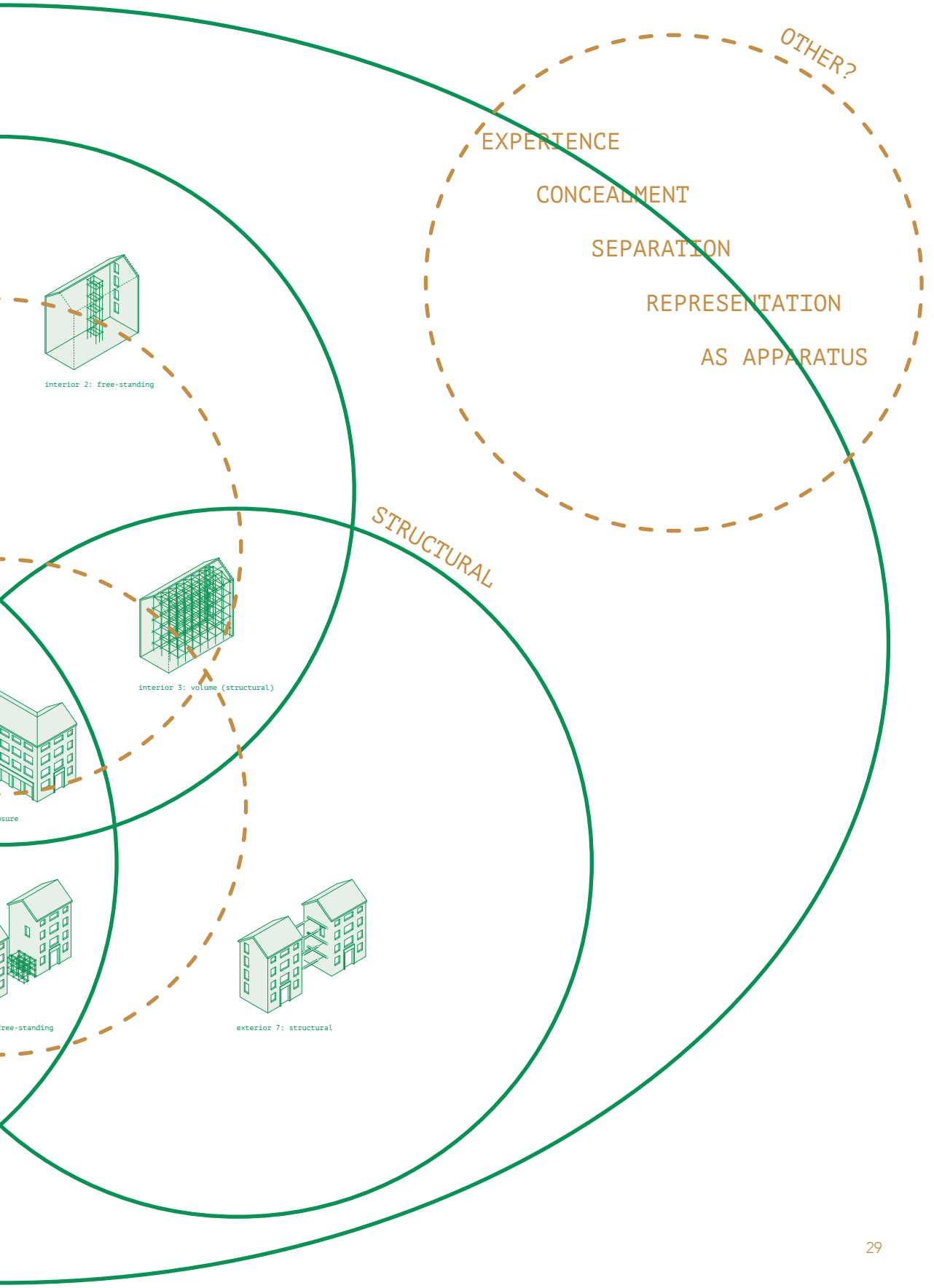
[3]Wei, Clarissa. "Bamboo scaffolding: Why does Hong Kong still use it in construction?." (Accessed 2020). Available online at https://www.goldthread2.com/culture/bamboo-scaffolding-why-does-hong-kong-still-use-it-construction/article/3080274.

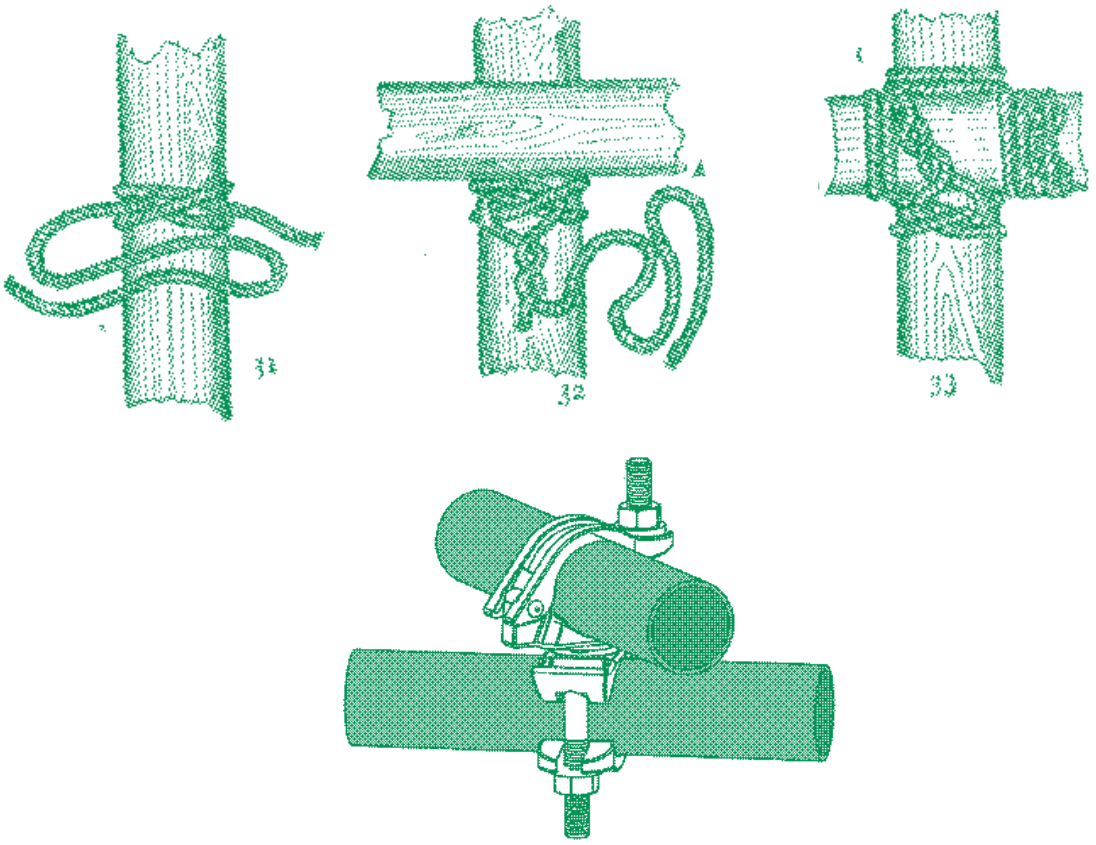


Left, twelve scaffolders putting up bamboo scaffolding on a residential building in Hong Kong.
Right, two scaffolders putting up modular scaffolding on a residential building in Oslo.



A diagram showing form typologies of scaffolding (see page 4), sorted by primary functions with an overlay of complementary functions.


OTHER?
EXPERIENCE
CONCEALMENT
SEPARATION
REPRESENTATION
AS APPARATUS
STRUCTURAL
interior 2: free-standing
interior 3: volume (structural)
exterior 7: structural



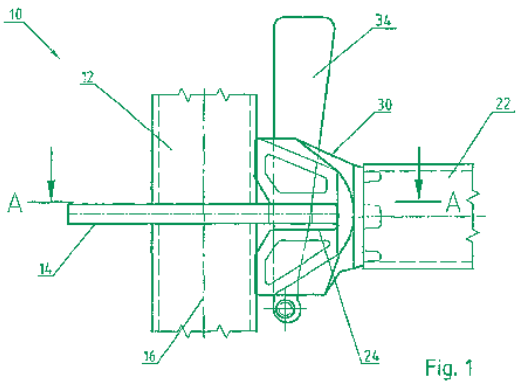


Fig. 1

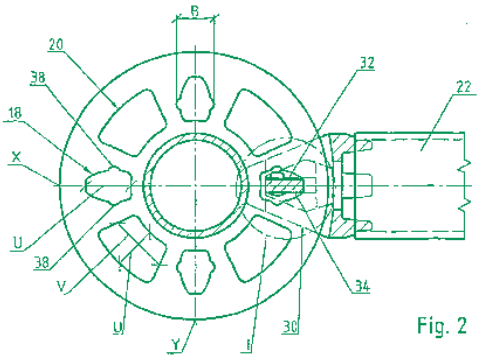


Fig. 2

Top, knot diagrams from "Scaffolding: A Treatise on the Design and Erection of Scaffolds, Gantries and Stating" (1907). Available online at https://archive.org/details/scaffoldingtreat00thatuoft.

Middle, coupler connection diagram from https://www.ferro-met.com/en/building-construction/scaffolds/tube-and-coupler-scaffold/swivel-coupler-en74/.

Bottom, ringlock assembly diagram from https://patents.google.com/patent/EP1301673B1/en.

[1] Slessor, Catherine. "Skin Deep." (2017). Available online at https://www.architectural-review.com/essays/skin-deep?tkn=1.

[2] Designing Buildings Wiki. "Putlog Holes." (Accessed 2021). Available online at https://www.designingbuildings.co.uk/wiki/Putlog_holes.

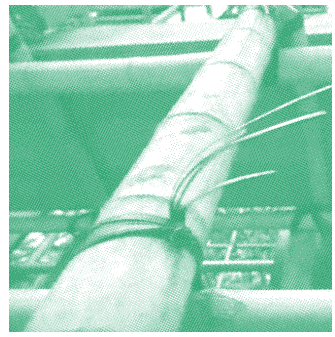
[3] See related entry no. 203 from scaffolding survey.

[4] Marks, Michael Terry. "Scaffolding: The Handbook for Estimating and Product Knowledge". (2016).

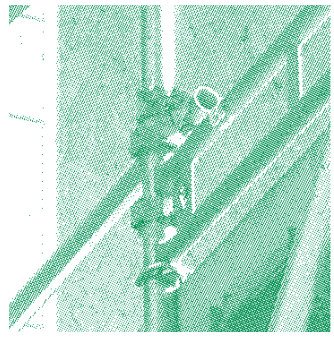
HISTORIC + CURRENT SCAFFOLDING TECHNOLOGIES

Evidence of temporary structures are apparent in leftover sockets / putlog holes in historic structures. Putlogs (which go into putlog holes) refer to short timber lengths which form structural support for this type of scaffolding. This technique is still used today in some parts of the world.

In Europe, timber scaffolding poles (with square sections) were used well into the 20th century, tied together with ropes and chains. In 1911, D.P. Jones filed a patent for *Scaffixer* in the UK, an alternative to ties, consisting of a metal component and chains that removed the need for a knot[1]. Early versions of metal couplers used steel poles originally manufactured as water pipes, which developed into the tube and coupler scaffolding system[2].

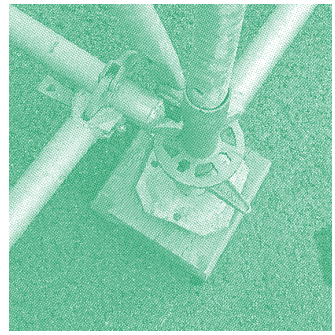


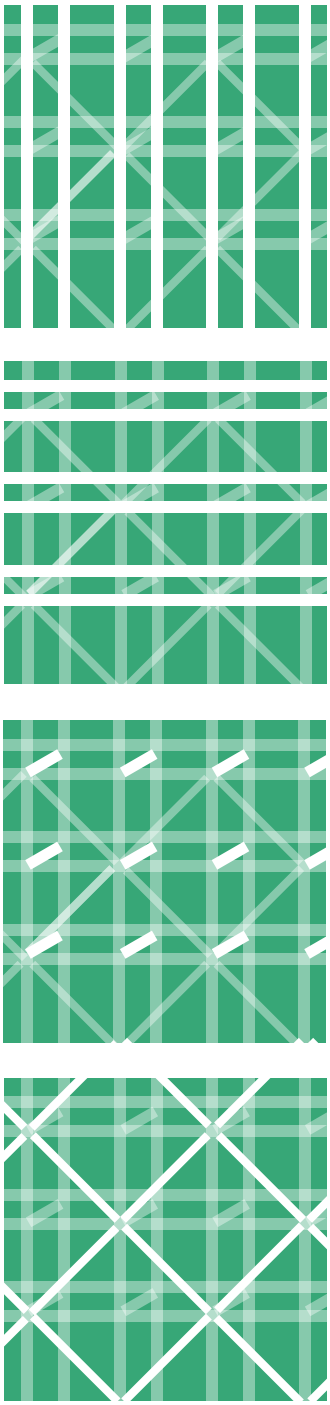
Modular scaffolding systems were introduced in the 1950s. Broadly speaking, these systems simplified assembly by integrating connections into the components themselves (system scaffolding), or by incorporating the use of frames as well as poles (sectional scaffolding)[3, 4].



Comparing the two, tube and coupler scaffolding systems are more open-ended, but may require more skill (and engineering) to assemble. Modular scaffolding is simpler to assemble, but is less flexible. To compensate for this, these systems often have a bigger catalogue of parts to meet specific situations, which increases complexity in a different way.

Scaffolding's technological development has mostly focused around improving / modifying the connection between parts. Tube, coupler and modular systems are the most common today, and are sometimes mixed in the same project. Where relevant, this diploma will focus on tube and coupler systems, because of their relative flexibility and operational similarity to traditional tie scaffolding methods (literally replacing the historical tie connection with a coupler, rather than reinventing all the components as with system scaffolding).

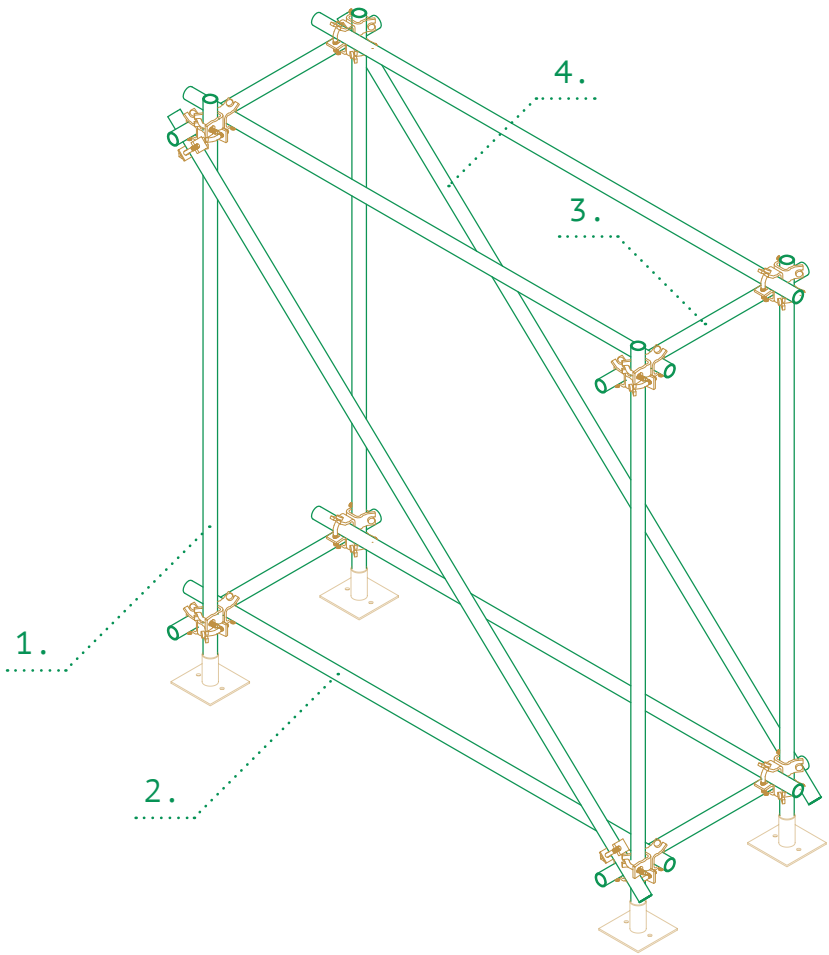




SCAFFOLDING COMPONENTS

While scaffolding technologies have been centered around improving the connection point between parts, the four components that make up scaffolding structures have remained the same. They are as follows:

1. Standards: Vertical lengths that keep the scaffolding upright. Modern tube systems will have a foundation plate. Bamboo and historic timber systems stand directly on the ground.
2. Transoms: Horizontal lengths that hold the standards together, spanning the length of a scaffolding structure.
3. Ledgers: Shorter horizontal lengths that holds sets of standards together, spanning the depth of a scaffolding structure. Often also the point of connection between the scaffolding and the primary structure.
4. Bracing: Diagonal lengths that are fixed to scaffolding structures to improve stability.



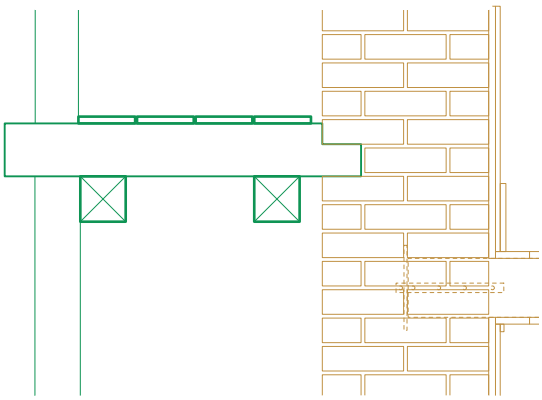
SCAFFOLDING CONSTRUCTION

Historically and today, scaffolding stands on the ground and does not have foundations. Its stability is dependent on its construction. There are two main categories:

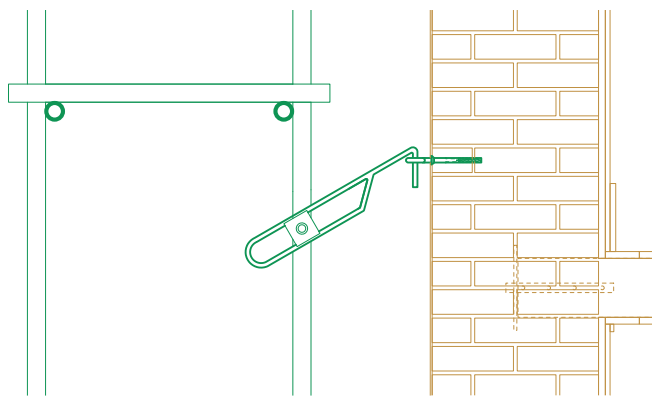
1. Putlog scaffolding: Structure with only one set of standards. Putlogs are inserted into holes in the (usually masonry) wall of the primary structure to support the scaffold and is often removed and filled in after work is completed. Historically, putlog holes were left on facades of old stone castles or towers throughout Europe as they do not compromise structural integrity. A comparable technique is found in the mud and adobe buildings of Sudano-Sahelian architecture, where toron (rodier palm sticks protruding from the facade) is both an architectural feature and facilitates maintenance.
2. Freestanding scaffolding: Structure with at least two sets of standards. Most modern scaffolding systems are freestanding, though not neccessarily independent and will be anchored (usually with some kind of ringbolt or bracket screwed into the primary structure) for improved support.

Putlog as ornament on Maison du Faucon, Belgium. Photo online at https://commons.wikimedia.org/wiki/File:Maison_du_Faucon_08.JPG

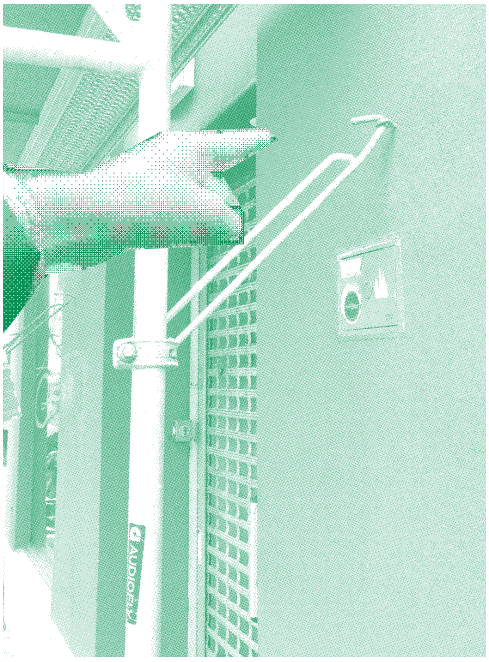
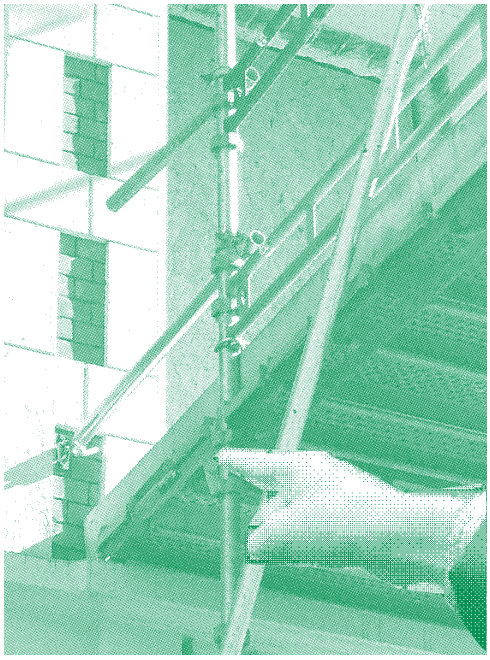
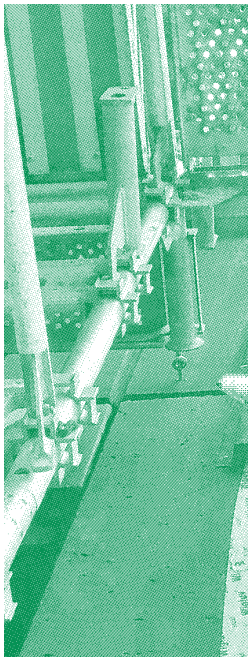
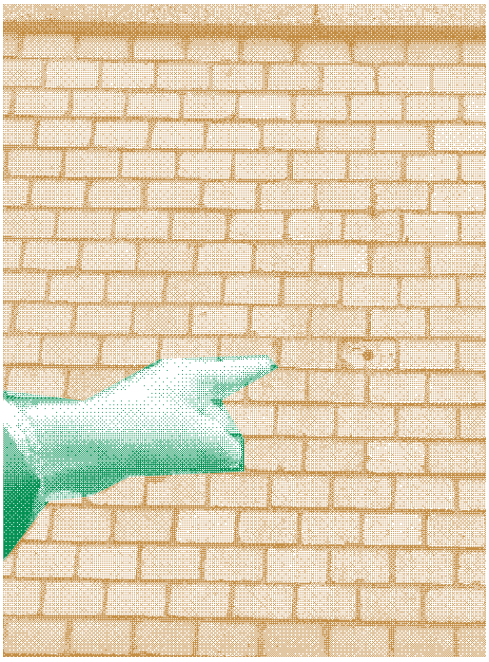
Toron on the Grand Mosque of Djenné, Mali. Photo online at https://whc.unesco.org/en/documents/107952

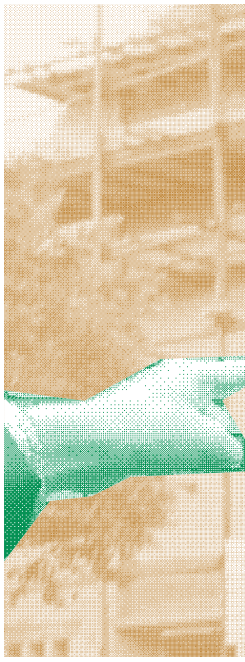


1:20 typical connection to masonry wall in putlog scaffold



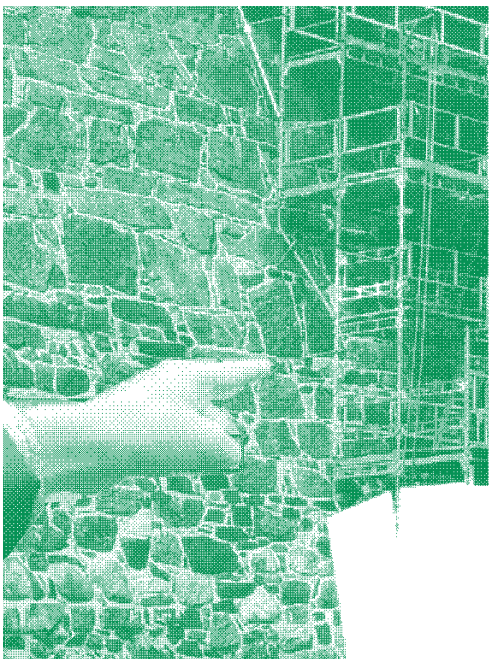
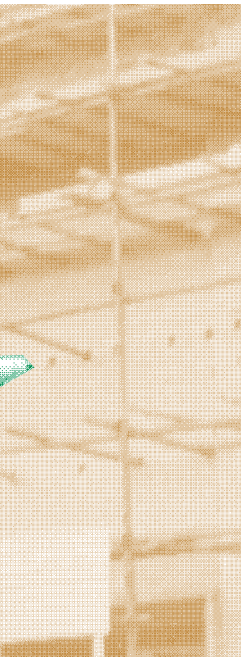
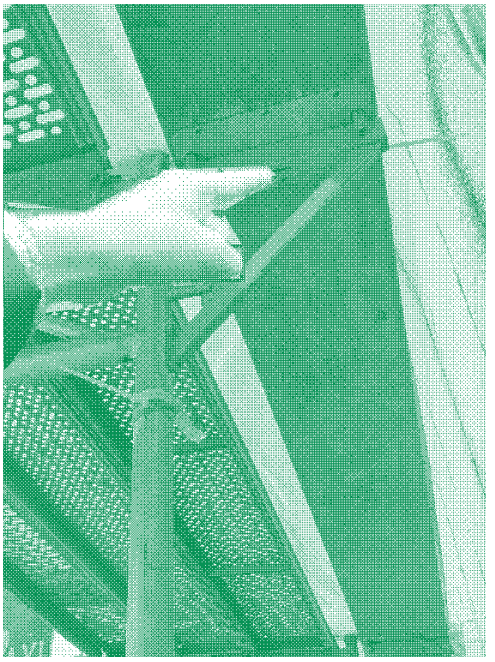
1:20 typical connection to masonry wall in freestanding scaffold



Scaffolding connections to primary structures and remains of anchoring points on building facades.



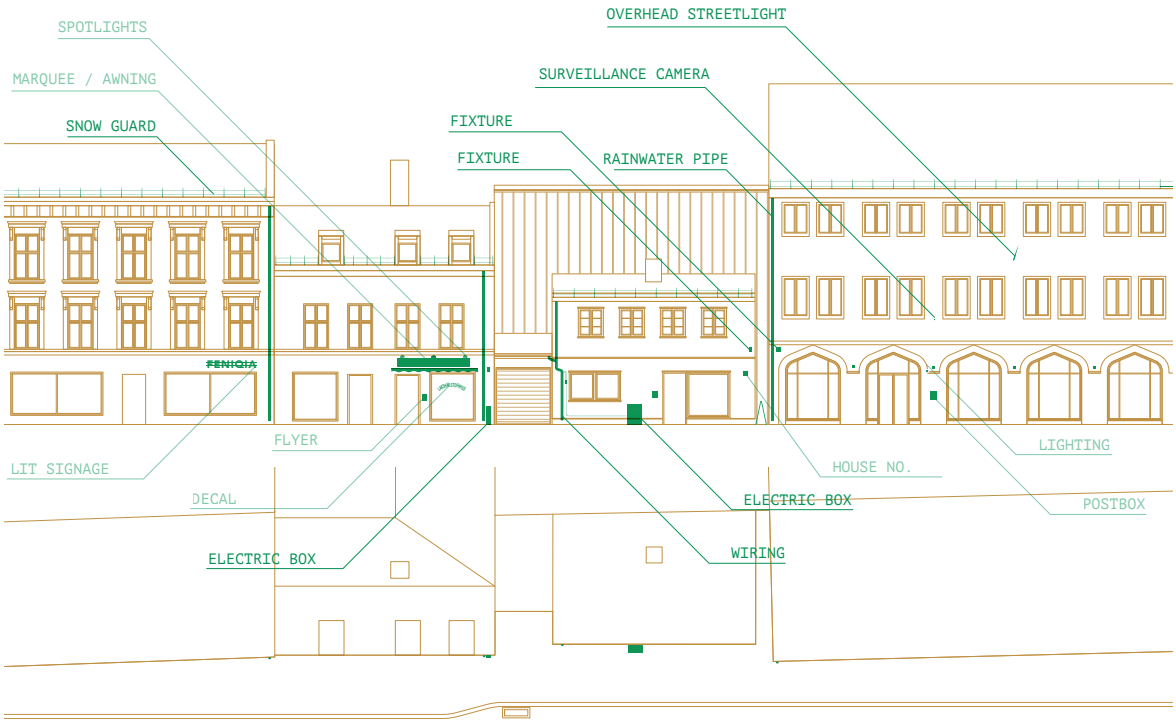

Despite our reliance on scaffolding and serious technological developments in the connection between scaffolding components, the (often neccessary) connection between the scaffold and primary structure has not really been considered, highlighting a disconnect between architecture (design of the built environment) and maintenance (use / upkeep of the built environment).

FACADE ELEMENTS

Appearance of a building has always been a consideration of architects, but facades often have additional elements installed after a building is completed to improve building operation. This step is often beyond the scope / control of the architect.

The buildings at Tøyenbekken 10-16 were built between the late 1890s and up to the early 2000s. To illustrate, their facades have been peppered with various new elements:

» Visible elements, such as ornamentation, signage and house numbers
» Functional elements, such as rainwater pipes, snow guards and vents
» Elements with characteristics of both, such as lighting, mailboxes, and surveillance cameras



ANCHOR AS FACADE ELEMENT

Because scaffolding does not use foundations, it is common practice to tie the scaffold to the primary structure (i.e. directly to the facades) to improve stability.[1] Examples on the previous spread show how temporary anchors are drilled into the facade as required. Scaffolders will have their own guidelines on anchor installation. Below is an example from UK's CFA, on the process and requirements of fixing scaffolding safely to facades.

Given that buildings are assessed to be structurally sound anyway before construction, and that we rely on scaffolding for maintenance, doesn't it make sense to anticipate future (temporary) loads already in the design process, therefore simplifying the maintenance cycle?

[1] Freestanding scaffolds can also be shored through weighted sandbags or pegged to the ground, but generally require more open space around that impact traffic.

[2] Construction Fixings Association & National Access and Scaffolding Confederation (UK). "CFA Guidance Note: Anchorage Systems for Scaffolding." (2011).

CFA Guidance Note:

Anchorage Systems for Scaffolding: "NASC TG4:11"

1.1 Terminology

In this Guidance Note the terms listed are taken to have the following meanings:

Allowable Load The load which may be applied to the anchor as determined from "Preliminary" tests on site when there is no manufacturer's Recommended Load data available for the base material concerned..

Anchor A component installed in the building structure to transfer the necessary forces between the tie and the building structure, it may be temporarily or permanently fixed into the structure.

Anchorage The combination of anchor, a fixture e.g. a bracket, and the immediately surrounding base material on which the anchor depends in order to transfer the relevant forces.

Masonry Brickwork, stonework and concrete blockwork

Masonry unit Individual brick, block or stone within a masonry wall.

Recommended Load The load which may be applied to the anchor as quoted by the manufacturer for a specific base material.

Tie A component used to connect the scaffold structure with the building structure via an anchor

Tie assembly The combination of tie and anchor

Working Load Actual load to be applied to the anchor according to the design, also known as Applied Load. It may be taken from tables in the NASC document TG20 - *Guide to Good Practice for Scaffolding with Tube and Fittings* or calculated from first principles. In designs to Eurocode 2 the equivalent term is "Characteristic action"[15].

1.2 Approach

APPROACH TO ENSURE SAFE FIXINGS

Check structure will support required loads

Choose an anchor suitable for the base material

Know the Working Load

Concrete — Check Working Load is lower than Recommended Load

Masonry — Do Preliminary Tests as required in section 6.1

Chosen anchor to be installed by a Competent Fixings Installer

Sample of anchors on every job to be Proof Tested by a Competent Fixings Tester as section 6.2.

2 SELECTING ANCHORS FOR TIEING SCAFFOLD STRUCTURES.

2.1 General

Aspects which need to be considered in selecting anchors for tieing scaffold structures are:

- The type of linkage to the scaffold structure
- The base material and suitability of the structure
- Working load compared to recommended or allowable load
- The way loads are transferred through the ties and the direction they are applied – tension, shear, bending or a combination.
- The need for testing
- The potential for corrosion

CFA Guidance Note:

Anchorage Systems for Scaffolding: "NASC TG4:11"

6.2 Proof tests.

These are needed to check that anchors to be used in the job have been installed correctly.
They should be carried out on all projects.
This guidance applies to all new jobs and to structures with previously installed anchors.
A sample of anchors to be used shall be tested to a load of 1.25 times the working load; in the case of ties with a working tensile load of 6.1 kN this means a test load of 7.6kN and where a tie load of 12.2 kN is required the proof load is 15.3kN. The pass criterion is that no significant movement of the anchor is apparent; a visual check only is sufficient.
A minimum of 3 anchors shall be tested and at least 5% (1 in 20) chosen at random and spread evenly throughout the whole job.

The minimum number (3) applies to every discreet area where:
a) different fixings may have been used.
b) the base material is different
c) the condition of the base material has been affected by different weather conditions on a different elevation or
d) a different team of installers has worked.

All anchors that have been proof loaded should be clearly identified with a tag showing the date of test and the test load, any anchors failing the test should be tagged as such.

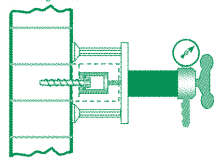
The failure of an anchor in proof testing is a serious issue and requires the investigation of the cause(s) of failure and an increase in testing rate as follows:
One failure – double the test rate to 1 in 10 and at least 6.
Two failures – double again to 1 in 5 and at least 12
More than 2 failures – test 100% of the job, review the fixing specification and installation method.

6.3 Regular examination

In view of the variations in loading which normally affect scaffold structures the anchors used to tie them to buildings should be re examined at periods not exceeding two years for most fixings but one year for self-tapping concrete screws or immediately following severe weather conditions or any undermining of the scaffold structure. The examination should include a visual inspection of the anchor and surrounding structure for any deformation, damage, rust seeping from the junction between fixture and substrate, cracks in substrate or mortar joints and a tensile test as per section 6.2. The anchors tested in each of these examinations should be anchors not tested in previous examinations. Anchors subject to re-test should be clearly identified with a tag showing the date of test and the test load, any anchors failing the test should be tagged as such.

6.4 Test Procedures

Site tests should be carried out by suitably competent personnel (other than the actual installer of the fixings tested) using a test meter with a gauge calibrated within the last twelve months to an accuracy of < 5%. Test equipment should apply the load to the anchor and not through the tie through suitable couplers and be arranged such that the reaction loads are taken sufficiently far from the anchor so as not to influence the result, typically this means ensuring the feet of the bridge do not rest on the masonry unit being tested.



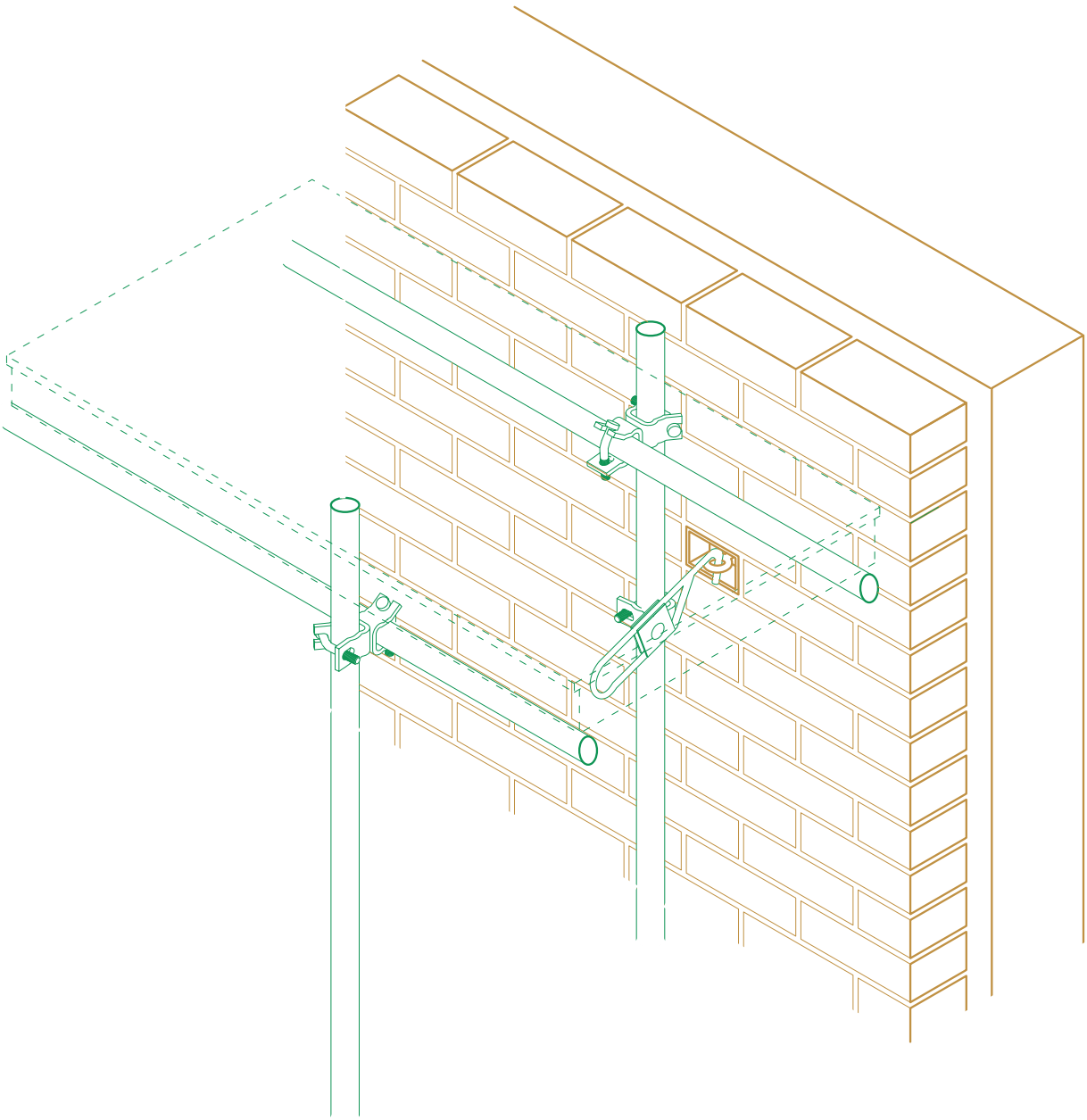
Typical test rig arrangement. Self tapping screw tested in situ. Adaptors are available to enable any anchor for scaffold ties to be tested. When testing in brickwork the feet of the bridge should be spaced far enough apart to span bricks. The bridge may need to be oriented vertically to do this.

Table of proof test sample	
Total ties on the job	number of proof tests
0 – 60	3
61 – 100	5
101 – 120	6
121 – 140	7
141 – 160	8
161 – 180	9
181 – 200	10
200 – 220	11
221 – 240	12

The Construction Fixings Association Guidance Note - "Procedure for site testing construction fixings" contains guidelines for site testing of anchors. Test anchors should be installed strictly in accordance with the manufacturer's recommendations. Test results should be formally recorded and retained with documentation relating to the project.

7 REMOVABLE AND RE-USABLE FIXINGS

Some anchor types are removable which avoids problems with long term corrosion.
Being removable does not make anchors re-usable. The re-usability of particular anchors is referred to in the relevant part of section 4 Anchor types. Anchors should only ever be re-used if the manufacturer specifically allows this and if a control system is in place to ensure they are not re-used more times than the manufacturer allows. They should be subject to 100% inspection and if there is any rust, damage (especially bending) or any doubt about their suitability for re-use then anchors should be discarded. If anchors or ties are found to be bent then the reasons for this should be investigated to ensure it cannot happen again.



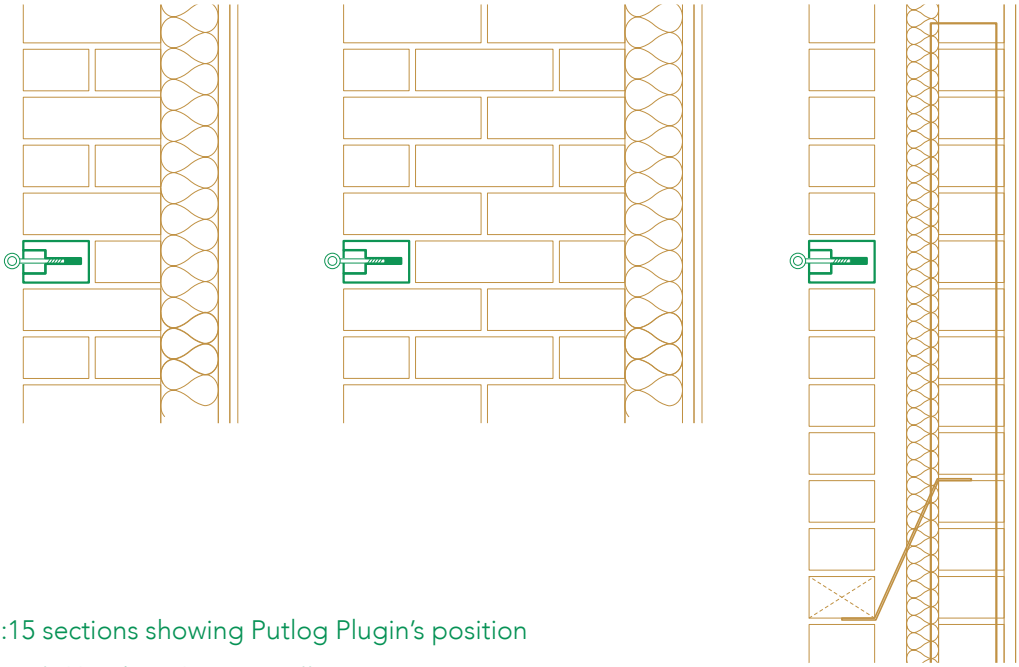
1:15 drawing for Putlog Plugin, a scaffolding anchor component integrated into brick walls at construction stage, intended to reduce intrusive damage to facadea in future maintenance cycles.

TEST 1: PUTLOG PLUGIN

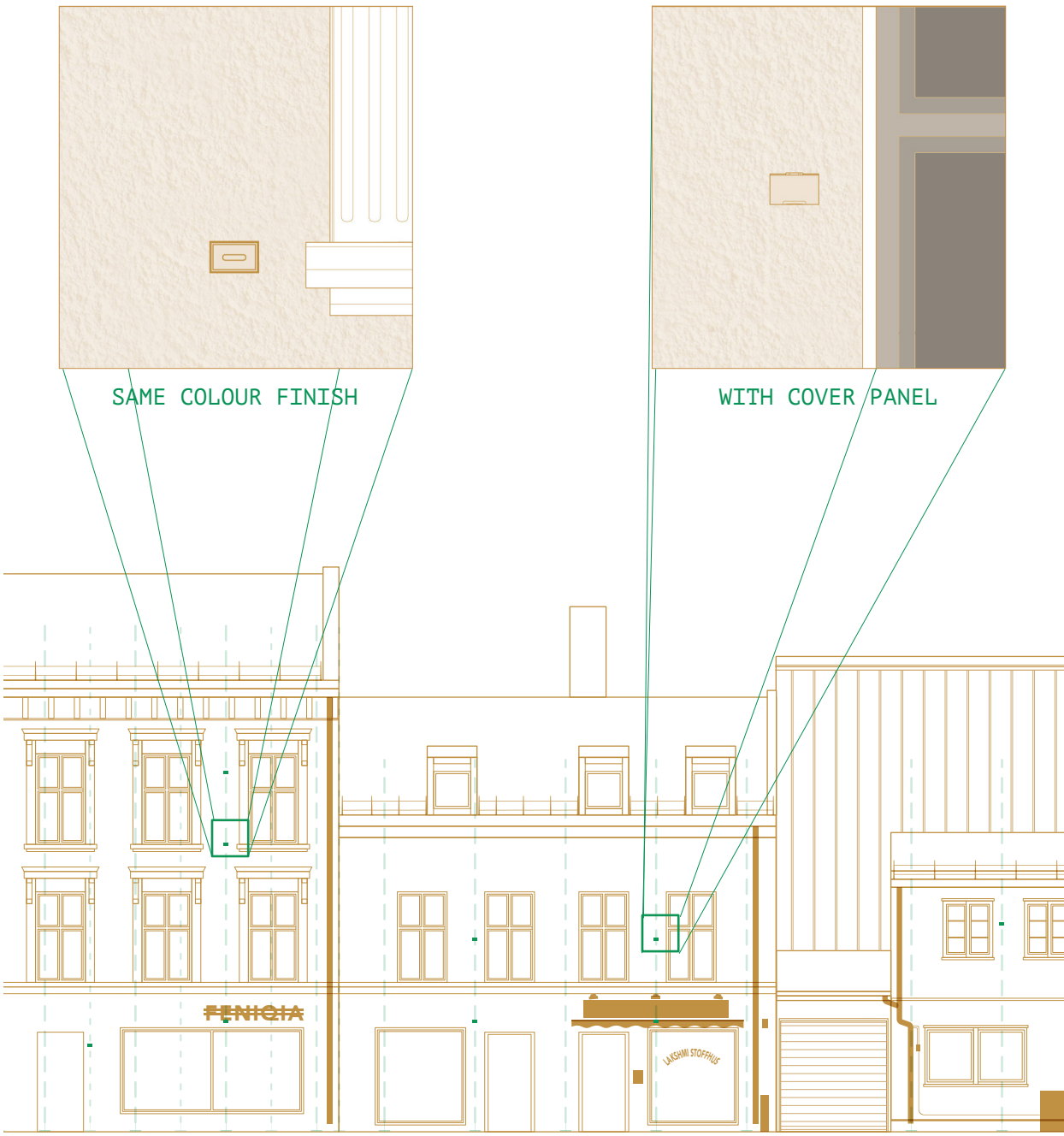
Putlog Plugin is a proposal for a permanent anchor component that is built directly into brick walls as a facade element. It offers an alternative to the existing practice of inserting temporary anchors, which can cause possible facade damage during future maintenance.

This idea is not new - there are precedents for the presence of fixed anchoring positions in the medieval castles of Europe and the toron of West Africa. Implementing a system of permanent attachment points for scaffolding could allow reuse of a series of approved designs during maintenance and repair cycles.

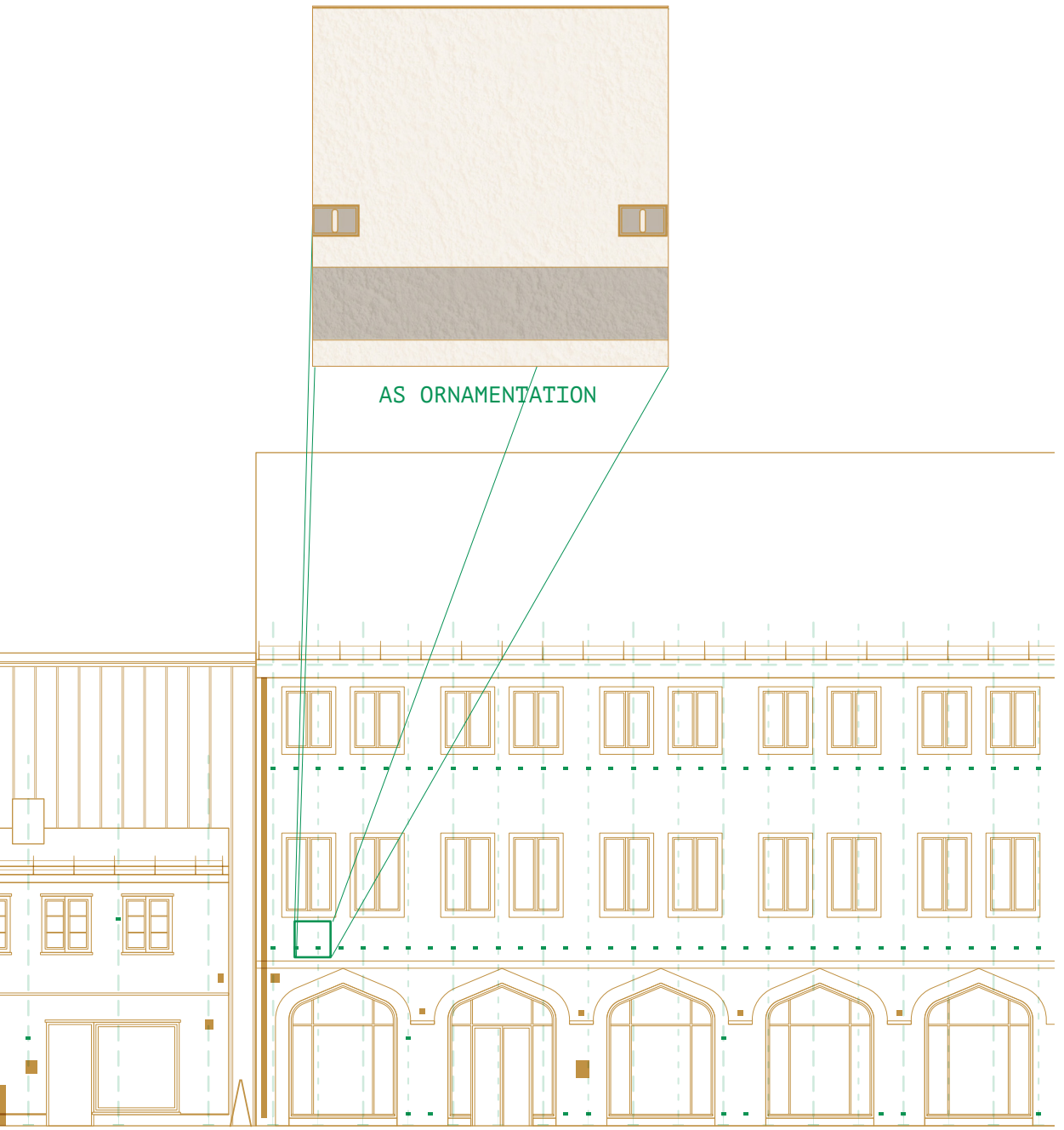
A permanent anchor could be especially useful if the surface being considered is unusual, or - in a retrofit situation - if the surface already has unwanted damage from weathering.



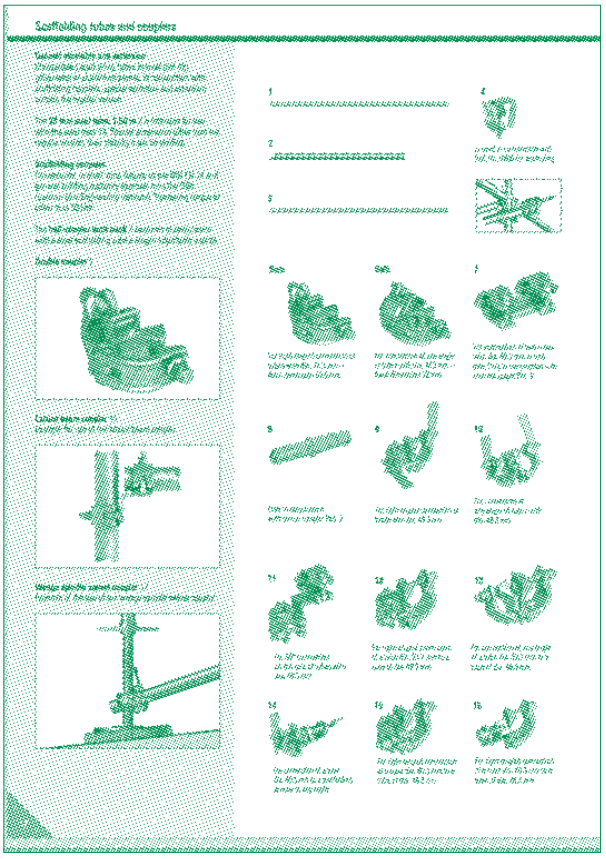
1:15 sections showing Putlog Plugin's position in solid brick and cavity walls.

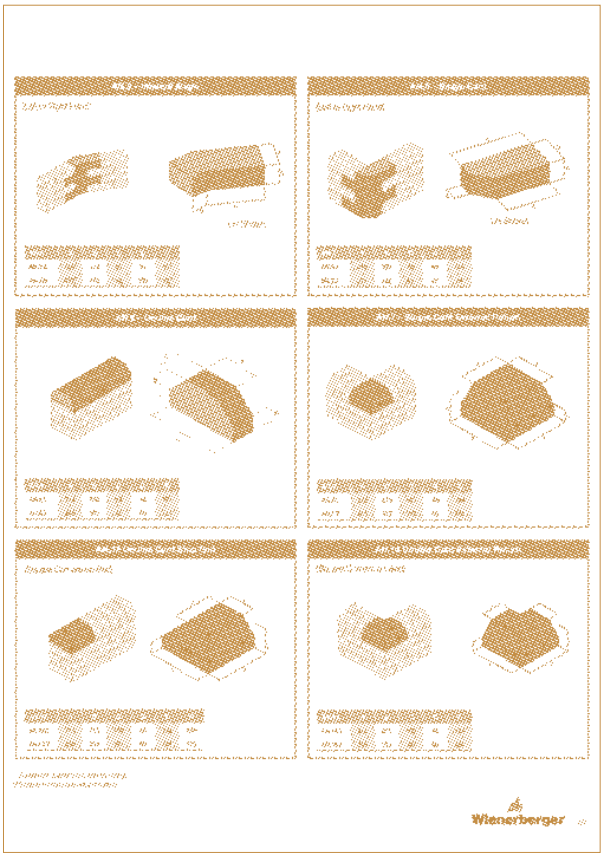


Visual options for Putlog Plugin implementation on facade. Technical requirements mean they should have a spacing of 2m, a typical span distance compatible with many modular scaffolding systems.



Wider and taller buildings (over 10m / 5 no. 2m modules width) could have additional anchoring points at 1m distances for more flexibility.





Choosing products from suppliers is a part of the modern building industry.

Left, scaffolding couplers. Right, available brick types.

REFLECTION

Putlog Plugin explores the possibility of improving scaffolding (and building maintenance) at the scale of a system component. Its permanence is intended to give more control to the architect by consolidating the most suitable positions for future anchoring in terms of support and appearance.

The idea has so far been explored in masonry. Other materials, will pose different challenges and require other solutions. Some considerations in using a permanent anchor with other materials[1], could be:

- Concrete: possibly cast into place, in-situ or off-site
- Metal: possibly riveted / welded to frame
- Timber: not so compatible. Scaffolding around timber structures often uses shoring for stability. For smaller scaffolds anchors ties can be used, but may cause problems with water ingress in the long term.

While the aim is to reduce maintenance complexity, new, other maintenance considerations are introduced. Naturally, these components will inevitably themselves require maintenance, upkeep, and replacement.

A permanent anchor also assumes that scaffolding standards are going to stay the same. Recommended maintenance cycle periods range from 5-30 years (explored in later chapters) - which are timescales where the future is hard to predict. Ease of installment, comes at the cost of flexibility, that may eventually become either inconvenient or problematic. While the anchor could be designed to be sturdy for permanence, its installation could be designed to be reversible with minimum damage.

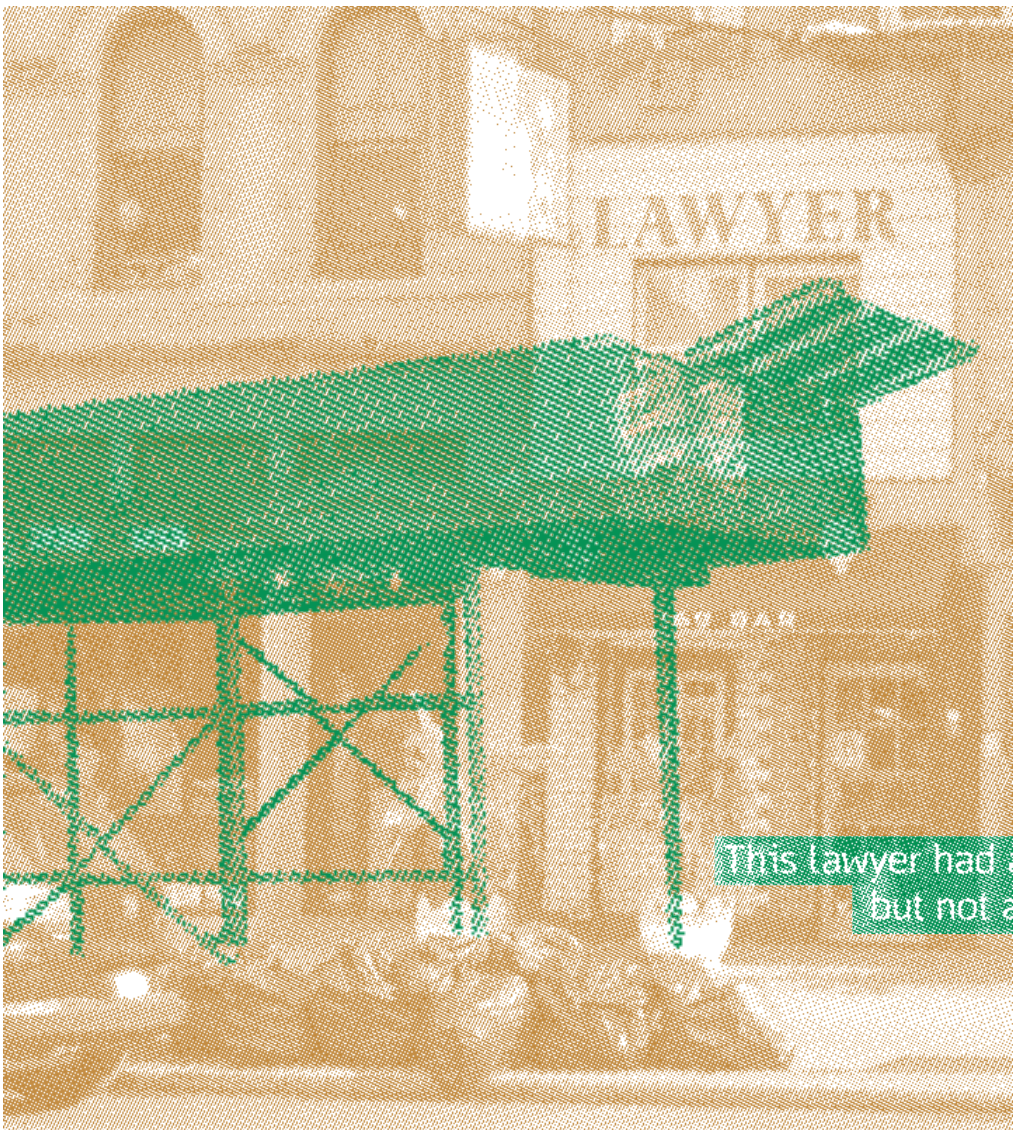
The site is revisited in Replugin, which examines the ability of scaffolding to accomodate to different situations. The consequences of Putlog Plugin is lightly touched on.

[1] I used information from these sources:

1. Construction Fixings Association & National Access and Scaffolding Confederation (UK). "CFA Guidance Note: Anchorage Systems for Scaffolding." (2011).

2. Marks, Michael Terry. "Scaffolding: The Handbook for Estimating and Product Knowledge" (2016).

TEMPORARINESS VALUE



Manipulated still from 'How to Build Scaffolding', showing the before and after of a protective scaffol

(HOW) CAN SCAFFOLDING HAVE TEMPORARY APPLICATIONS BEYOND MAINTENANCE?

d in New York.

(FIXED LIFESPAN)

TEMPORARINESS VALU

(HOW) CAN SCAFFOLDING HAVE TEMPORARY APPLICATIONS BEYOND MAINTENANCE?

As mentioned in the chapter on usefulness, scaffolding's lifespan on a site is only as long as it is functionally useful. It is a type of temporary structure which differs from conventional buildings (which are percieved as permanent[1]) and have distinct qualities like portability, rapid disassembly, and low-impact groundworks to facilitate short life spans.

The awareness of the fixed lifespan of temporary structures also results in an awareness of anticipating future reuse of components for economic and material sustainability - in this case, the parts are just as important as the whole. Keeping stock and planning beyond the lifespan of one project is part of the process of scaffolding management. In contrast, a closed-loop system for building materials - from projects like Assemble's Folly for a Flyover[2], or Overtreders W's People's Pavilion[3], to companies like Norway's Resirquel[1] and Belgium's Rotor[4], - seems to have appeared as a way towards sustainability only in the past 10 years.

Despite technological improvements to scaffolding - particularly in the 20th century - intended to make it easier, more efficient, or more flexible to build with, scaffolding's applications have remained mainly (but not exclusively) limited to construction work. This chapter examines existing practices of acquiring and using scaffolding in sustaining its temporariness.

Scaffolding is a specialised industry which is made available through a rental system. The possible consequences of having scaffolding directly available through an ownership model[5], forms the premise for YIOBY / Yes, in our back yard! which explores possible scaffolding structures built for purposes other than maintenance.

[1] Percieved being the operative word - the demolition of late 20th century buildings (Y-blokk, Robin Hood Gardens, Nakagin Capsule Tower) due to their 'unpopularity' and deterioration are examples to the contrary. More on this in the universality chapter.

[2] See https://assemblestudio.co.uk/projects/folly-for-a-flyover

[3] See https://www.dezeen.com/2017/10/27/peoples-pavilion-dutch-design-week-low-ecological-footprint-bureau-sla-over-treders-w/

[4] See https://www.resirqel.no/om-oss-1 and https://rotordc.com/about/

[5] Unfortunately the feasibility study does not include an economics angle, as I was unsuccessful in getting quotes or estimates from suppliers.

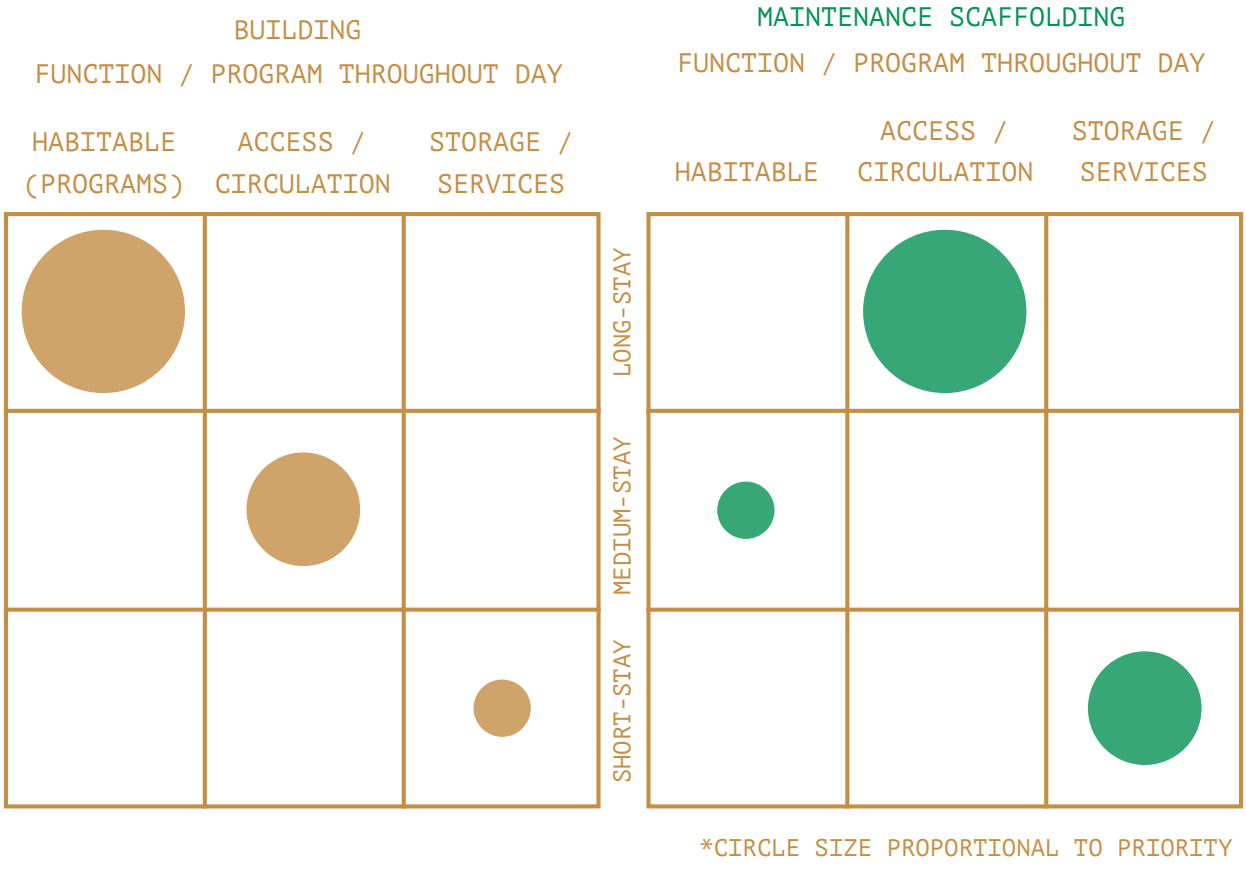
E

Scaffolding components sorted and laid out after disassembly in Oslo.

FUNCTIONAL PRIORTIES

Scaffolding has a supportive role to buildings. When they are built during maintenance, they fulfill functions that the building (usually) does not have, like access to exterior surfaces, or protection to fragile elements that are exposed. As a result, the functional priorities of scaffolding (and temporary structures generally) have a 'compensational' relationship to the functional priorities of the building. The diagram below illustrates this, marking types of functions against how frequently / how long they are used for.

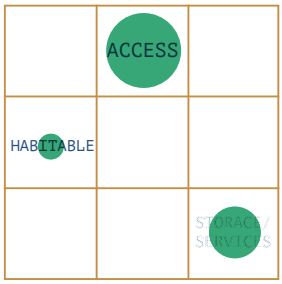
But scaffolding is just one kind of temporary structure - different temporary structures compensate for different functions, as shown on the opposite page.



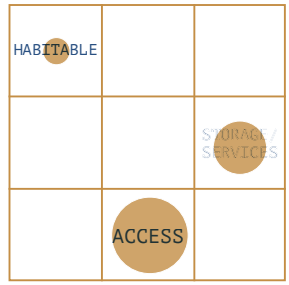
MAPPING TEMPORARY TYPOLOGIES

Typologies marked in green often incorporates scaffolding components in their constructions. Typologies in yellow do not have scaffolding components in their construction, but may be complementary to the presence of scaffolding.

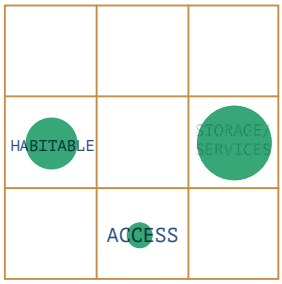
MAINT. SCAFFOLDING

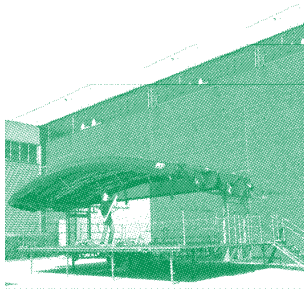


CRANE

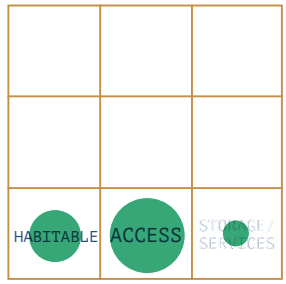


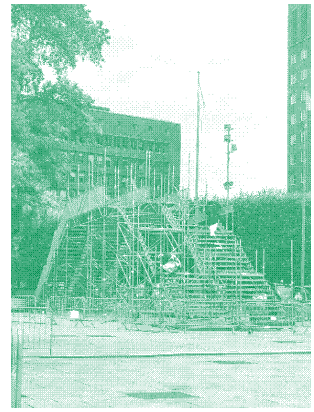
STAGES



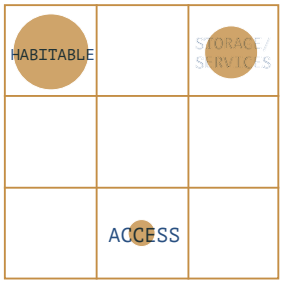


FOOTBRIDGE

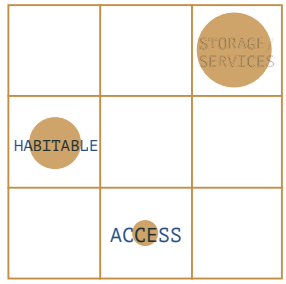


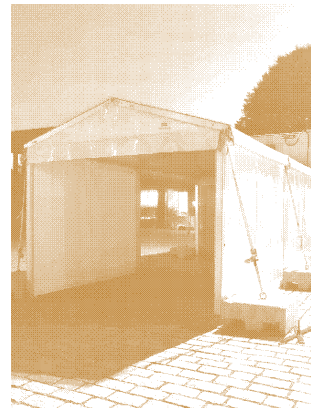


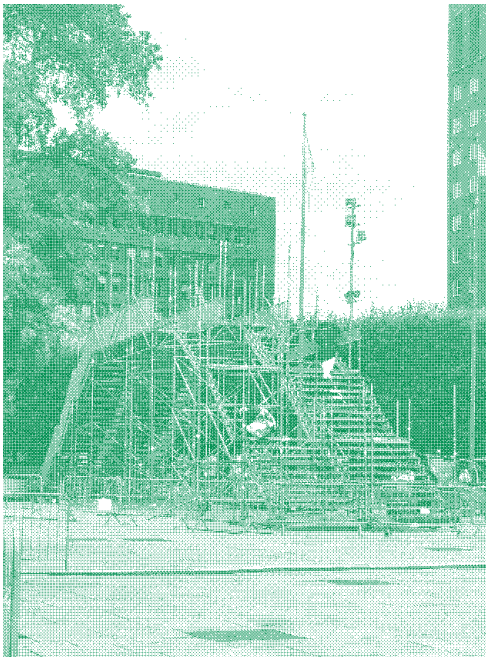
PORTABLE BUILDINGS

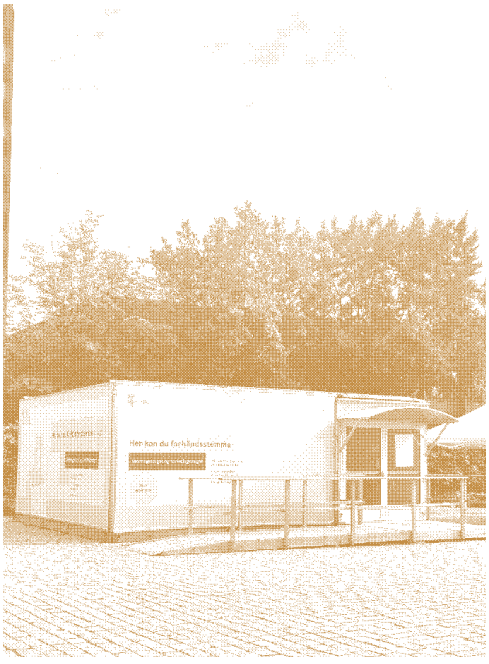


OPEN-AIR TENT

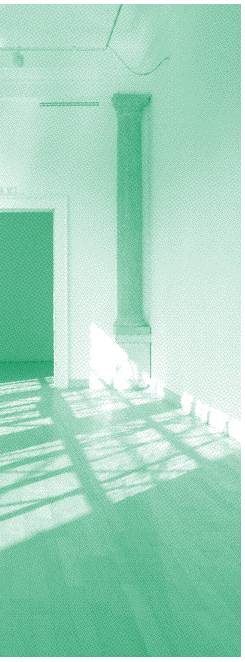
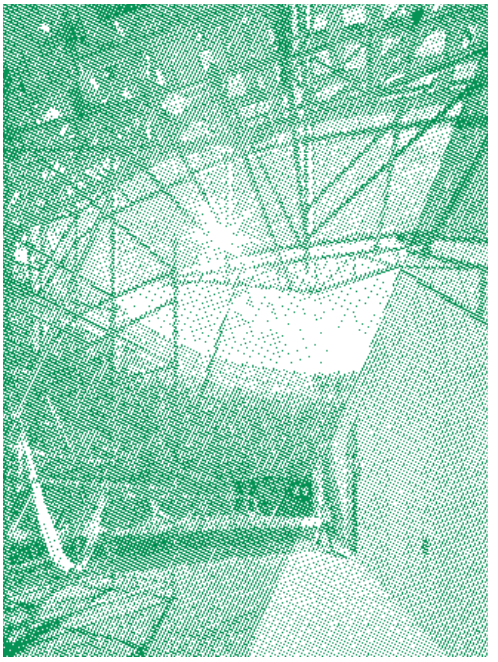






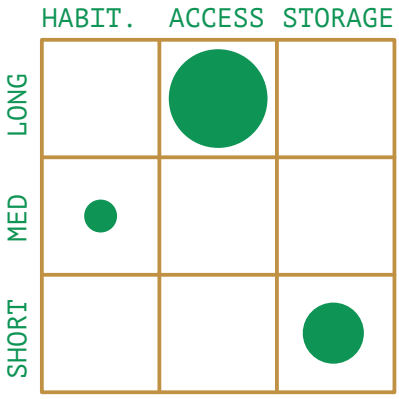



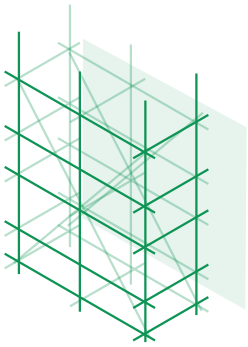
Top, temporary scaffolding structures with non-maintenance functions. Bottom, other kinds of temporary structures, which similarly don't require foundations and are minimally viable.

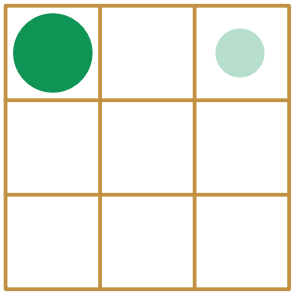


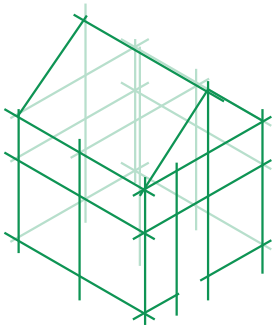
Clockwise from top left, ref. 031, ref.032, Caruso St. John's Island, Pedro and Juanas Hórama Rama, ref. 204, container module as voting booth, tent as COVID testing station, stacked container modules, ref. 025, signposting at Ullevål stadion



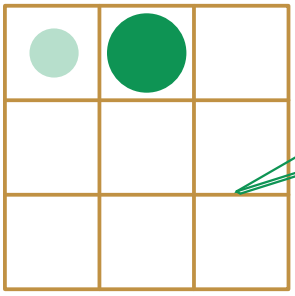


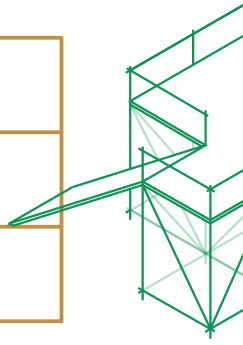
TYPICAL SCAFFOLDING
LONG-STAY ACCESS



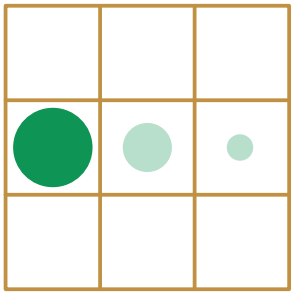


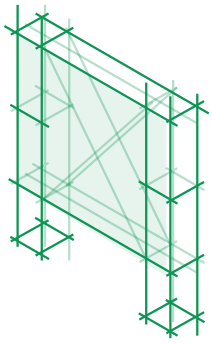
GLASSHOUSE
LONG-STAY HABIT.



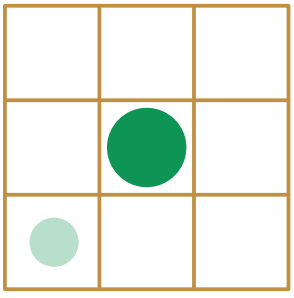


TERRACE
LONG-STAY ACCESS

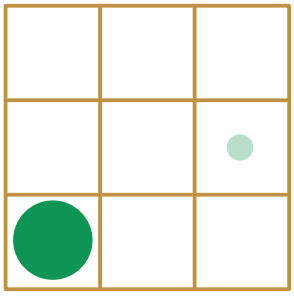


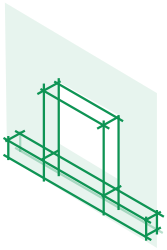


CINEMA
MID-STAY HABIT.

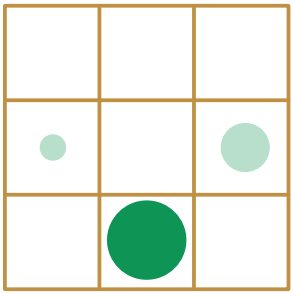


PLAYGROUND FRAME
MID-STAY ACCESS





WINDOW RECESS
SHORT-STAY HABIT.

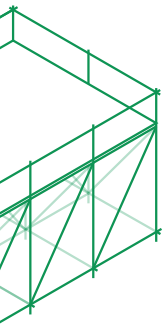


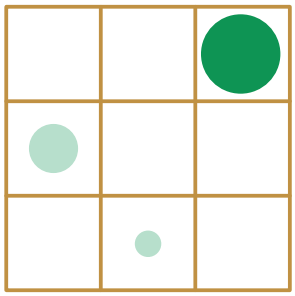
ARCADE
SHORT-STAY ACCESS

FORM FROM FUNCTION: STUDY

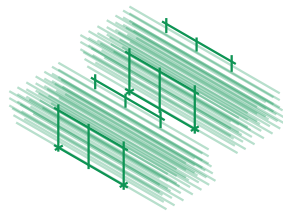
Lifespans of a scaffolding structure is limited to the duration it is functional. But as the scaffolding survey has shown - functionality (as shown in the diagram on p. 28) can be expanded through adding more components.

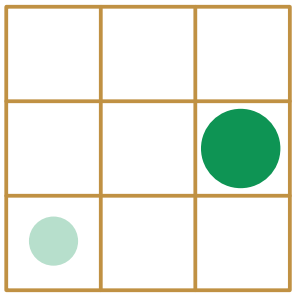
Here, possible, non-maintenance-related configurations of scaffolding are imagined by looking at different combinations of functional priorities in order to produce possible temporary programs. Several are developed further in the project YIOBY, with the kinds of non-structural components required for operation drawn and quantified in more detail.



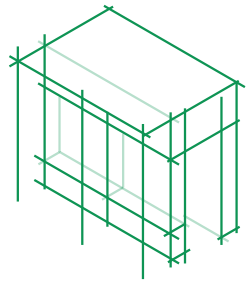


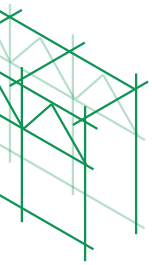
SCAFFOLDING DEPOT
LONG-STAY STORAGE

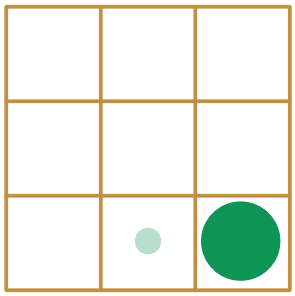




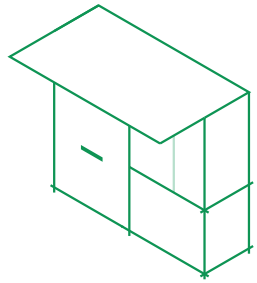
BOOT ROOM
MID-STAY STORAGE







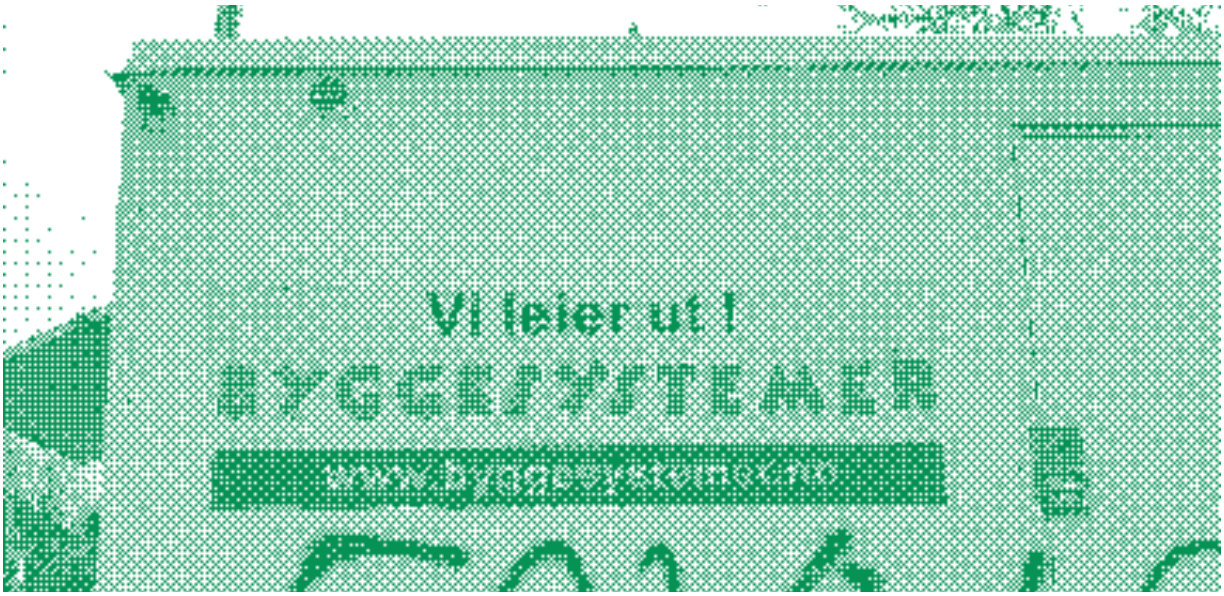
POSTBOX / POSTROOM
SHORT-STAY STORAGE



Diagrams as tool for quick sketches of possible scaffolding forms based on function and period of use.

FIG. 52. A LADDER SCAFFOLD, DIFFERING SLIGHTLY IN DESIGN FROM FIG. 51.

FIG. 53. A SCAFFOLD OF THE BRICKLAYERS' POLE TYPE, BUT WITH STOUT LADDERS FOR UPRIGHTS.
(From the new German Museum Building, Munich.)



Top, images of ladder scaffolding from the 1915 handbook.

Bottom, signage - "We rent out!" - for scaffolding rental in Oslo

THE SCAFFOLDING BUSINESS

The 1915 American handbook, Safety Engineering as Applied to Scaffolds[1] mentions the practice of renting ladder scaffolding (see photo; transoms and platforms are mounted on the rungs) in Europe:

> *The most distinctive thing about the ladder scaffold is the fact that it is built so that it can be erected and taken down again, without damage, and can therefore be used repeatedly...Scaffolds of this type are owned by companies that lease them to the users, the rental covering the work of erection and removal... They are extensively used in Germany, Switzerland, France, and Austria, and for doing light work they are exceedingly satisfactory. There does not appear to be any good reason why they should not be widely adopted in the United States also...They have been used in Germany for more than 25 years.*[1]

[1] The Travelers Insurance Company, Hartford, Connecticut. "A Treatise On Safety Engineering Applied To Scaffolds." (1915).

The business model described above is the norm for acquiring scaffolding today, where component rental and construction / removal are provided as a service. Because the cost of keeping scaffolding on-site runs continuously, it is economically sensible to keep the scaffolding on-site as short as possible, and to build them strictly to briefs that meet only the minimum requirements of load, structure and access. From the scaffolders' side, there is an incentive to track, look after, and keep scaffolding components in use rather than in storage.[2]

[2] Components are also usually labelled with the company that owns it. From: Marks, Michael Terry. "Scaffolding: The Handbook for Estimating and Product Knowledge". (2016).

The scaffolding business further optimises efficiency of assembly and demounting of scaffolds. However, the business model forms a sort of deterrent in exploring other potential avenues for scaffolding. Under an ownership model of scaffolding, what could this potential be?

ON-SITE STORAGE: VOLUMETRIC STUDY

A feasibility study if an ownership model was carried out. The first step was to work out whether the volume of scaffolding in a project might reasonably fit onsite / nearby. I used Grønlandsleiret 16, a 7-storey infill building currently under construction, as an estimate. Two versions of a 3D model of the site was produced[1], with scaffolding components modelled as blocks in built and unbuilt form:

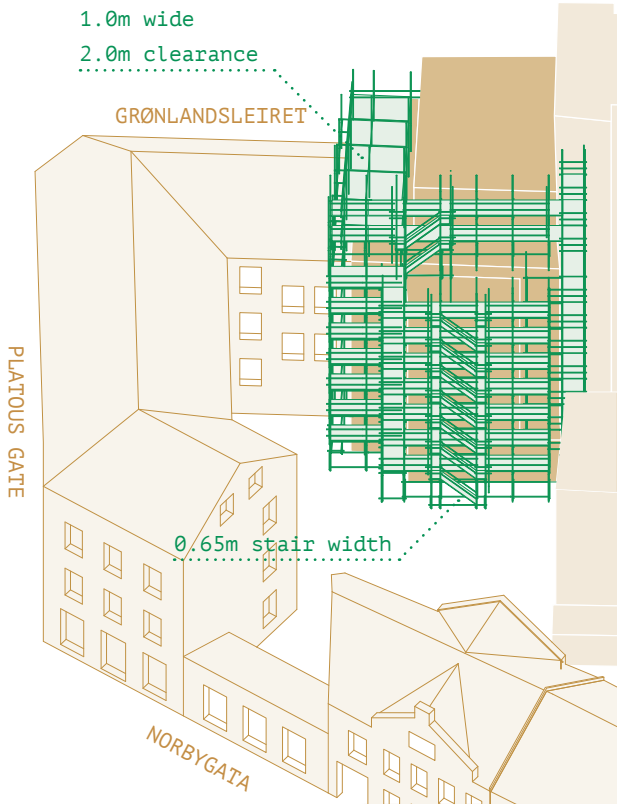
[1]Although there is some variation in module dimensions on site, the model is simplified and uses modules of 2.2m x 1.2m x 2.2m. Stair modules have 0.8m width.

Built:

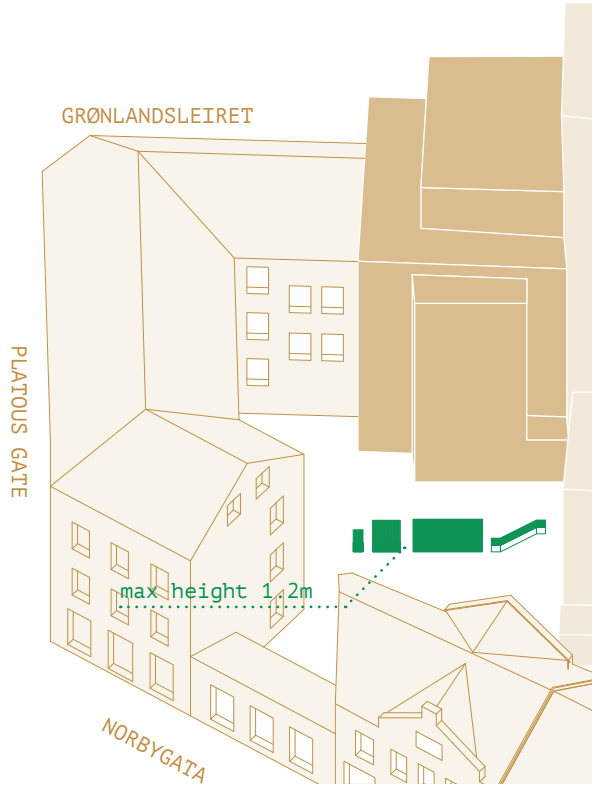
» Total area (accessible): 185sqm

Unbuilt:

» Total area: 35sqm



Current scaffolding around Grønlandsleiret 16. Drawings extracted from 3D model.



Dismantled scaffolding around Grønlandsleiret 16, sorted by component.

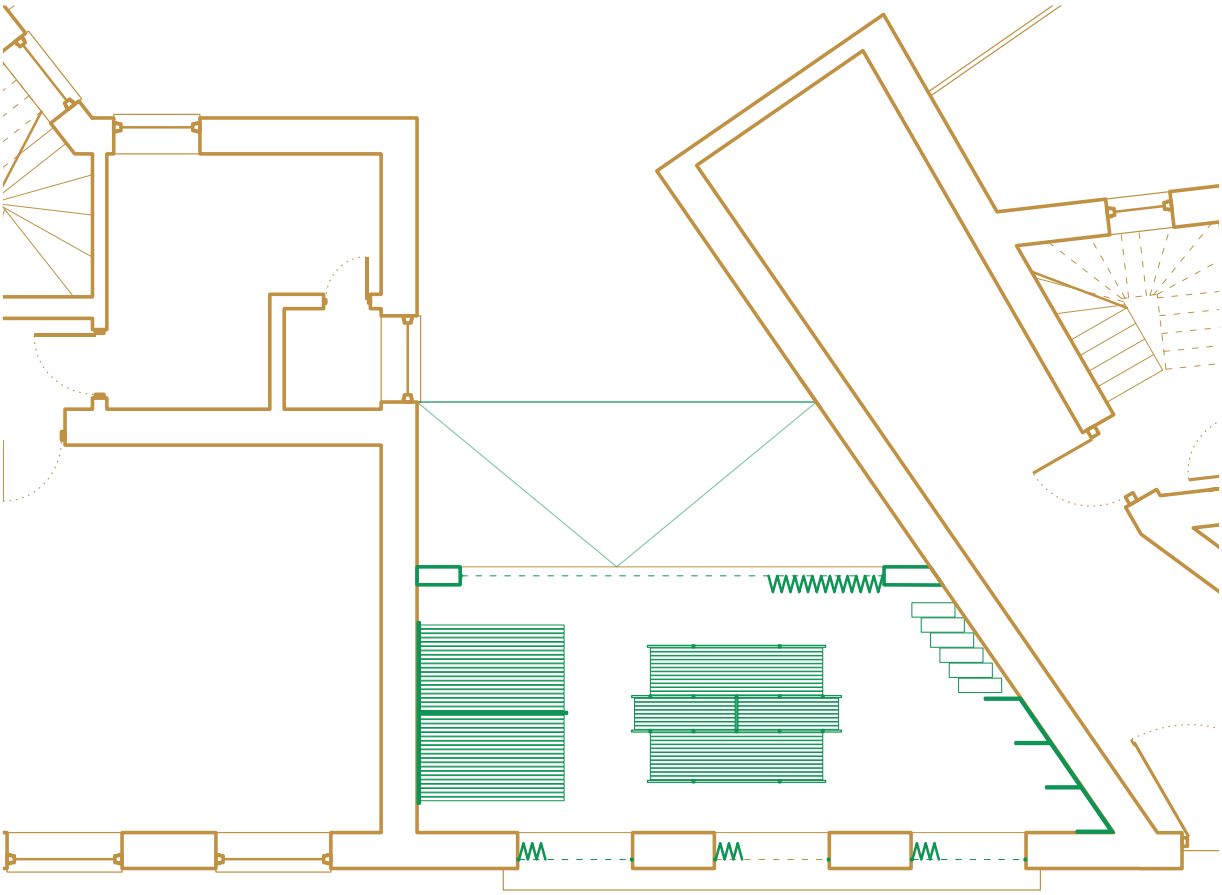
ON-SITE STORAGE: FEASIBILITY STORAGE

The second step was to find a suitable site for storage. A vacant annex on the end of Norbygata (currently accessed from the courtyard) is converted to a shed that holds the equivalent of 50 modules (2.2m length x 1.2m depth x 2.2m height) and 6 stair modules[2], which is enough to enclose the largest facade facing towards Platous gate.[3]

Based on this study, immediate access to scaffolding seems possible. Next, non-maintenance-related, temporary configurations are explored.

[2] Component count: 120 no. 2.5m poles, 120 no. 1.4m poles, 6 no. stair modules and shelving for connectors.

[3] Downside is maintenance is phased, though it also reduces length of impact on building inhabitants.



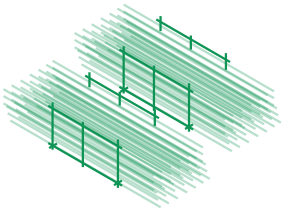
1:100 proposed plan of scaffolding storage, with new folding doors and a slope to improve access.

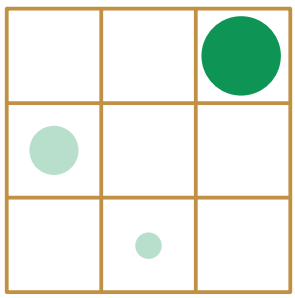
YIOBY (YES, IN MY BACK YARD!)

YIOBY operates on two levels - first it looks at the feasibility of an alternative model of scaffolding ownership, conducted as a volumetric and quantity study of how much scaffolding components is suitable and possible to keep on a site.The second part is a series of non-maintenance structures that can come out of the same pool of scaffolding components, selected from the function / form study on page 51, developed and assessed on its 'success' but also relative to each other.

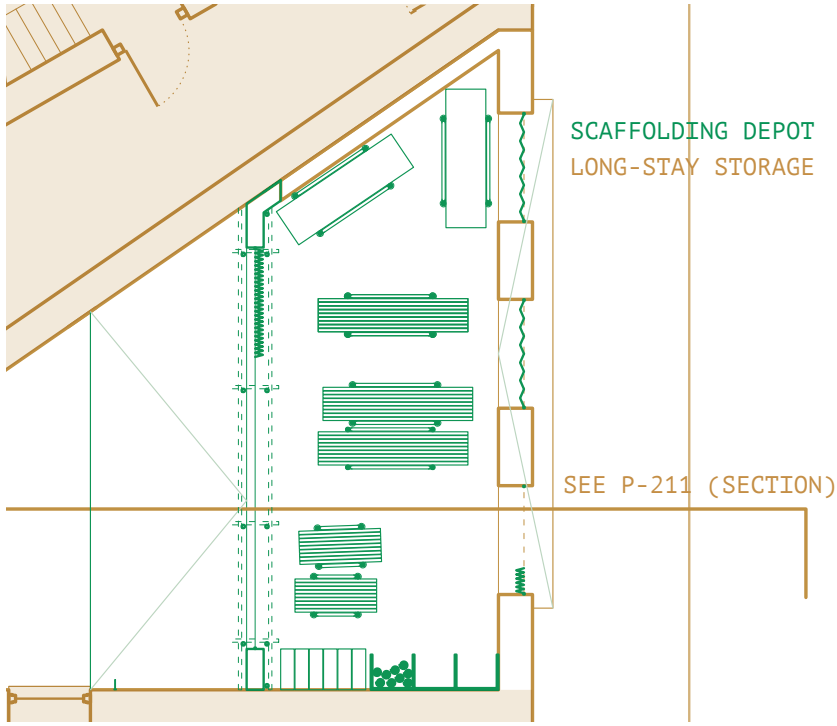
SCAFFOLD DEPOT

The only long-term proposal, the scaffold depot is the conersion of a vacant annex facing Norbygata into storage for scaffolding components, which are stored on typical moving carts. The courtyard wall is rebuilt and braced with scaffolding.





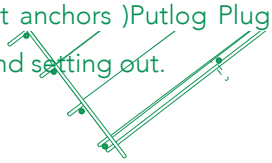
SCAFFOLDING DEPOT
LONG-STAY STORAGE

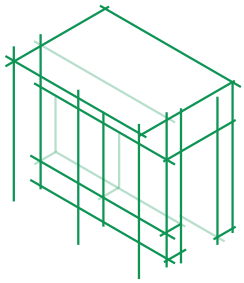


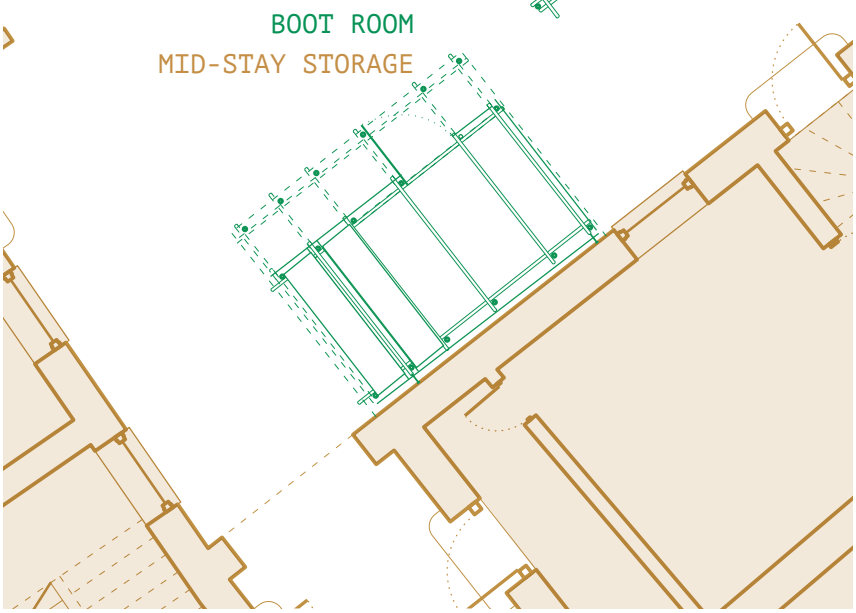
BOOT ROOM

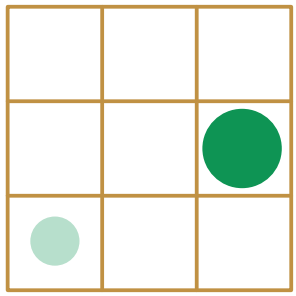
The boot room is a coveed shelter for taking off and storing wet and muddy outdoor things in the colder months, working s a cloakroom accessed off the entrnace to the buildings. Bracing poles are used as hanging space. As a storage site, the structure is partially enclosed with hoarding and can be secured with a padlock if things are left there overnight.

The structure uses some permanent anchors)Putlog Plugins) installed into the wall, helping with stability and setting out.





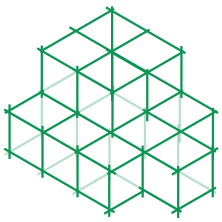


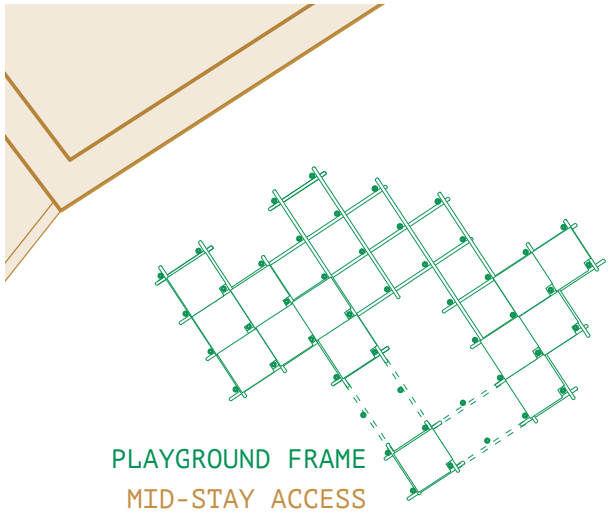


BOOT ROOM
MID-STAY STORAGE

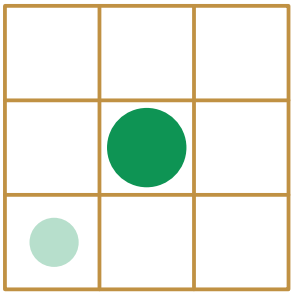
PLAYGROUND FRAME

Various lengths of scaffoling poles are assembled to form a mountain of 600mm cubes with right angled couplers to build a geometric frame as play furniture.





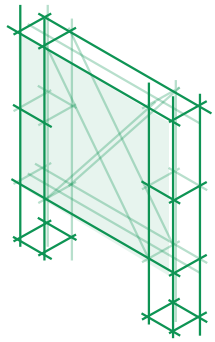
PLAYGROUND FRAME
MID-STAY ACCESS

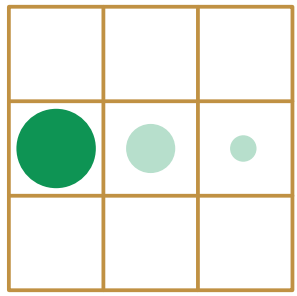


PLAYGROUND FRAME
MID-STAY ACCESS

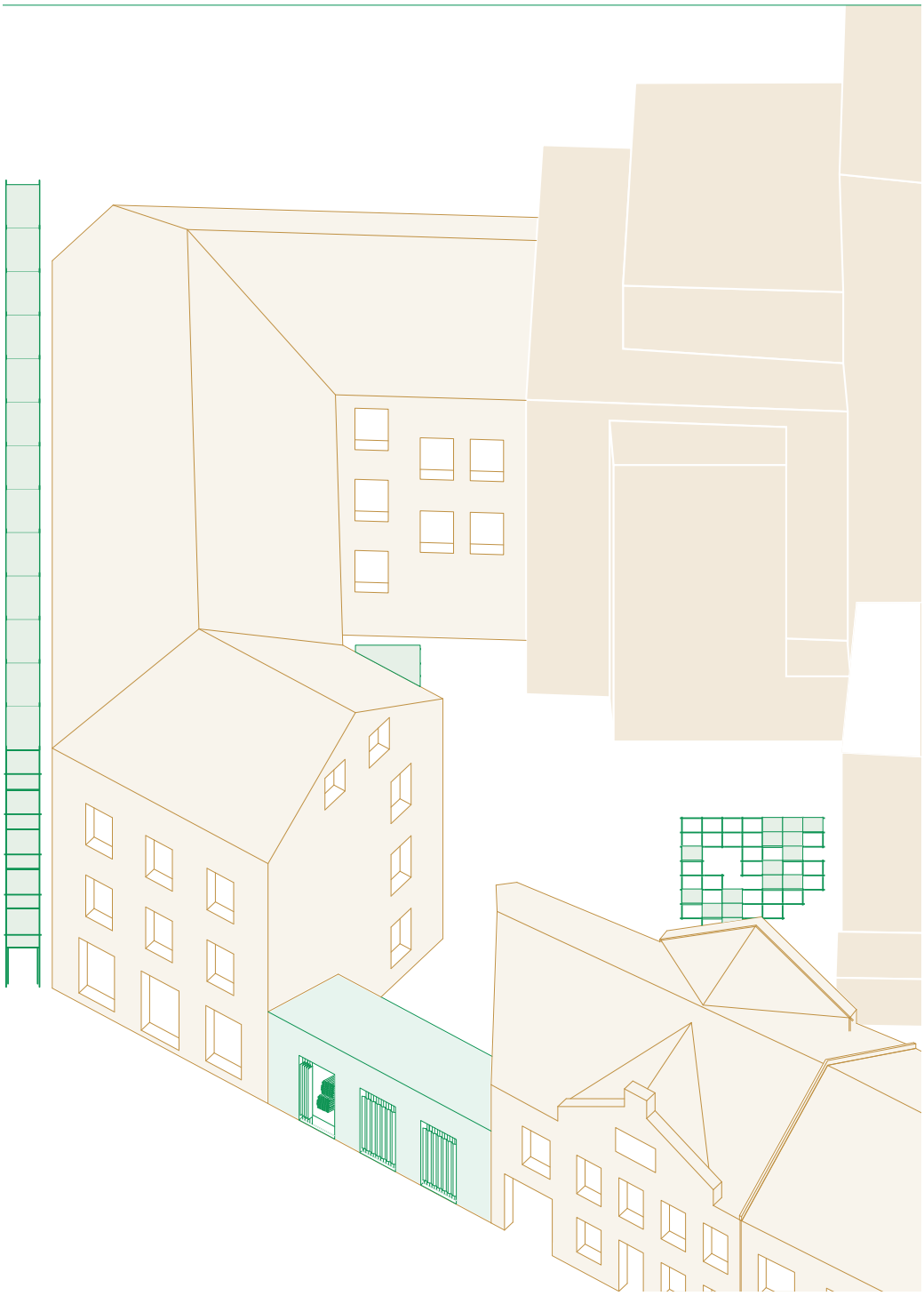
CINEMA STANDS

The windowless face of a 4+storey building facing into the courtyard used as a surface for projecton, from the windows of 3rd or 4th floor inhabtants of Grønlandsleiret 18. Stands are built from scaffolding components, to accomodate for some single-aspect flats whose windows only face out towards the street. Where required, the overall length of the transoms is achieved with sleeve couplers.





CINEMA
MID-STAY HABIT.



Axonometric drawing showing explored typologies in relation to the site.

REFLECTION

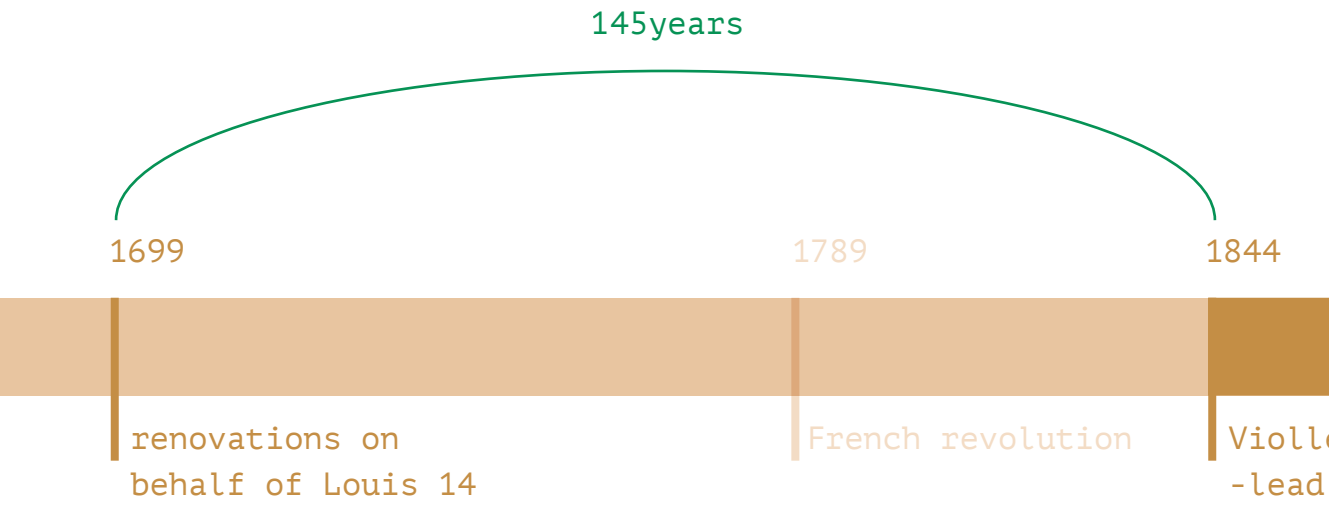
YIOBY explores non-maintenance typologies for scaffolding. The core quality of their lifespans being linked to their function is retained, and a emphasis is placed on the scaffolding structure's usefulness in facilitating different kinds of activities.

All the typologies are built from the same pool of scaffolding components. They are pragmatic in design. Being scaffolding, possible services will be minimal. The appearance of Putlog Plugin in some of these options shows how permanent anchors might be used to support non-maintenance structures by making it easier to install.

I was overly ambitious with this test. The feasibility study was time consuming and ultimately only looked at the volume / quantity of scaffolding. Given more time, the tests could have been develoepd through detailing, and II would have liked to explore the economic perspective further.

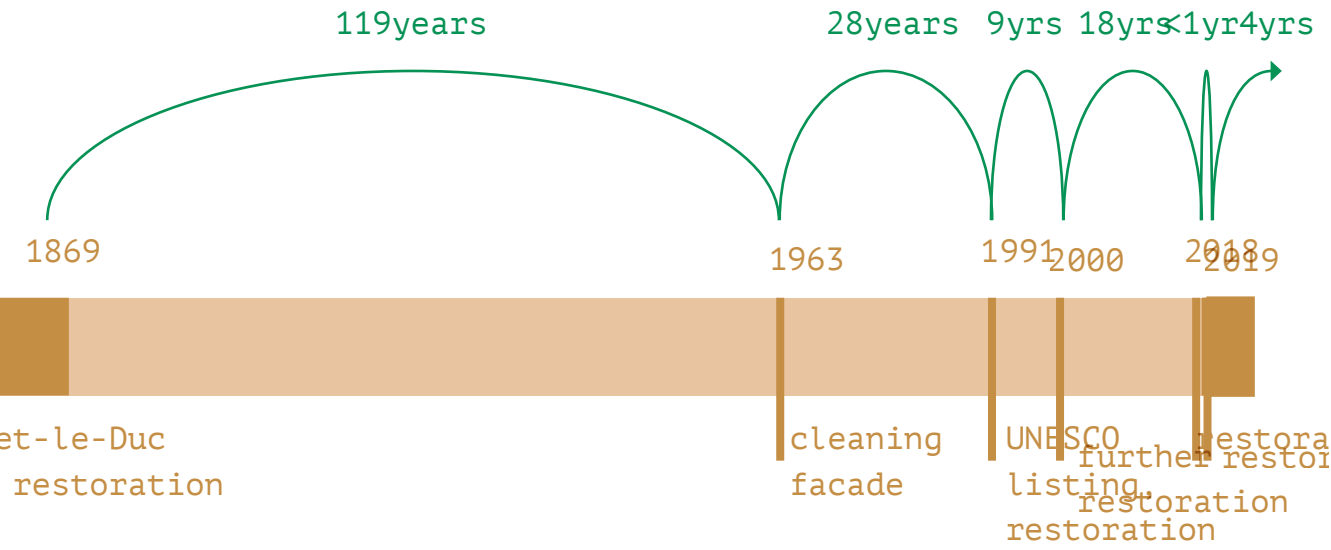
And while scaffolding has developed to be easy to build, safety becomes a much larger concern at heights, limiting the non-maintenance forms explored generally to small, low-lying structures. Again, having more time to work into the drawings would have been a good avenue to round off this test and chapter.

RECURRENCE VALUE IS THERE RO



Timeline of major recorded renovations / restoration works at Notre-Dame, with time periods marked

OOM FOR MAINTENANCE CYCLES WITHOUT INTERRUPTING REGULAR SERVICE?



throughout.

(RECURRENCE)
LIFESPAN VALUE

IS THERE ROOM FOR MAINTENANCE CYCLES WITHOUT INTERRUPTING REGULAR SERVICE?

The previous chapter examined temporariness and function. Another aspect of fixed lifespan is the recurring need for maintenance (and subsequently scaffolding) in relation to the lifespan of a building. When a building is undergoing construction work, its operation is typically reduced (for safety / security purposes) - resulting in limited visibility, areas cordoned off, alternative routes, or even entire site closure - making the parts under maintenance less accessible.

Historic research has shown that when churches in medieval Europe were rebuilt on existing sites, demolition and construction often happened simultaneously, with temporary solutions (which must have included scaffolding) to allow religious services to take place throughout the works.[1]

Documentation of restoration works is one of the principles outlined in the 1964 Venice Charter, intended as a record for future study. But projects like Carmody Groake's Hill House Box[2] shows the possibilities of a live documentation of maintenance that is experimental and experiential.

This chapter focuses on the processes involved in preservation of historic buildings, and explores how different intensities of scaffold support might be experienced as "live" documentation through continuous use throughout the maintenance period.

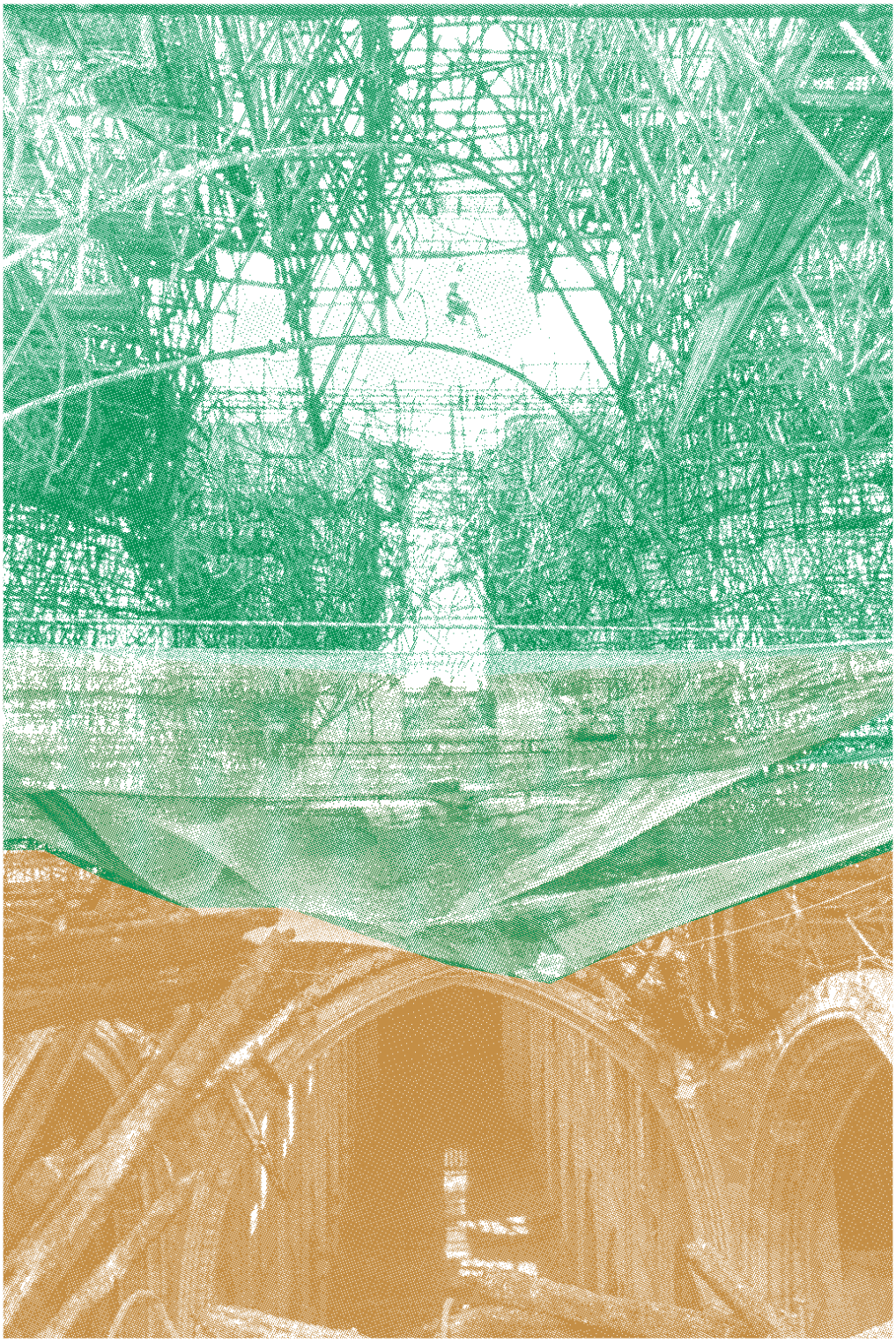
This is the premise for Out of Order[3], which explores the mutual support between scaffolding and the built environment - scaffolding provides support to the main structure while simultaneously reliant on the main structure to stand. The interior of Grønland kirke is used as a test site. First, a maintenance cycle is composed, then speculating on the kinds of support it might need as the building ages and deteriorates.

[1]A detailed example from Nickson, Tom. "Notre Dame de Paris: the medieval cathedral and its 19th century restoration." (2020). Lecture available online at https://www.youtube.com/watch?v=utRPwAKWfxs

[2]A restoration project for Scottish architect Charles Mackintosh's Hill House, see https://www.nts.org.uk/visit/places/the-hill-house/highlights/hill-house-box. Further reading on temporary shelters over monuments https://lucooke.wordpress.com/2018/04/30/conservation-inside-the-box/

[3]Referring to both the conventional meaning of something on pause because of a maintenance period, but also reread as a rearrangement of things (in this case, scheduled maintenance).

[4]Image from Komenda, Alexis. Available online at https://www.architecturaldigest.com/story/two-years-later-heres-latest-notre-dames-restoration



Photograph through Notre-Dame cathedral after 2019 fire[4].

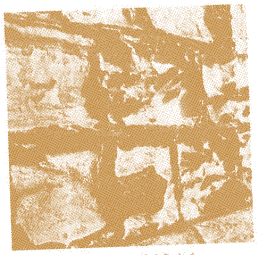


Figure 15.7 St William's College, York, England

The hard cement pointing, stained grey, while the decay of the softer parent stone has been accelerated. An example of wrong maintenance

ing at regular intervals. Staff must be of a suitable grade for the building they care for, and they should be given simple training in reporting defects. Reliance upon cleaners for front-line intelligence is unrealistic if, as in so many buildings, the turnover of cleaners is frequent or they are simply not interested. Contract cleaning presents other problems. The potential of, and the need for, good-grade permanent cleaners for valuable buildings cannot be over-emphasized.

It is most desirable to provide adequate access to the internal structure of roofs by means of walkways, as well as good access externally over roofs and along gutters. Such provision is a good investment because it makes routine checks easy and effective. For the same reason, it is good policy to provide electric lighting within roof spaces; socket outlets for hand-lamps should be provided for viewing difficult places such as the underside of parapet gutters. It is a wise policy to maintain all concealed spaces clean and decorated and in good order, because this encourages a high standard of preventive maintenance.

Budgets

The budget should be divided into two parts: running costs and maintenance costs. Running costs include day-to-day expenses of providing light, heat and water, cleaning the building, security and fire measures, etc., and providing staff for performing these activities. Maintenance costs, on the other hand, include payment for items needed to prevent avoidable damage to, or decay of, buildings and their plant. Doors, windows and gutters and roofs are primarily vulnerable. Also included as maintenance is the cost of replacing any of these items.

Figure 15.8 Parish church, Bedfordshire, England

The prior pointing breaks up because it is too hard. The cement mortar has been spread widely across the fabric but not thoroughly enough — it has accelerated the decay of the stone

Cyclical maintenance

While the simple categories outlined earlier in Chapter 13 are a basis for scientific preventive maintenance, J. Henry Chambers approaches the problem differently, in his book *Cyclical Maintenance for Historic Buildings*, starting with daily routines and working upwards. His book deals with maintenance surveys, the role of conservation craftsmen and conservators, supervision, work records, staffing, and all matters relating to organizing a maintenance programme for buildings in a reasonable state of repair. He makes suggestions as to what should be done by outside contract service and also touches on training, work space planning and maintenance tools and covers cleaning. These maintenance techniques are based upon the preparation of a maintenance

manual which is a sophisticated document giving assessments of work frequencies and calculation of work time units and measurement of areas. Ten different frequencies that are specified are given below:

'A' policing as required: Policing is a high-frequency task which is performed during and immediately after the use of the building by large numbers of people, removing conspicuous soil and trash so that it will not have a chance to become permanently embedded in the finish surfaces. The amount of policing will depend upon weather conditions and the building use. Each historic property will have different priorities and different problems.

'B' routine housekeeping and maintenance: This is a dry-type maintenance, covering all reachable surfaces so that accumulations do not become permanently embedded due to their oily content. The frequency could be daily, twice a week, or weekly. It may vary for different locations in the building and with the season because of peak visitor periods, or it may vary because of seasonal weather conditions or seasonal air quality.

'C' periodic maintenance: This may be a dry, damp or in some instances a wet treatment which cleanses surfaces, removing those accumulations not generally removed by the more frequent methods. If wet, it removes portions of the finish itself which have become chemically changed due to exposure, thereby renewing to a certain extent the surface. The frequency ranges from weekly to monthly.

'D' periodic maintenance: The frequency is monthly, bimonthly or quarterly.

'E' periodic maintenance: The frequency is quarterly or semi-annually.

'F' periodic maintenance: The frequency is semi-annual or annual. Perhaps by a contractor.

'G' periodic maintenance: The frequency is annual or biennial. Perhaps by a contractor.

'H' maintenance: The treatment is prescribed by a conservator. It may be both routine and periodic at a frequency which would best protect the item. The conservator should suggest means of protection as well as treatment.

'I' maintenance: The treatment should be done by a conservator or an outside specialist.

'J' maintenance: Irregular frequency; use past experience as a guide; consider outside contractors.

A good deal of expertise and time is needed to prepare such a maintenance manual, but it is undoubtedly well worth while, as scientific preventive maintenance can save large sums of money and reduce the need for costly major works.

Maintenance programming

Having established the importance of maintenance in the care of historic buildings, the methods by which this can be implemented need consideration. In Denmark since 1865, and in the Church of England, quinquennial inspections have long been the basis for maintenance of parsonage houses, and since 1955 the same routine has been applied to parish churches. This is one of the most sophisticated and economical systems in the world, because it involves the users and voluntary cleaners in the overall maintenance strategy as well as professional advisers. The extension of the system to include all important historic buildings is to be recommended.

Maintenance costs should be divided into the following separate categories, which should be recorded in a log book:

(1) Small items (basically good housekeeping).
(2) Repairs to services: (a) heating, (b) electrical, (c) plumbing.
(3) The rolling programme of long-term preventive maintenance carried out year by year and using scaffolding economically.
(4) Major items when in need of renewal, such as (a) roofs, (b) walls, (c) windows, doors and floor coverings, (d) services.
(5) Emergencies. A reserve of about 10% should be allowed for contingencies.

Each of these categories should be budgeted separately. If reductions have to be made, they should be spread equally unless special reasons exist. Just as a doctor keeps a case history for each of his patients, so the log book should be kept by a responsible person.

A routine for the maintenance of an historic building should be laid down, and a year-by-year log book should be instituted with records of costs allocated to headings as given above. Such a procedure will enable rational policies to be established and should ensure a constant feed of data from those with first-hand information. The records should pinpoint weaknesses in design and construction and indicate 'cost-in-use', thus providing the organization (and its architects) with valuable feedback information.

The study of records can lead to an assessment of the frequencies of servicing and repair in the past, and with a detailed survey of the fabric it is possible then to produce a detailed programme as the basis of future preventive work. This may have to be an elaborate document, and the clerical administration and documentation will be considerable. Indeed, in a large operation a computerized programme is the most efficient way of looking after a group of historic

Top, cyclical maintenance guidance from Bernard Feilden's Conservation of Historic Buildings.

Right, guidance for expected scaffolding frequency from Byantikvaren.

Besøksadresse: Maridalsveien 3
Postadresse: Postboks 2094 Grünerløkka, 0505 Oslo
E-postadresse: postmottak@bya.oslo.kommune.no
Internettadresse: www.byantikvaren.oslo.kommune.no
Telefoner:
Oslo kommunes sentralbord 02180
Byantikvarens publikumsservice 23 46 02 95
Åpningstider: Resepsjon: kl. 08.00 - 15.30
Kundemottak tirsdag - torsdag kl. 09.00 - 11.30 og 12.15 - 15.00

GUL LISTE
Dette er Byantikvarens oversikt over registrerte verneverdige kulturminner og kulturmiljøer i Oslo. Kulturminnene som er oppført på Gul liste har så stor kulturhistorisk og/eller arkitektonisk verdi, at de ønskes bevart. For mer informasjon vises til informasjonsarket "Byantikvarens GULE LISTE".

INFORMASJONSTJENESTER
På vår nettside **www.byantikvaren.oslo.kommune.no** finner du informasjon om:

- Byantikvarens GULE LISTE
- Vinduer
- Arkeologiske registreringer
- Småhusplanen og arkeologi
- Tilstandsvurdering
- Balkonger
- Tilskudd til istandsetting av kulturminner

Du finner også informasjon om Byantikvarens rolle og prosessen rundt:

- Byggesaker
- Plansaker
- Rivesaker
- Fredete anlegg

Vedlikehold hvert 10. år:

- Regn med å sette opp stillas hvert 10.år. Da må man tette riss der ulike materialer møtes, utkrasse og reparere revner i pussen og vaske bort løs skitt. Eventuell løs puss bør skrapes bort og erstattes. Hull i takrenner og nedløp må tettes, og man må gå over vinduer og beslag. Hvert 10., 20. eller 30. år når stillaset er oppe, vil det kunne være behov for større reparasjoner av puss og malingslag.

Det bør utarbeides en plan for vedlikeholdet. Slik skaffer man seg oversikt over arbeid som må utføres og over kostnader og investeringsbehov. Samtidig blir en bevisst på hvilket ansvar man har og konsekvensene av å ikke ta dette ansvaret.

En vedlikeholdsplan bør inneholde:

- Et skjema hvor hver type bygningsdel er spesifisert og beskrevet i forhold til materiale, tilstand og forventet vedlikeholdsbehov. Dette vil kunne variere etter hvor værutsatt de ulike delene av fasadene er.
- Oversikt over hvilke arbeidsoppgaver som bør gjennomføres, og med hvilke tidsintervaller.
- Oversikt over forventede kostnader: Årlig og hvert 10. år osv.
- Opplysninger om de produktene som er blitt brukt.
- Oversikt over serviceavtaler for de tekniske anleggene, hvilke firmaer man har brukt, bruksanvisninger etc.

Det er svært viktig at planen oppdateres og holdes à jour. Den er et redskap – ikke et mål.

CYCLICAL MAINTENANCE GUIDANCE

Protected / listed buildings often have long-term maintenance plans as part of their preservation programme. Two examples of cyclical maintenance guidance are briefly presented below to give an overview of how they work, and why it might be useful to anticipate scaffolding as part of a preservation programme generally.

Bernard Feilden's Conservation of Historic Buildings advocates and outlines the considerations of a 'maintenance manual'[1], a preventative approach intended to reduce problems and costs in the long-term. It is organised in terms of time and building part, from daily / weekly tasks (sweeping floors, cleaning windows) to yearly / 5-yearly tasks (roof inspections, repointing walls). It is not explicit about scaffolding, but access to check and repair usually inaccessible areas (which probably requires scaffolding) is recommended at least every 5 years.

Oslos Byantikvaren publishes various guidance for preservation of the city's buildings, one of which covers the brick city blocks arranged around a courtyard (murgård). These buildings are used as examples in this diploma. Built during from the late 1800s onwards with the same construction technique, they have similar maintenance requirements and it is advised to expect scaffolding every 10, 20, 30 years[2].

[1]Feilden, Bernard. "Conservation of Historic Buildings." (1982).

[2]Oslos Byantikvaren. "Murgårdsfasader Istandsetting og Vedlikshold." (2014).

An English-language resource comparable with the guides by Byantikvaren on maintenance cycles is available from Historic England, see https://historicengland.org.uk/advice/find/a-z-publications/.

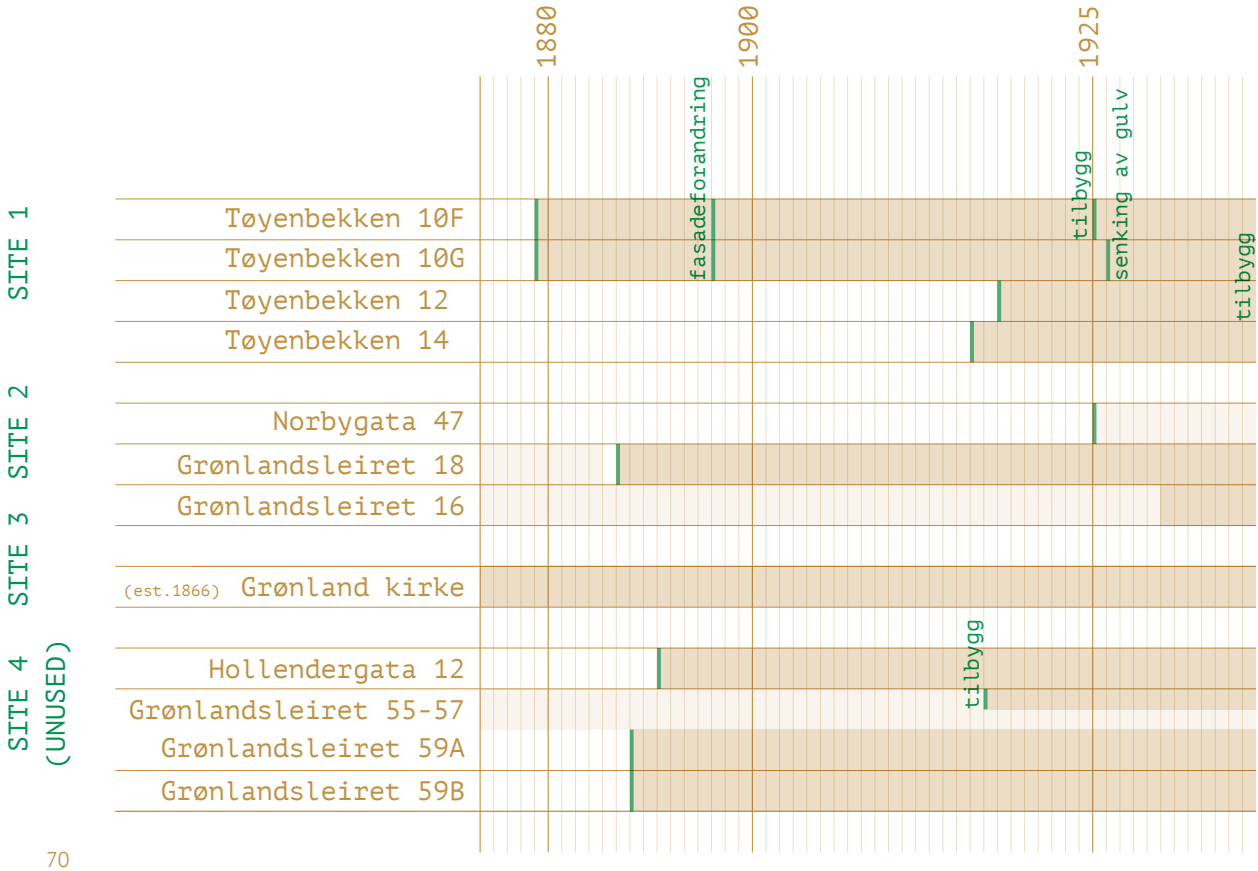
Top, Site 1, Tøyenbekken

Bottom, Site 2, Norbygata

GRØNLAND: SCAFFOLDING FREQUENCY STUDY

A study of planning applications for the buildings on several test sites selected for the diploma was done to see if it was possible to estimate the frequency of scaffolding use throughout a building's lifetime.

The timeline below shows the lifespan of each building, marked with planning applications that plausibly require scaffolding to do (such as extensions, facade changes, advertising boards). With the exception of Tøyenbekken 12 (a timber building with a concrete hall behind) and Grønland kirke (a brick Romanesque church), all buildings recorded are murgårder.

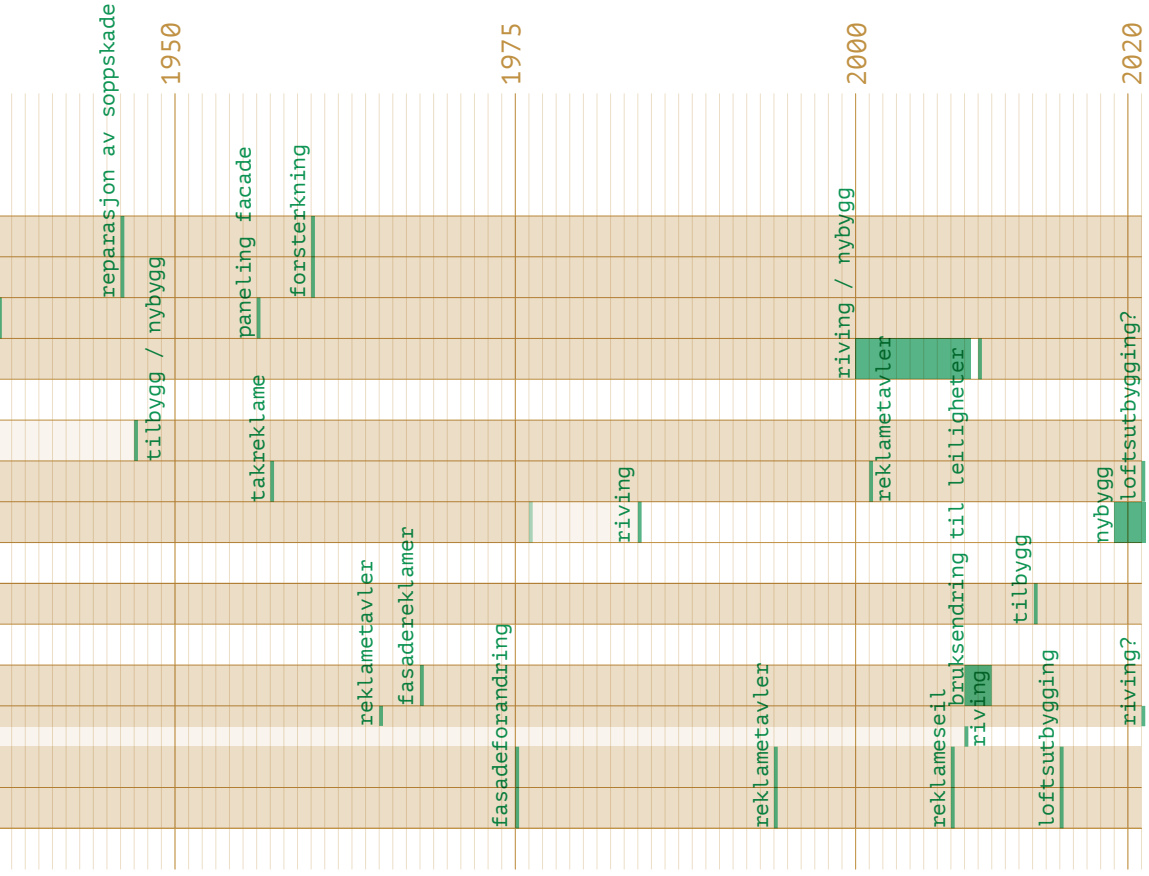


For this study, only the Oslo planning portal (saksinnsyn) was used. Therefore this study does not record the duration of each maintenance period (as this info is not part of planning applications). Neither is every instance of scaffolding use recorded (as not every change may have been reported to planning).

As discussed in the usefulness chapter, standardisation of scaffolding components began in the 1900s (Scaffixer being a prominent example) and accelerated in the mid 1950s (with the popularisation of modular scaffolding systems). I had wanted to explore if increased availability and ease of assembly could have influenced scaffolding frequency, but this sample is a bit too small to draw any conclusions.

Top, Site 3, Grønland kirke

Bottom, Site 4, unused



MODERN DAY: SCAFFOLDING TO BE SEEN

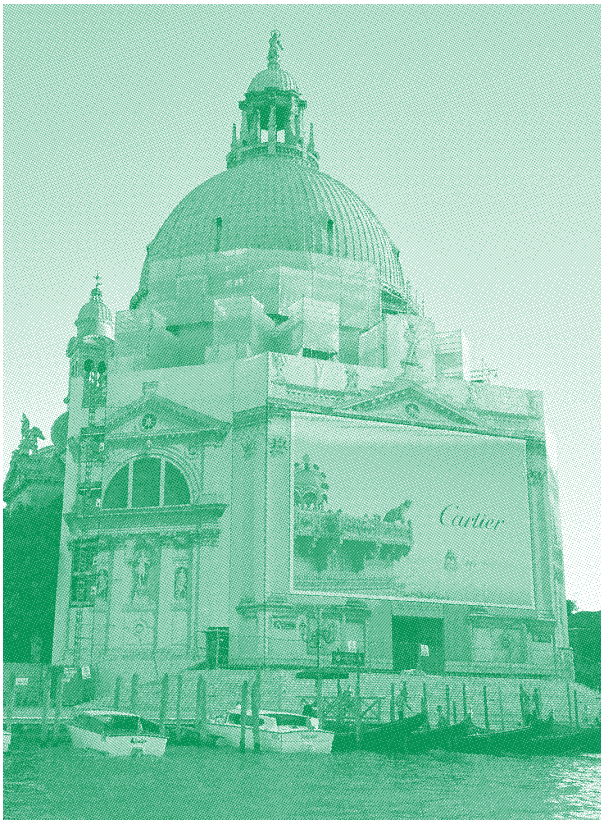
Since the 2000s, Italy has controversially restored cultural and historic monuments with private corporations covering the cost of repair... the caveat being the scaffolding used to facilitate maintenance is also conveniently used to facilitate mounting of billboards. Notable cases include the Doge's Palace in Venice (pictured below) and the Colosseum in Rome[1].

The controversy comes from a conflict of interest - can a contribution be called a donation if they get something in return?

[1]Aloisi, Silvia. "Luxury shoemaker raises $34 million to save Colosseum."(2011). Available online at https://www.reuters.com/article/us-italy-colosseum-idUKTRE70K5HF20110121

Below left, photo showing the Coco-cola billboard wrapping around one corner of the Doge's Palace and over the Bridge of Sighs. Image source at https://observers.france24.com/en/20100901-italy-coca-cola-billboards-defacing-venice-restoration

Below right, Basilica de Santa Maria della Salute enclosed in scaffolding with a huge billboard towards the canal. See scaffolding survey ref. 100



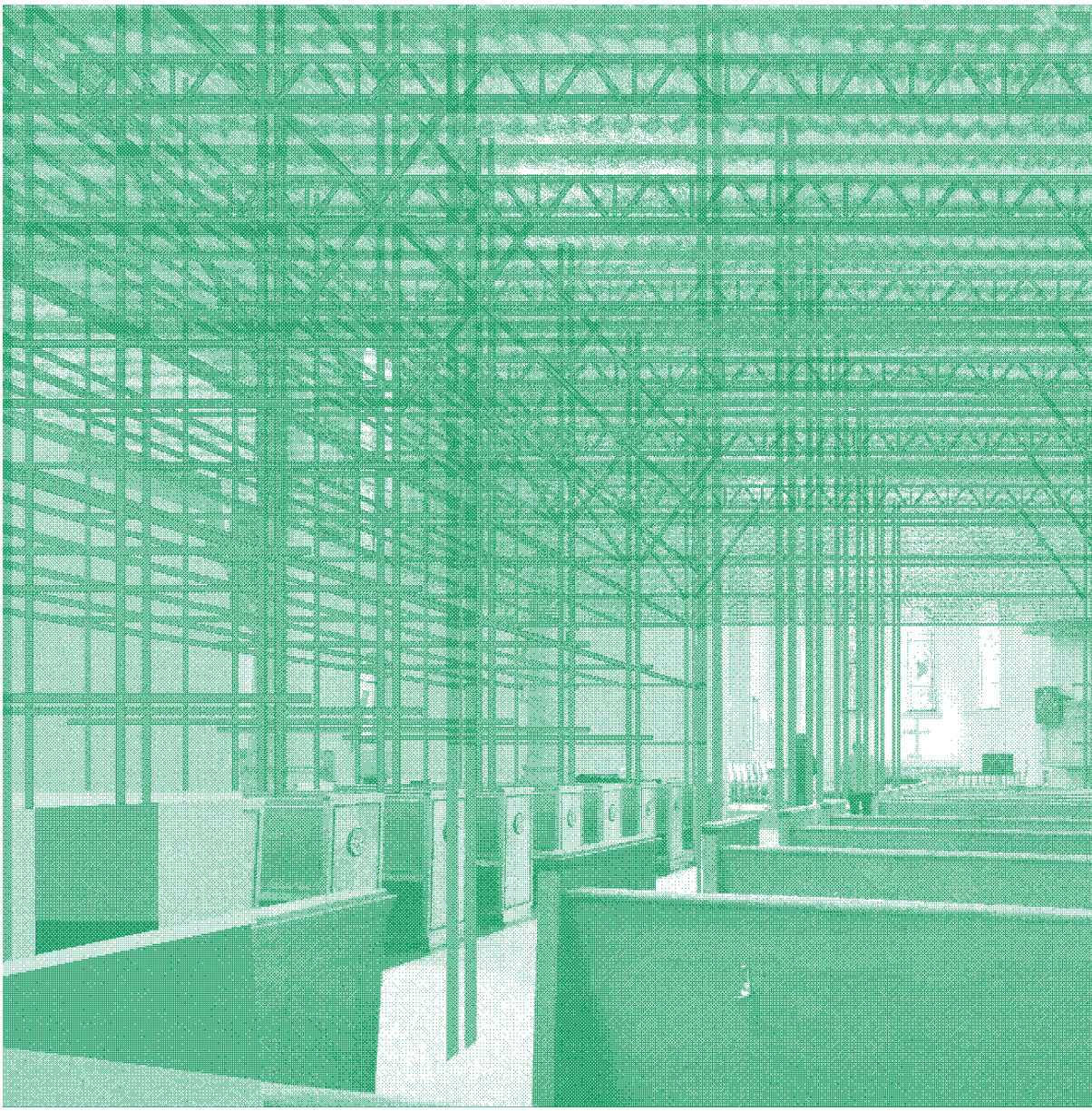
HISTORIC: SCAFFOLDING TO BE IN

Churches today are static and protected from significant change[2], but records show that services continued throughout alterations to churches (whether it was a modification, an extension, or a rebuild). The current iteration of Notre-Dame was built as the old one was being demolished in the 1100s, and a temporary wall partitioned off a more completed part of the nave for services while the rest of it was being built. The same solution was used during the rebuild of Cantebury Cathedral - also in the 1100s. A more contemporary example is Gaudi's Sagrada Familia - funded by donations - which was consecrated in 2010, but will not be completed until after 2026.

[2] A good example of this is the decision to rebuild the spire of Notre-Dame to Viollet-le-Duc's design, despite it being an idealised rebuild of an earlier iteration.

Below, annotated still showing extent of church from Nickson, Tom. "Notre Dame de Paris: the medieval cathedral and its 19th century restoration." (2020). Lecture available online at https://www.youtube.com/watch?v=utRPwAKWfxs

Left, view looking across the aisle. Right, view looking towards the altar.



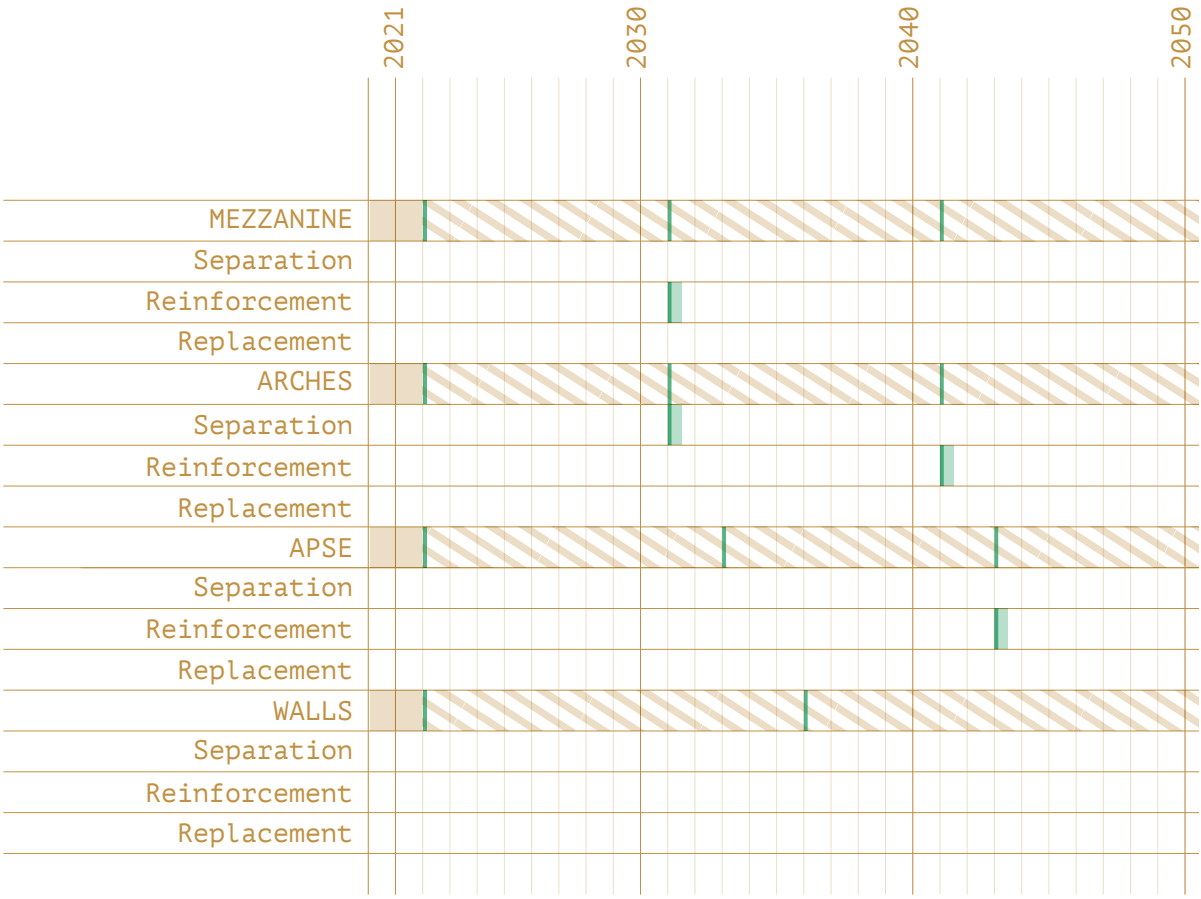
Sketches placing a typical birdcage scaffold (for high-level works) into Grønland kirke while in operation. Two layers of scaffolding netting - knitted enough to catch debris but loose enough to be translucent - hangs in the nave over the pews, with some standards landing between them.

TEST 3: OUT OF ORDER

Out of Order explores the consequences of maintenance cycles co-existing with regular services. The chosen test site is the interior of Grønland kirke. In addition to their religious function, churches are buildings intended to evoke an emotional / spiritual response, expressed through grand spaces and ornamentation. How will the insertion of scaffolding - conventionally seen as disruptive and unattractive - change the experience of the church?

[1]The maintenance schedule format is based off of construction schedules to estimate progress during building construction.

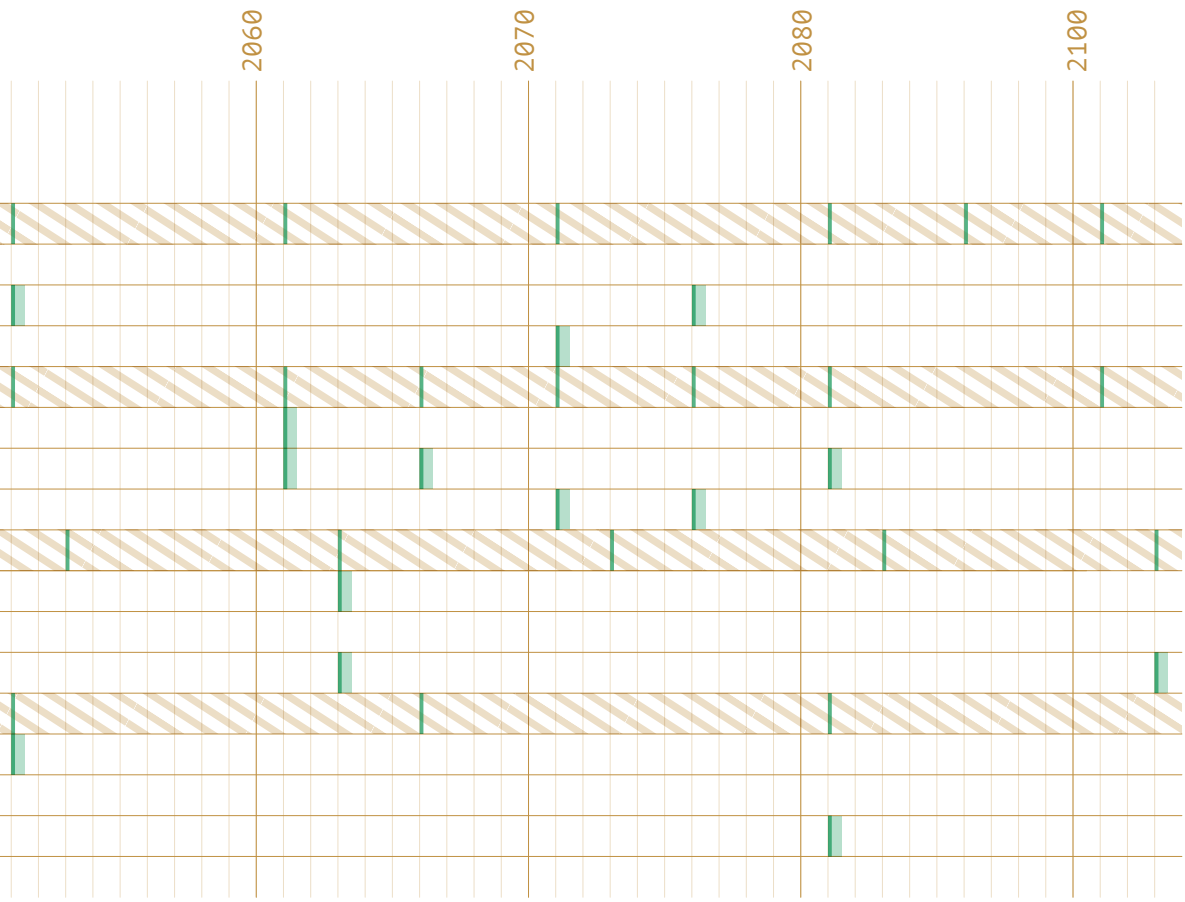
The design work is framed through a proposed maintenance schedule[1] outlined below. Different elements have differing inspection periods, and imagined scenarios of gradual deterioration and types of support forms the basis for the interventions.

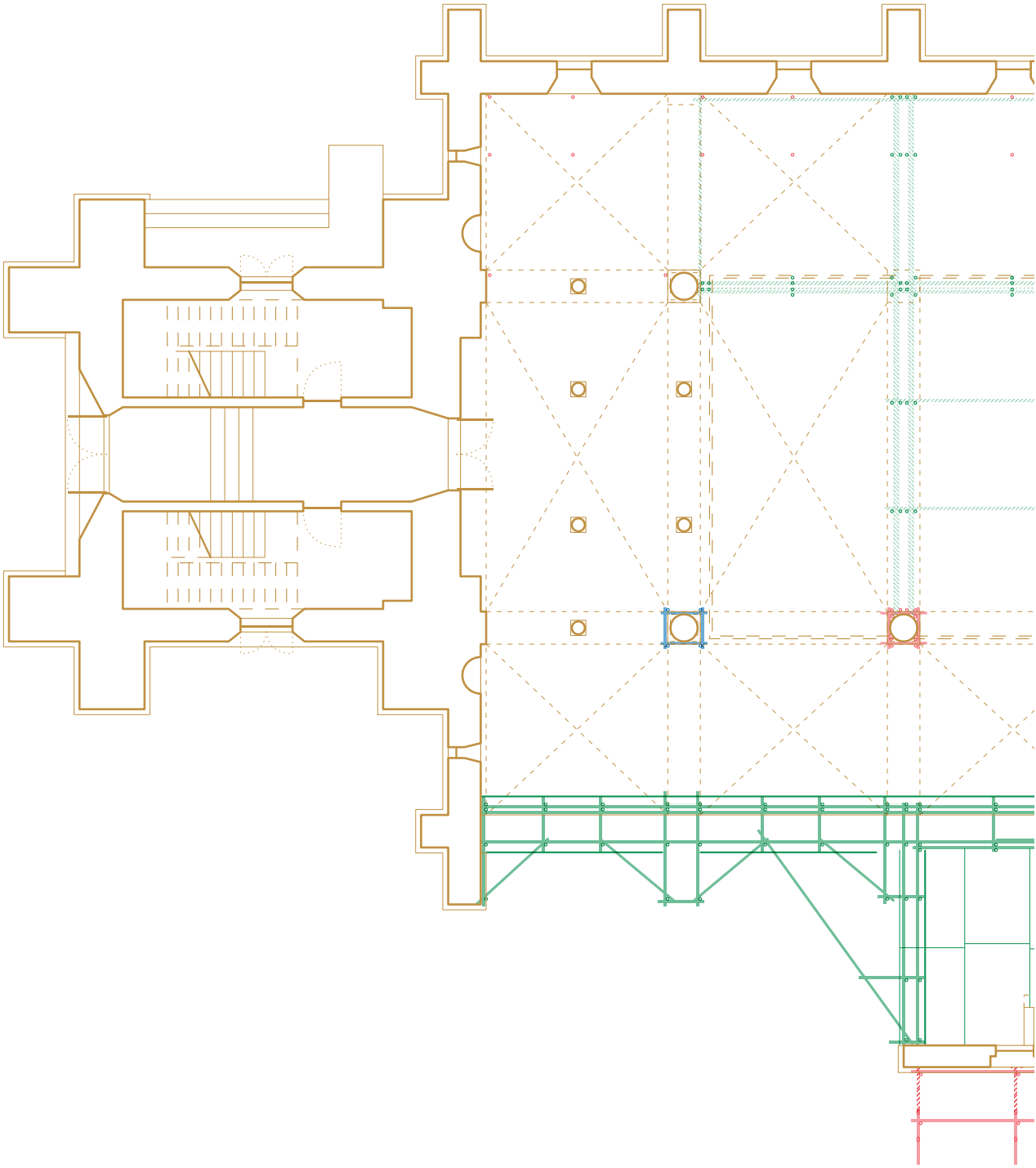


The supporting structures proposed are organised by increasing intensity /invasiveness:

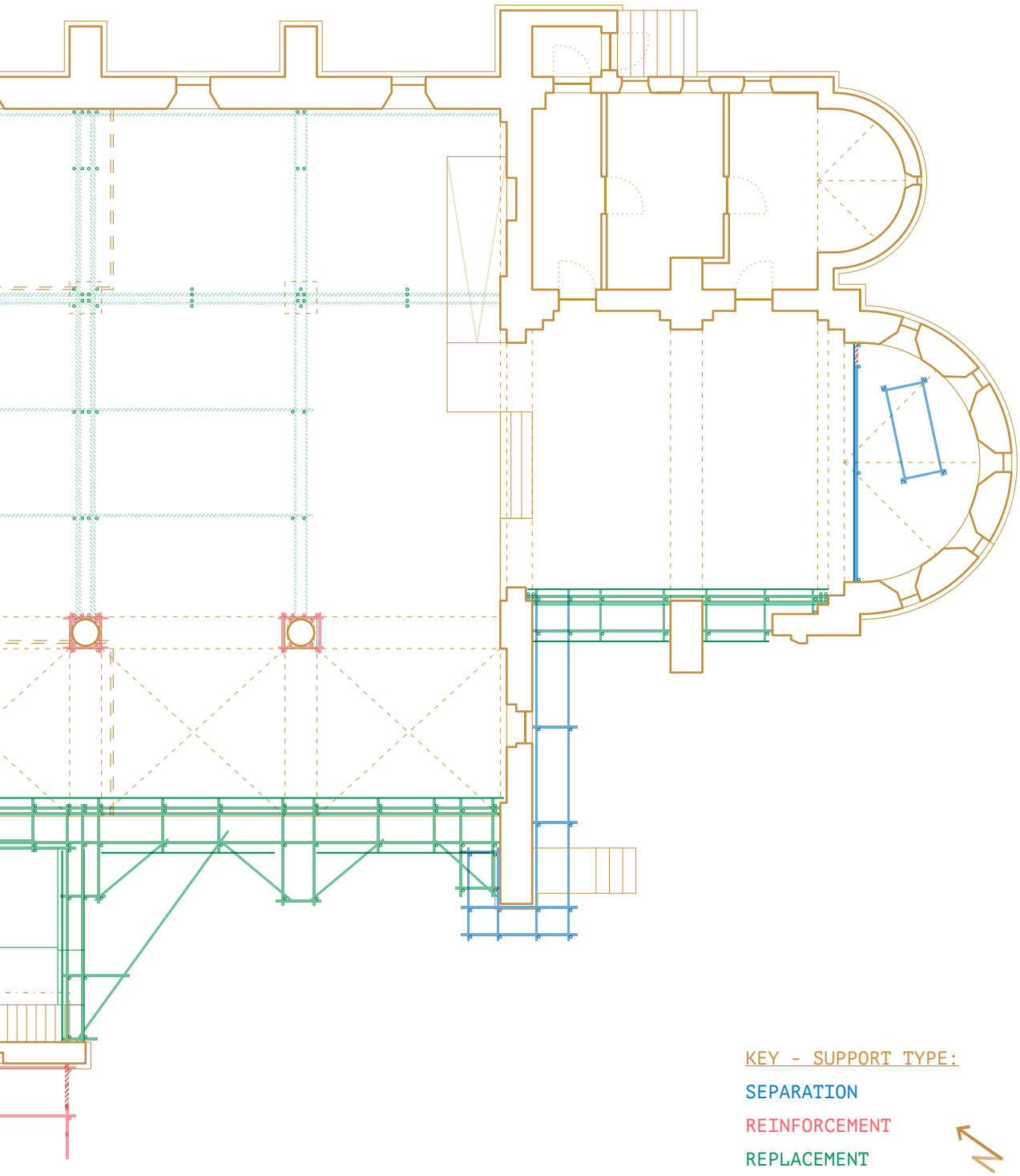
» Separation: the existing structure is retained, and isolated to protect it from further / accelerated deterioration that might compromise its structural integrity.
» Reinforcement: the existing structure is retained, and additional material is added to support the structure.
» Replacement: the existing structure is not retained and replaced with a component that performs the same structural function.

The interventions are tested in the model and recorded in drawings.





Annotated 1F plan marking locations and types of support interventions following the maintenance cycles and deteriorating conditions presented in timeline diagram on previous page. The scaffolding is simplified to show its structure.



KEY - SUPPORT TYPE:

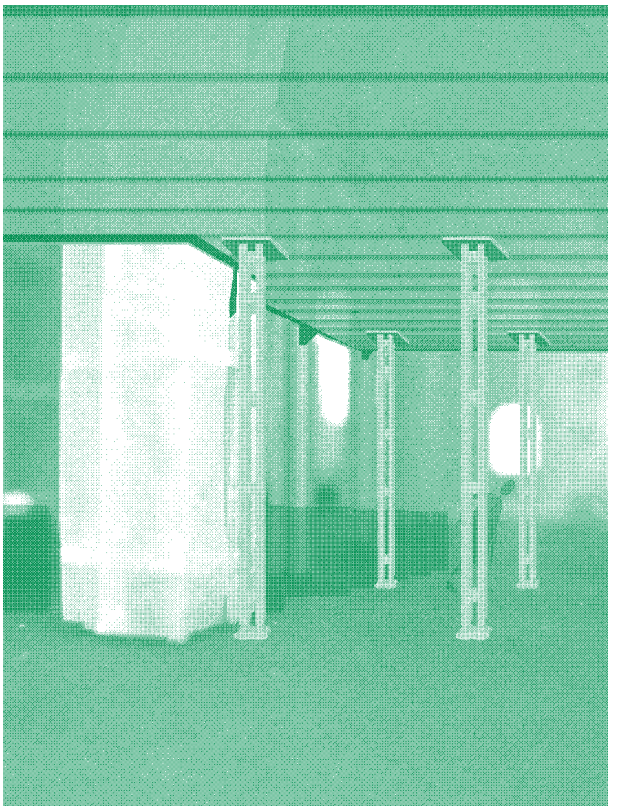
SEPARATION

REINFORCEMENT

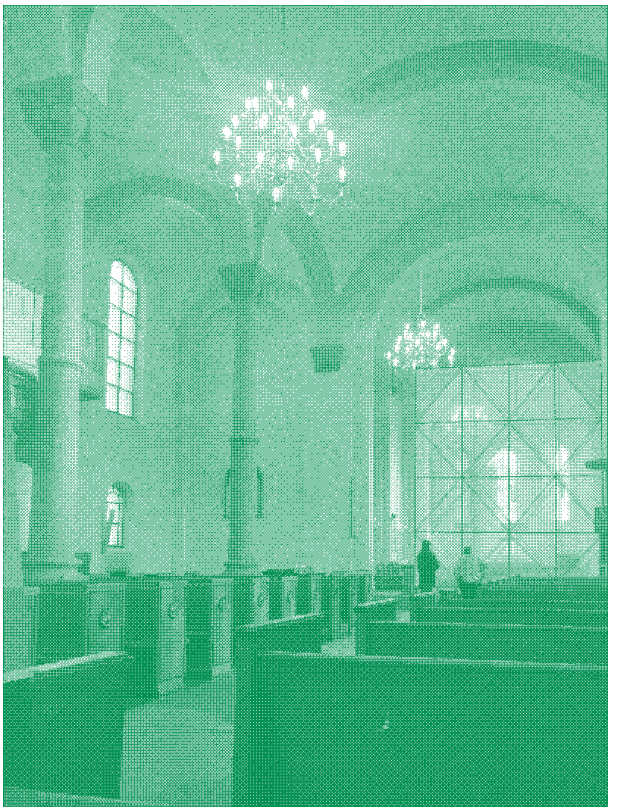
REPLACEMENT

SUPPORT THROUGH SEPARATION

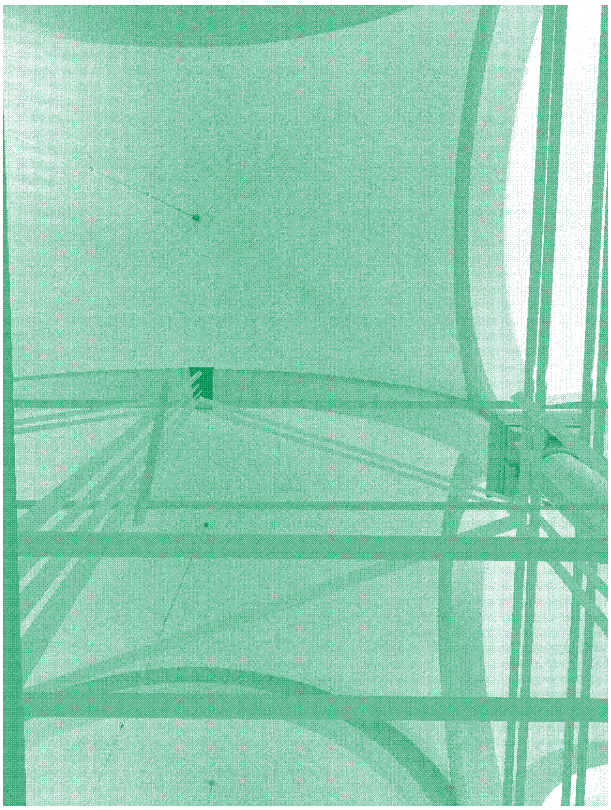
The existing structure is retained and isolated in order to protect it from further / accelerated deterioration that might compromise its structural integrity. This support is easily reversible and does not require immediate maintenance.



Scenario 1, year 2032: A fragile column is isolated with scaffolding and enclosed in tarp. Bundles of scaffolding columns prop up the mezzanine for reinforcement.



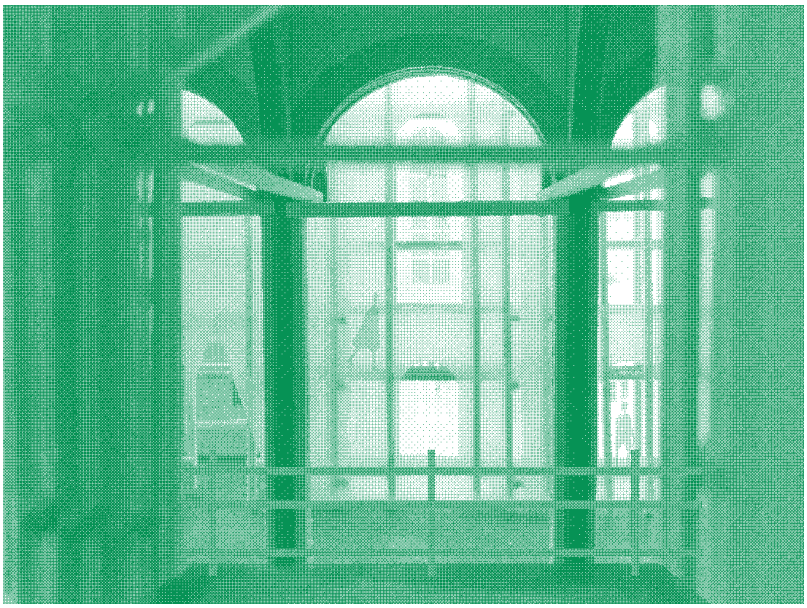
Scenario 2, year 2044: Following an inspection the apse is isolated to replace deteriorating timber floor beams. While inaccessible, the tranluscent tarp allows light from the stained glass windows to shine through.



SUPPORT THROUGH REINFORCEMENT

The existing structure is retained, but additional material is added to support the structure. Medium intensity support.

Scenario 3, year 2041: Following initial inspection, reinforcement is installed, and a mesh is overlaid underneath the vaults, as a safety precaution.



Scenario 4, year 2061: During the next inspection cycle, the structure is deemed to require additional support, and the arches are further braced with more scaffolding.

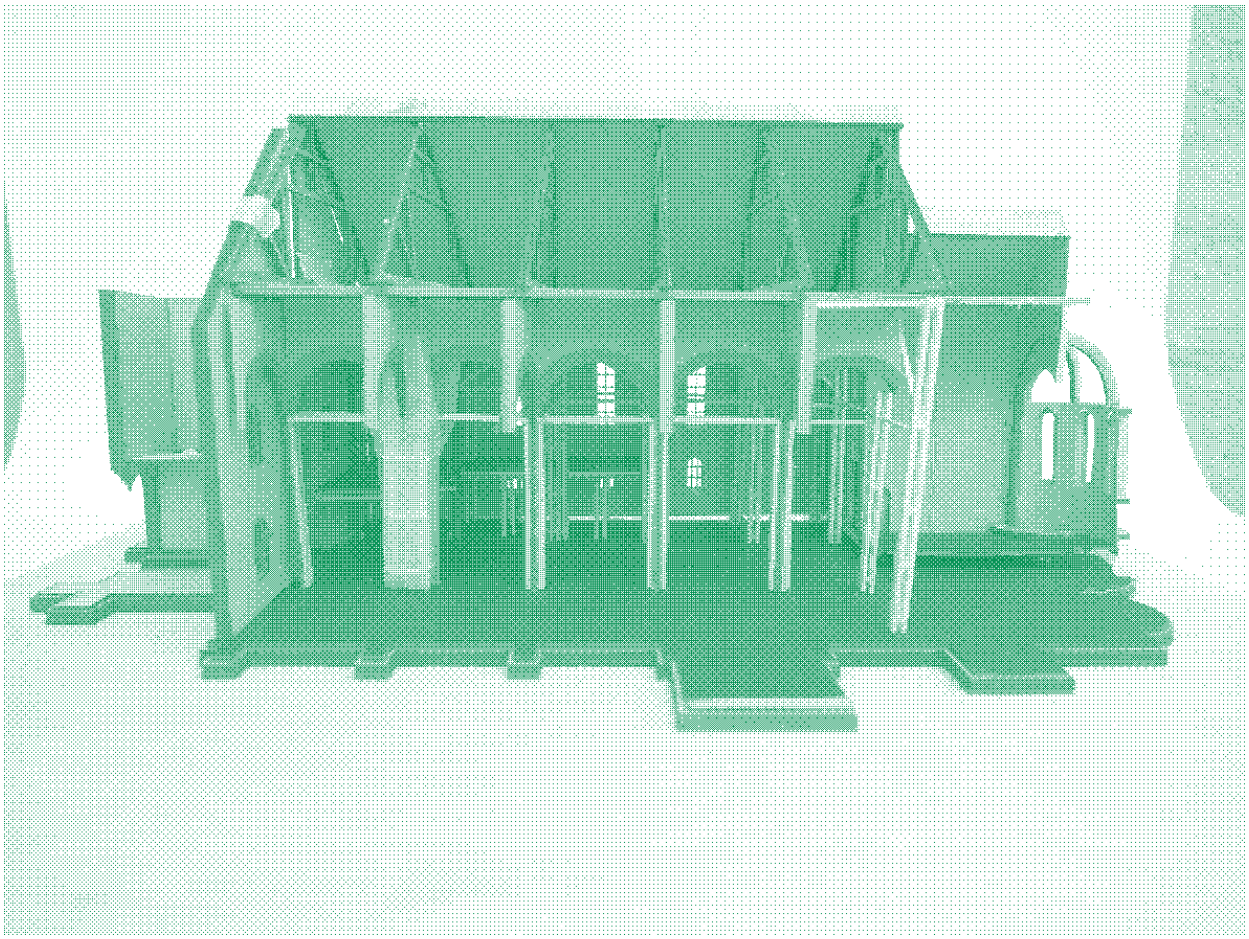
SUPPORT THROUGH REPLACEMENT

The existing structure is not retained and replaced with a component that performs the same structural function.

Scenario 7, year 2081: Serious damage to the western wall and entrnace results in a full replacement to keep the church somewhat climatised. A parting in the tarp is pulled back to show the building is open.

Scenario 6, year 2081: Inside of the scaffolding wall. Due to increasingly reduced church manbership the mezzanine is pulled further back and is frequently used as storage for salvaged elements.

Scenario 5, year 2077: The eastern row of columns and vaults, and the mezzanine floor is entirely replaced. The organ - which is in bad condition - is dismantled and stored away for future maintenance.



Front view of 1:75 Grønland kirke model with western wall removed.

The model was intended as a working model, made of paper and card with timber sticks representing scaffolding for easy testing. As the model developed it seemed there would be nothing learned from making a clean,"final" version, so it was left as it is.

REFLECTION

Out of Order explores possible kinds of scaffolding support, framed by imagined maintenenance cycles in the lifespan of Grønland kirke. Staggered maintenance is not uncommon in large buildings - such as churches (in Europe). There is an incentive to keep open throughout the maintenance for both religious reasons and tourism reasons.

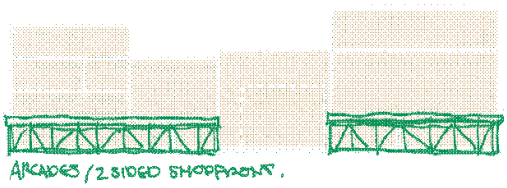
The scenarios aim to to make maintenance visible to visitors. In some instances the "closeness" and contrast between the elements of the building and scaffolding are extreme. With the working model, I intended to build different scaffolding structures that corresponded to the timeline. However, visually it began to look as if the structures were cumulative and existing together, which then became an interesting condition to push further. This new interpretation of the model as holding all scenarios simultaneously shows how scaffolding not only provides literal structural support, but also supports understanding, contextualising elements of the church which might otherwise be unrecognisable - or difficult to read - as they deteriorate.

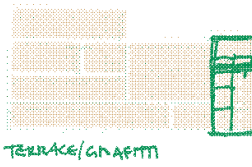
The findings of the model recalls Jorge Otero-Pailos description of a "monumentary": a supplementary element that is essential to understanding the primary object.[1]

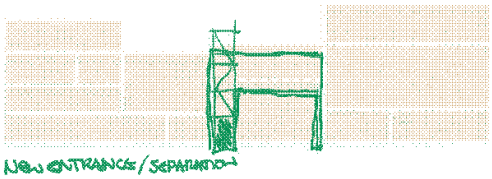
[1]Otero-Pailos, Jorge. "Monumentaries: Towards a theory of the apergon." (2015). Available online at https://www.e-flux.com/journal/66/60754/monumentaries-toward-a-theory-of-the-apergon/

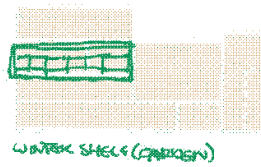
Fragments of ancient Egyptian tablet reconstructed in original positions in Neues Museum, Berlin.

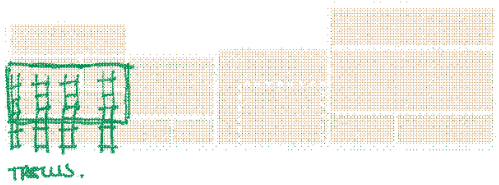
UNIVERSALITY VALUE IS SC

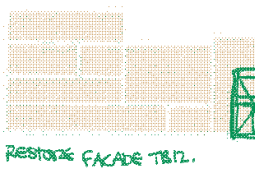


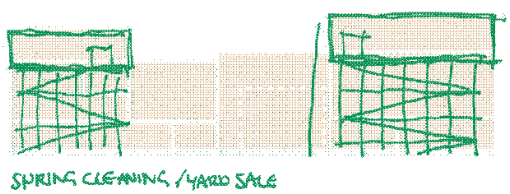


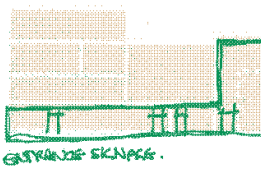


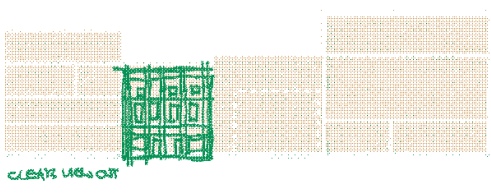


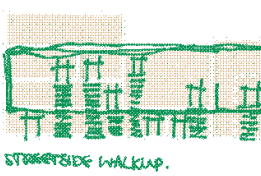


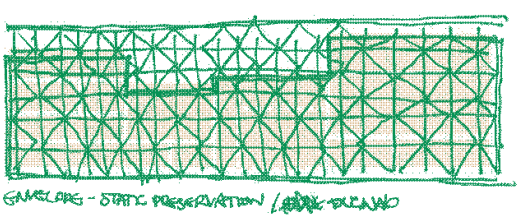


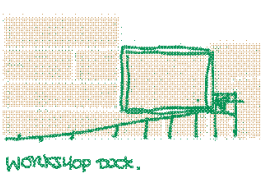






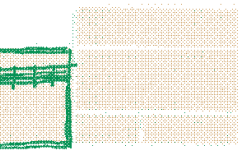


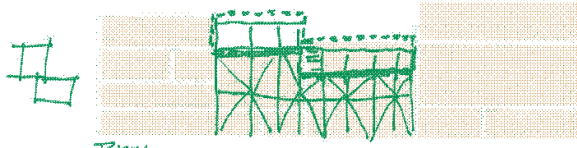


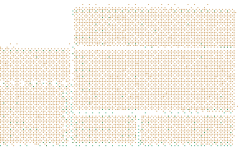


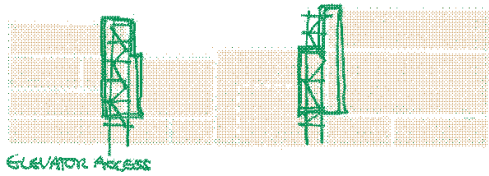
Concept sketches testing different outcomes of functional needs.

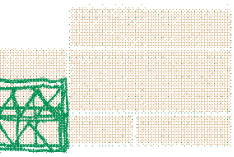
CAFFOLDING REALLY SFLEXIBLE ENOUGH TO ACCOMODATE ANY SITUATION?

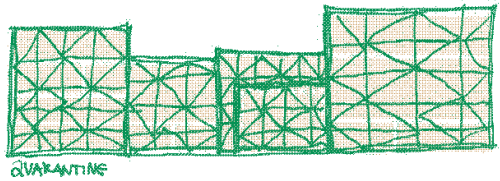


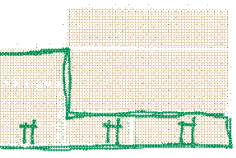


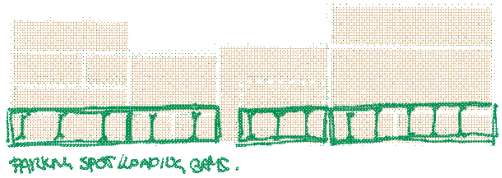


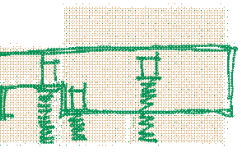


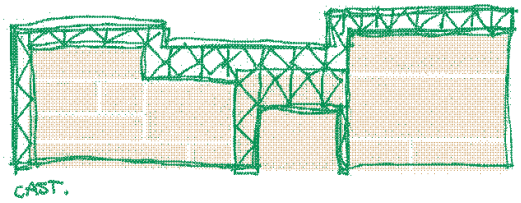


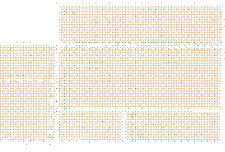


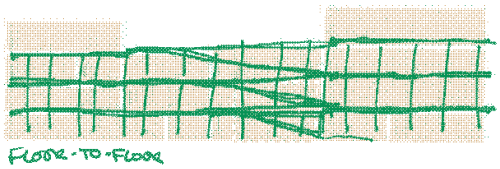












UNIVERSALITY VALUE

HOW FLEXIBLE IS SCAFFOLDING IN ACCOMMODATING COMPLEX SITUATIONS?

Historically and today, maintenance of the built environment is dependent on scaffolding and other temporary structures. In particular, buildings - regardless of age, location, form, or material - are enveloped in a grid composed of modules roughly 2m in width and height during maintenance or construction work. This is universality value - that metal scaffolding systems have been standardised and largely adopted all over the world.

Modernism and its successors in 20th century architectural movements worked around ideas of 'universality', achieved through utilitarian and functionally designed proposals that - generously summarised - could be understood as complete systems, either with their own internal logic, or flexible enough to be extended endlessly. Many of these projects have been contested and controversial. This chapter tries to argue that a possible reason for their failure was that within architecture, ease of use and operational maintenance was not prioritised.

At the same time, our scaffolding systems have developed with a dependence on the primary structure, even in situations where the structural integrity of the existing structure - even in preservation projects - might be comparatively fragile or unstable.

This chapter tries to test the flexibility of scaffolding in material, ideological, and cultural (eg. social, heritage, urban) aspects, reassessing our reliance on scaffolding and its impact on its surroundings. While the Grønland kirke project Out of Order explored the impact of scaffolding in one building, Replugin returns to Tøyenbekken site - which has buildings varying in scale, function, and construction. The tension between scaffolding against more variables is explored to push the limits of scaffolding's apparent flexibility.

SCAFFOLDING	BUILT ENVIRONMENT
COMPENSATIONAL RELATIONSHIP	–
TEMPORARY / PREDETERMINED LIFESPAN	LIFESPAN NOT DETERMINED / UNKNOWN
PORTABLE	STATIC
REVERSIBLE ASSEMBLY	ASSEMBLY NOT REVERSIBLE
DISRUPTIVE IN URBAN ENVIRONMENT	FORMS URBAN ENVIRONMENT
UNIFORM CONSTRUCTION LOGIC	VARIABLE CONSTRUCTION LOGIC
STANDARDISED MATERIAL / PARTS / FORM	STANDARDS REGULATED BY REGION
IP RECOGNITION (OBJECT)	ARTISTIC ATTRIBUTION (ARCHITECTURE)

Comparison of qualities between scaffolding and built environment (buildings)

UNIVERSALITY: (SCAFFOLDING-FREE) VISIONS OF THE FUTURE

One well-known lens of analysis of modernism and its successors from the historian Kenneth Frampton is that it rationalised the process of architecture, from which a new language (of form) emerged[1], whose internal logic was self-explanatory.

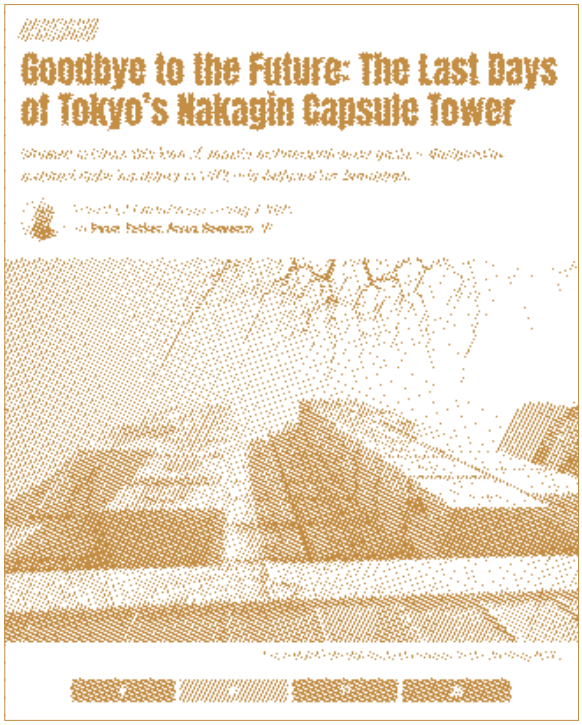
Metabolist and hi-tech movements, for example, worked with modules and units - ideas of replacable elements that together formed theoretically 'complete' networks systematic enough to overcome problems of site specificity, creating a form of universality through completeness.

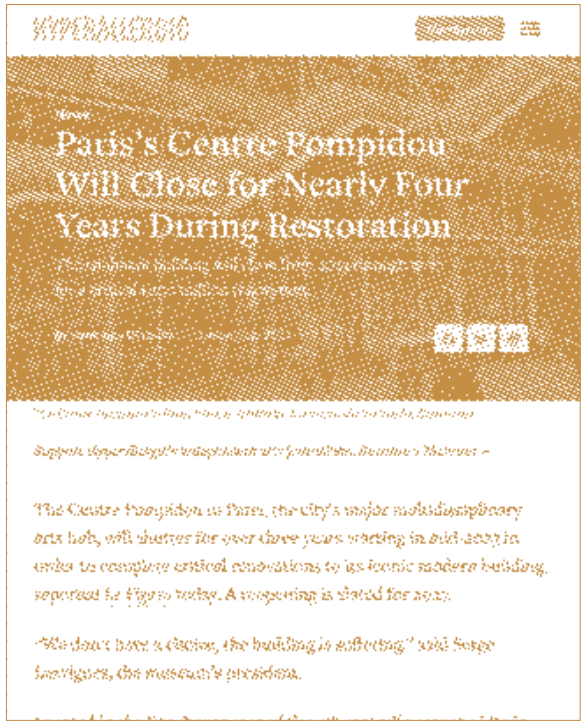
Dutch structuralist and brutalist movements worked with function-zoning and utilitarian finishes that focused on an 'honest' approach that placed emphasised interior experience: universality as democratic. Considerations of flexibility and future expansion were implemented either through use of a consistent scale or controlled sightlines.

[1]Frampton, Kenneth. "Modern Architecture: A Critical History." (1980).

[2]Tasker, Peter. "Goodbye to the future: The last days of Tokyo's Nakagin Capsule Tower." (2021). Available online at https://japan-forward.com/goodbye-to-the-future-the-last-days-of-tokyos-nakagin-capsule-tower/

[3]Di Liscia, Valentina. "Paris' Centre Pompidou will close for nearly four years during restoration." (2021). Available online at https://hyperallergic.com/616958/pariss-centre-pompidou-will-close-for-nearly-four-years-during-restoration/



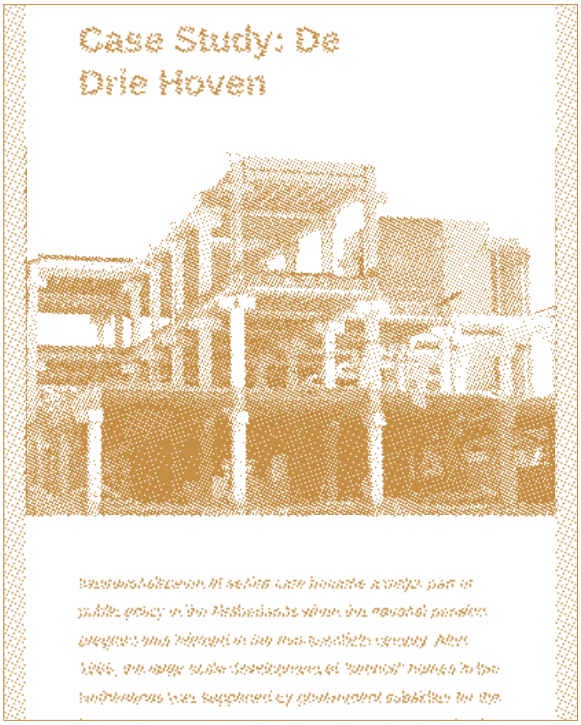


As future-proofing strategies, they have struggled to stand the test of time. Internally complete networks required bespoke-ness and complexity, and - as with Nakagin[2] and Centre Pompidou[3] - has made it difficult and costly to maintain. Flexible spaces and view-framing have suffered the consequences of being too generic and idealistic, and - as with De Drie Hoven[4] and Park Hill[5] - have become either unsuited to host any intended function at all, or its limited visibility has made it less safe, both factors that reduce the incentive for maintenance or upgrading.

As architecture is built, it naturally ends up imposing some from of values and systems. In contrast, scaffolding's supplementary and temporary nature means any values or systems imposed are reversible, giving it a flexibility architecture fails to have.

[4]HOME. "Case Study: De Drie Hoven." (2018). Available online at https://housing-ourmatureelders.wordpress.com/2018/11/09/case-study-de-drie-hoven/

[5]Haines, Samantha. "Sheffield's Park Hill flats: Design icon or Eyesore?" (2013). Available online at https://www.bbc.com/news/uk-england-south-yorkshire-23358401


Case Study: De Drie Hoven


Sheffield's Park Hill flats: Design icon or concrete eyesore?

SCAFFOLDING AS MEDIATOR: KNOWN AND UNKNOWN

In the introduction to the Summer 2020 issue of Future Anterior, Jorge Otero-Pailos recontextualises the aftermath of the 2019 Notre-Dame fire to reassess the preservation process and its reliance on scaffolding, as well as the contradiction of scaffolding being a support structure that itself relies on the primary structure to stand. In his first point:

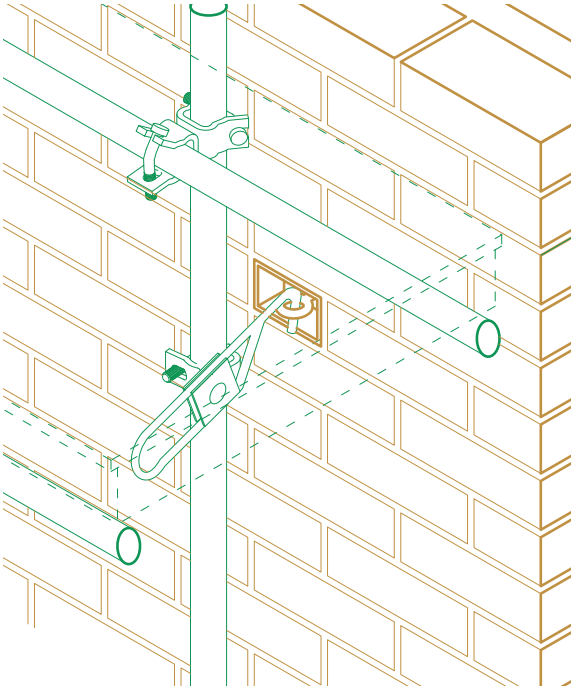
[1] Otero-Pailos, Jorge. "Editor's Introduction: The Notre-Dame Effect." (2021).

> *The scaffolding [at Notre-Dame], like all preservation scaffoldings, was not simply a physical construction. It was also an intellectual structure made of disparate political, economic, social, and cultural elements that were joined together according to various historical proccesses and habits..As the oldest modern preservation bureaucracy in the world, French intellectual jointery was used as a pattern book in erecting preservation scaffoldings around the world...they illuminate a global process, a gradual loss of cohesion among the financial, political, social, and cultural elements that once shared an interest in joining forces to protect these heritage buildings.*

His second point:

> *By definition, scaffolds, intellectual or physical, cannot stand on their own. They must be attached to another pre-existing structure. Particularly in the case of preservation scaffoldings, these prior structures cannot be taken for granted, as they might be unstable...the fatal mistake is to anchor a scaffold only into fabric of unknown firmness, as it will surely become unmoored. It must be anchored into known matter, but bearing in mind that what matters is the unknown matter: preservation scaffolds are meant to facilitate access to unknown matters.*

Otero-Pailos highlights the problems of our dependence on scaffolding, using restoration disasters as examples that it cannot be taken for granted. This call forms the research question of the final test - can scaffolding really accomodate any situation?



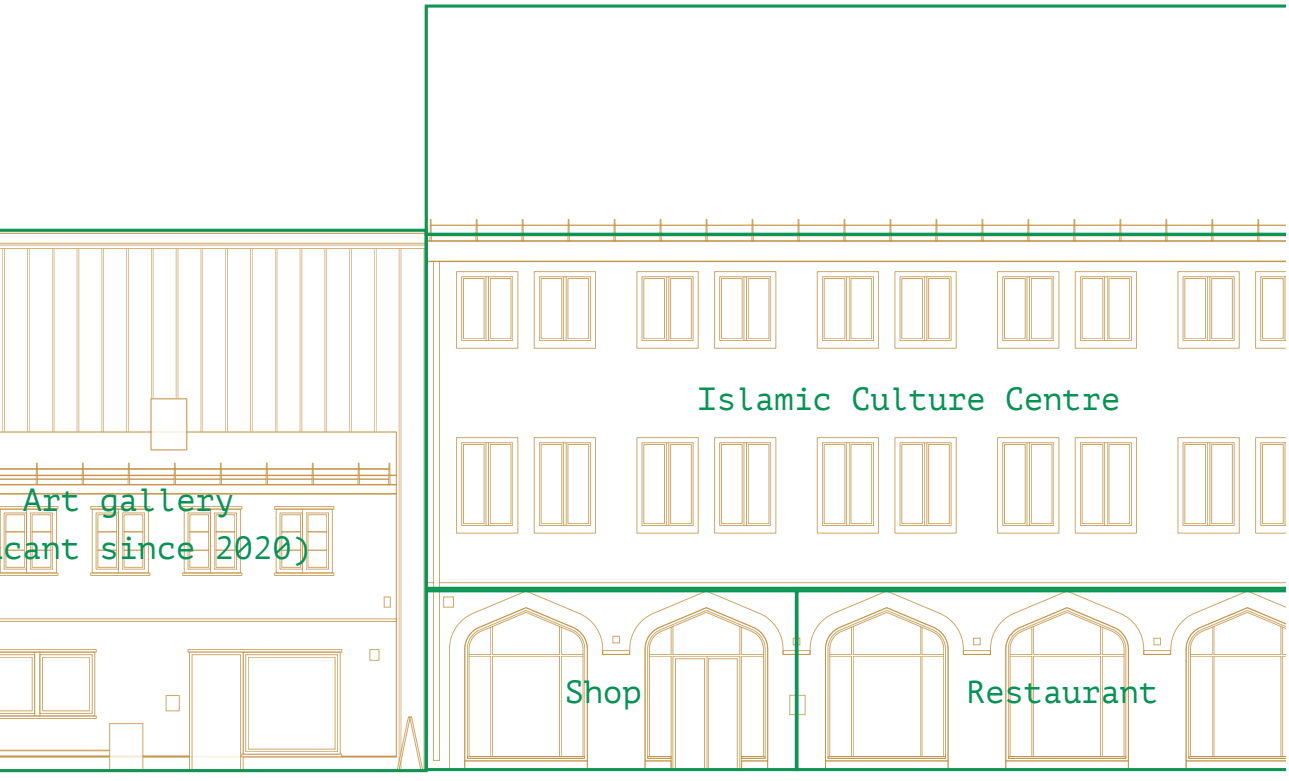
Left, typical temporary anchor scrrewed into wall for scaffold stability. Right, Putlog Plugin proposal.

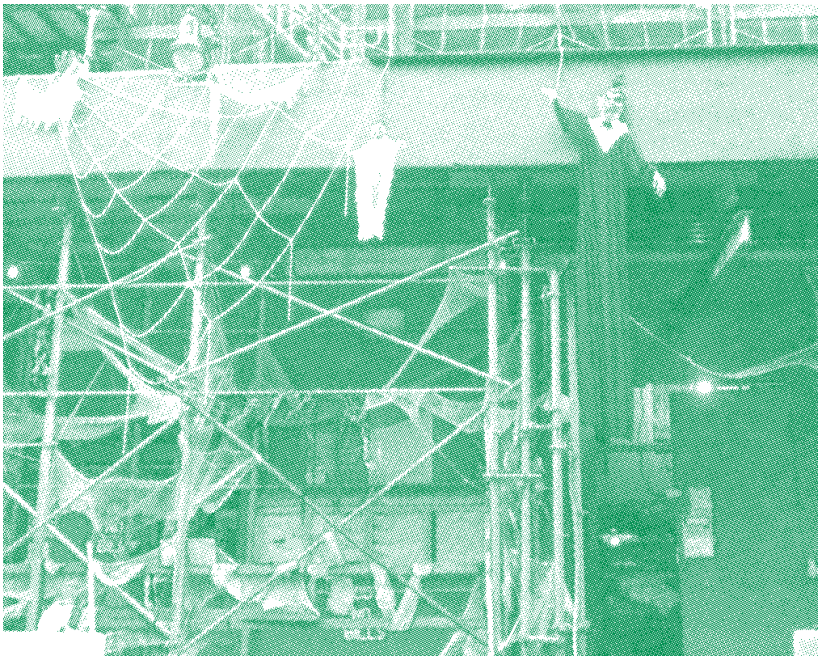

Office
Office
Collective
Workshop
(va
FENICIA
Restaurant
Shop

TEST 4: REPLUGIN

Replugin tests universality through site specificity. The diagram below analyses the site's different programs and stakeholders, and, like Out of Order, imagines scenarios in which scaffolding (structures) might be required by one party and examines how it affects its neighbours and surroundings.

A 1:75 street model of Tøyenbekken was built for this test. Buildings were modelled as independent elements to have freedom in arranging different situations. A street-level plan was also drawn, but was used for sketching ideas and a final diagram (present in previous tests) was not produced in time.





Stills showing the scale and ornaments hung on scaffolding in 'How to Build Scaffolding', possibly a result of New York's Local Law 11. Recognisable as an urban environment (but perhaps not necessarily New York), these examples demonstrate a more permanent (and accepting?) attitude towards scaffolding as part of the city life.

Clockwise from top left, fake vines wrapped around standards, party balloons wrapped around bracers, pride flag wrapped around two sides of a module, various halloween decorations on sidewalk shelter, double height scaffold over entrance to Empire State Building, provisional opening between planks for tree to poke through.

Printed graphic and Urban Umbrella's sidewalk shelter.

CASE STUDY: NEW YORK'S LOCAL LAW 11

In 1998, New York City passed Local Law 11 - the Facade Inspection Safety Program - to mandate inspections of exterior walls and facades of buildings taller than 6 storeys every 5 years (which totals about 12 000 buildings) - to ensure the safety of pedestrians[1]. This was meant as an improvement to the existing inspection program that failed to prevent a number of falling object accidents. Given the frequency and scale of the program, it's easy to see how maintenance (and deterioration) is a never-ending process.

The social impact of this is explored in the 2019 observational documentary 'How to put up scaffolding'[2]. The filmmaker notes that this law has resulted in a lot of covered sidewalk shelters and the near-permanent presence of scaffolding in New York - obscuring landmarks, blocking views, and generally homogenising the city at street level. Interviewees note that some of these structures have stood for over a decade, making them permanent safety fixtures in the city (rather than addressing the issue of failing buildings that need serious renovations).

One solution presented is to "prettify" scaffolding. The documentary shows several instances of 'Urban Umbrella'[3], a sidewalk shelter manufacturer who does scaffolding for high-end / luxury stores and buildings. It was the winning entry of a 2009 competition to 'thoroughly re-imagine temporary sidewalk shed design while improving pedestrian experience.'[4]

The implicit premise of Urban Umbrella (and the competition that started it) approaches the presence of scaffolding as a cosmetic problem rather than the result of deteriorating buildings and the maintenance problems associated with it.

[1] Superstructure Architects. New York City's Facade Inspection & Safety Program (FISP). (Accessed 2021). Available online at https://www.superstructures.com/local-law-11-fisp-facade-safety-inspection-nyc-cycle-9/

[2] How to Put Up Scaffolding. John Wilson. (2020).

[3] While I could not find out how long these structures have stood for, the first ones were rolled out in 2011. See https://www.urbanumbrella.com/story

[4] Competition brief available online at https://web.archive.org/web/20100225135541/http://www.urbanshed.org/index.html

Scenario: visibility

Main stakeholder: art gallery

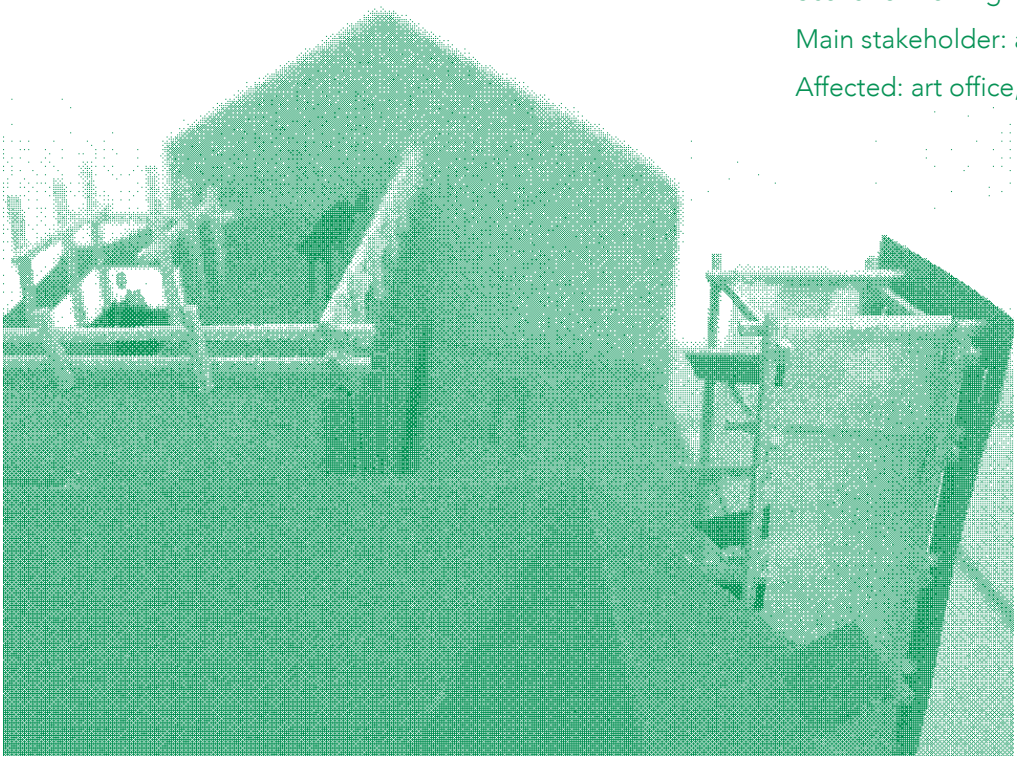
Affected: workshop

Scenario 1a: The front and back of Tøyenbekken 12, vacant since 2020, is split into two lots. The warehouse is bought up, but its function is undetermined. While decisions are being made, the deteriorating entrance is demolished and replaced with a prominent scaffold that is intended for leasing ads while the building is vacant.

Scenario: viewing

Main stakeholder: art gallery

Affected: art office, workshop



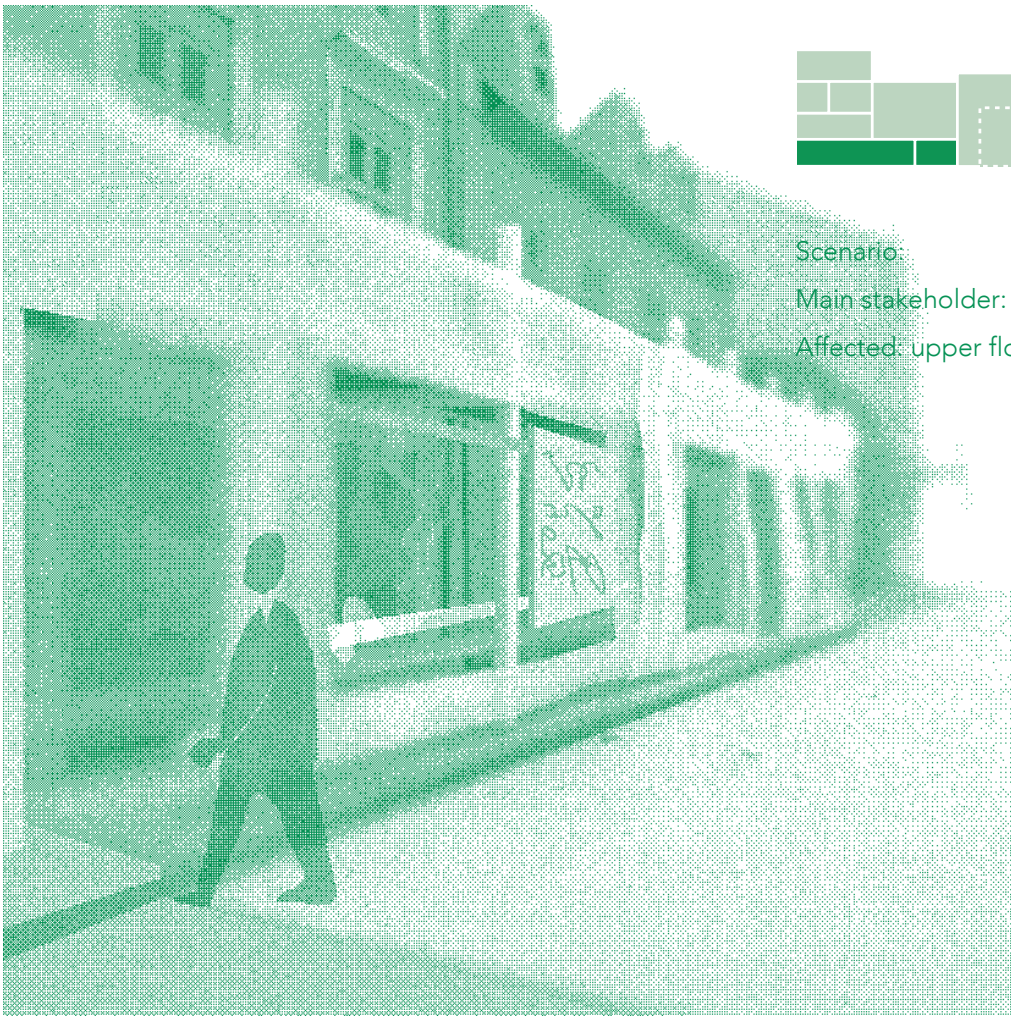
Scenario 1b: A survey of the hall is carried out as part of a feasibility study of possible future programming. A scaffolding stair module is built to assess the condition of the roof.

Scenario: access

Main stakeholder: workshop

Affected: art gallery

Scenario 1c: The temporary entrance scaffold - which is unclimatised and unexpectedly cinematic in the way light falls into the corridor is becomes a popular photography spot...until the gradual accumulation of litter left by visitors makes it terrible to visit.



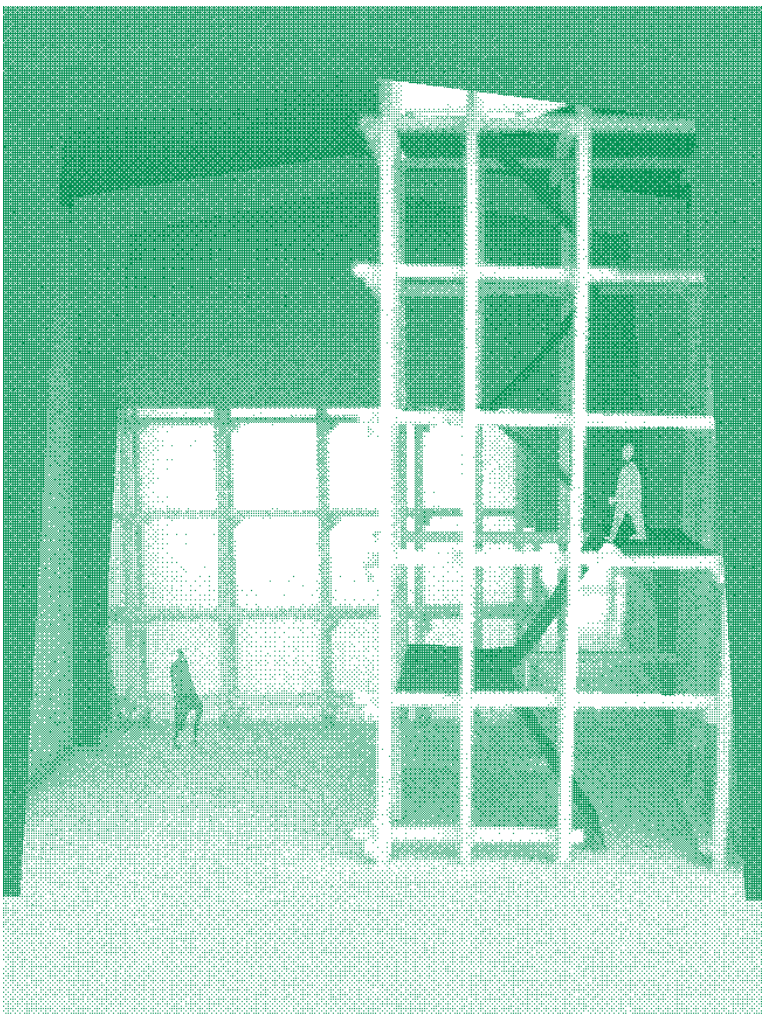
Scenario:
Main stakeholder: shops, restaurants
Affected: upper floors

Scenario 2a: A scaffold shelter the width of the pavement is built for the renovation of the upper floors of Grønlandsleiret 1. As the street only has two lanes, the roof of the shelter serves also as storage of material deliveries. As a concession to the disruption of street-level businesses, a custom covering is made to retain visibility into the stores from acroess the street. Gradually the bracing is used to display more goods, becoming an extension of the shop.

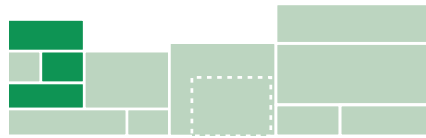
Scenario: separation

Main stakeholder: art gallery

Affected: workshop



Scenario 1d: The front of Tøyenbekken is bought up, reuniting the two lots. The dividing wall between them is demolished in preparation for a rebuild.

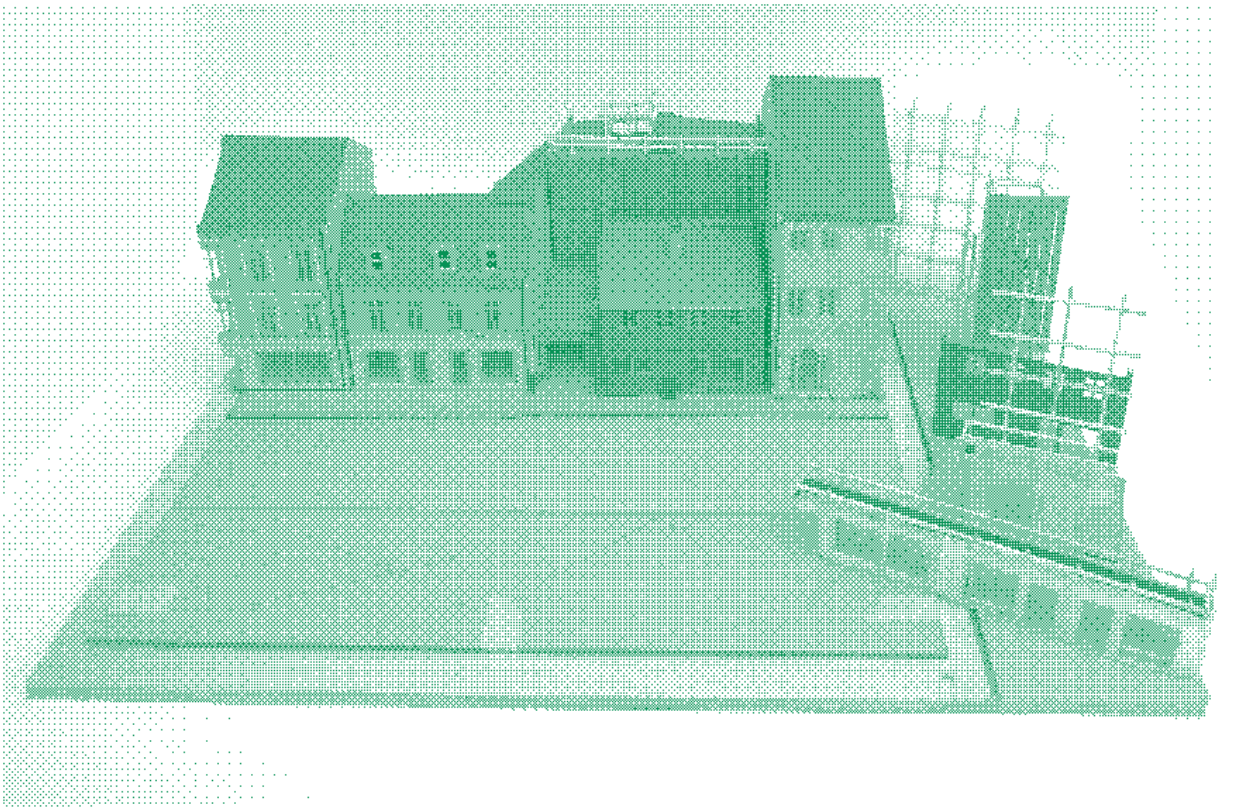


Scenario: extension

Main stakeholder: upper floors

Affected: roof

Scenario 2b: Poor management means not only does the renovation of Grønlandsleiret goes over schedule, but a bureaucratic error leaves a window chute unaccounted for. The new tenants decide to use it as a trellis.



1:75 working model of Tøyenbekken, arranged with existing elements on the model space and scaffolding elements to the side.

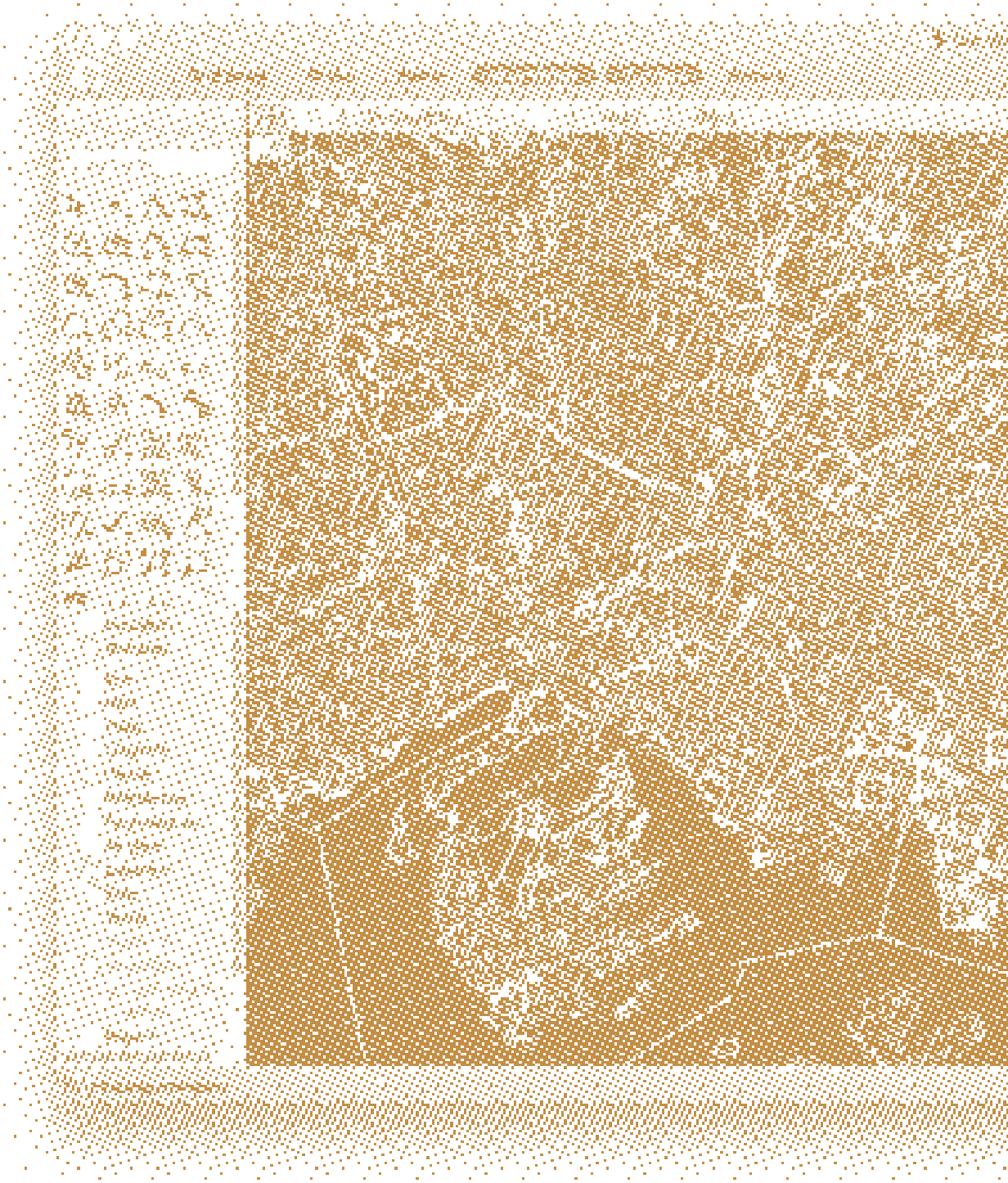
REFLECTION

Like the other tests, Replugin explores the use and function of scaffolding, but in this case its interpretation is more in line with architectural understandings of program and function. It was hoped that by mixing the pragmatism of scaffolding with elements of the architectural process, the idea that scaffolding becomes accepted as architecture could be explored.

I don't think this test was so successful in evaluting that as a parameter - although speculative like Out of Order / Grønland kirke test, designing non-supportive scaffolding to examine its potential consequences runs counter to the values of scaffolding. In addition, I the scaffolding structures built stood independently, rather than being integrated into the existing fabric - in retrospect, while conventional, it does not really examine the point of contact between scaffold and primary structure.

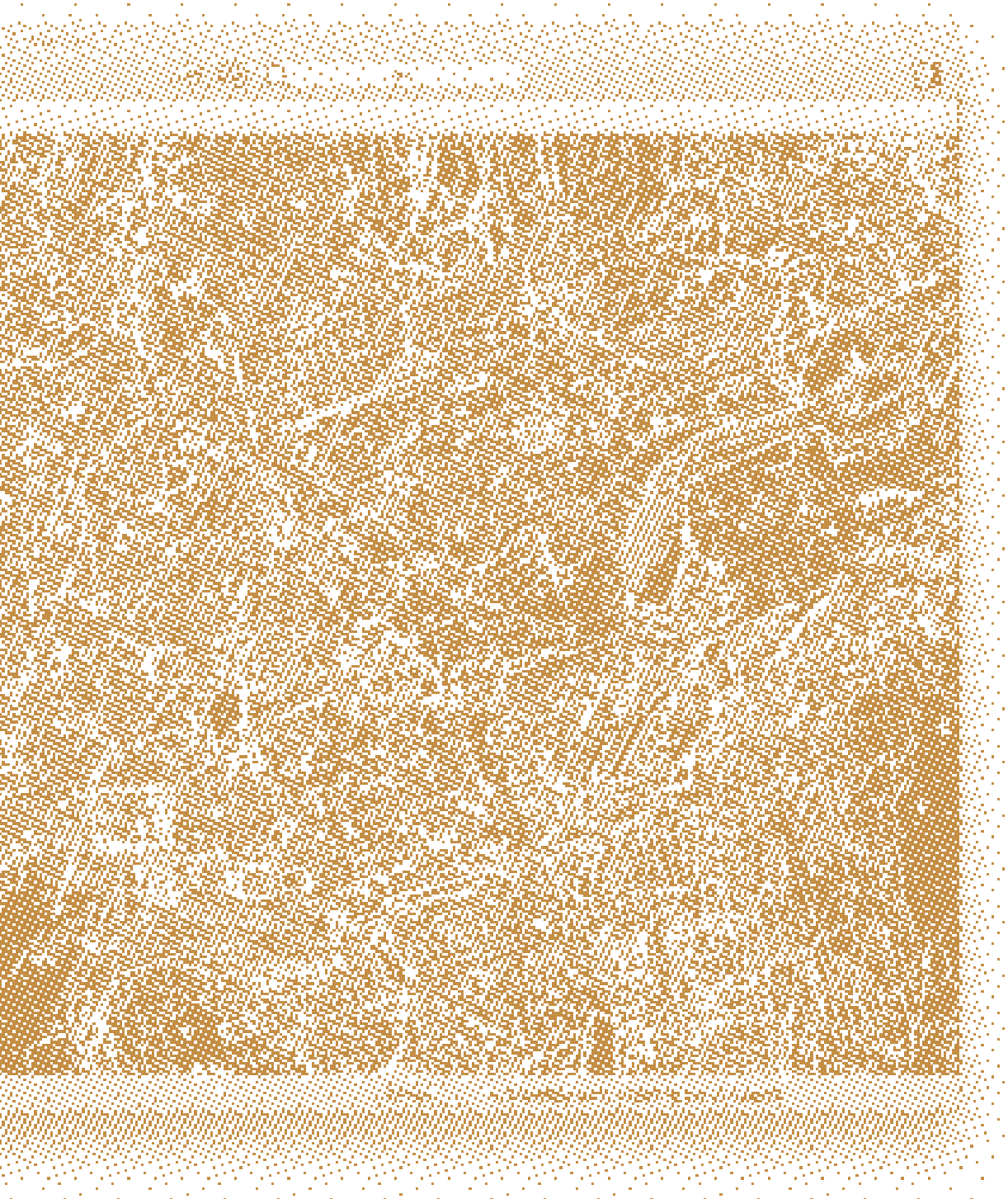
What this test did reveal, was the evocative nature of scaffolding structures that has been used by architects in temporary / pavilion-style projects. Among these examples, most of the scaffolding structures are self-contained ('known') and not playing a supportive role. I think if there was more time this is what I would like to push.

REFLECTIONS AND CON



CAD map of Oslo used to record locations of scaffolding and possible test sites throughout diplom

ICLUSIONS



a.

REFLECTIONS
& CONCLUSIONS

SO - CAN SCAFFOLDING, A SUPPORT STRUCTURE, BE ON EQUAL TERMS WITH ARCHITECTURE?

With A Study into Scaffolding, I hope I have shown the existing relationship between architecture and scaffolding, but also its potential as a support tool beyond its current uses as a support structure or for facilitating access. The material presence of scaffolding everywhere - especially in cities - was conceptualised as a physical structure / indicator of maintenance that could be analysed, but once I got started with the survey it became apparent that there was more to scaffolding than it seemed.

The key research question is open-ended, but from the research and design work, I think scaffolding is already on equal terms with architecture because the built environment relies on it - scaffolding can't be substituted, but neither can it substitute architecture. And although they are separate professions, as with many other symbiotic topics, an awareness of the other can produce a more positive and holistic understanding - whether it be minimising future problems or building more sustainably - of the impact of (in this case) architecture in the built environment.

Along with my interest in preservation, the diploma format was inspired partly by precedent studies of elements of the built environment whose architectural qualities and influence were not immediately apparent, like Made In Tokyo, Learning from Las Vegas, and the Image of the City - the process of (reading about) closely examining the odd part of something mundane to work out how it works is... just so cool.

The diploma began with an even broader intention to exploring idea of (materially) repairing things, something I felt could potentially open up discussions on topics that run parallel to architecture - maintenance, construction, services. I also wanted to see what could come out from an approach that contextualised architecture as one of several elements of the built environment. I hope this has come through.

Thank you for reading!

Mural of a scaffolding structure and various related figures in Berlin.

CHOICES, LIMITATIONS

Balancing the scope of the diploma with the one semester's worth of time was definitely a challenge. My approach favoured breadth of scope over depth into a topic, because it seemed both more achievable and more fun. Perhaps I would have gotten farther if I had explored scaffolding more specifically during the pre-diploma.

One consideration I maintained throughout the diploma was to keep the investigation of each value open-ended, at the expense of slowing down the investigation - splitting fixed lifespan value by focusing on the scaffolding and the buildings that have scaffolding, for example, was an unexpected development that took some time to think about. I deliberately avoided forming solution-based questions like 'designing a new scaffolding system', or 'writing a technical handbook of scaffolding configurations', as I thought it would they would need to be more resolved (and take more time) to come to conclusions.

Taking cues from precedent studies, I used diagrams as a way to both formulate relationships between things and also to limit the scope and scale to something specific in each chapter. The diagrams also helped inform the direction of the design work, highlighting a 'variable' to work with in each test and keeping me on track. With each value I think I touched on its significant quality, though there was a lot of streamlining, and some ideas to study didn't happen due to time. So I think the design work could be pushed further to test and draw more precise conclusions with each topic.

The research and reading I went though covered scaffolding in different ways for different audiences - some of the technical and theoretical readings was a bit challenging and took some time to get my head around, but I thought it was valuable and neccessary to become familiar with other writing on the topic. As a result, I spent more time on research than preferred, though the parallel streams of research and design helped inform the direction of each other to in a thought-provoking way.

Although I think it was good overall to have several sites to test different conditions and scales, it took some time to survey, select, and draw up each site.

Title	By
Architecture's Scaffolds	Ateya Khorakiwala
Conservation of Historic Buildings	Bernard Feilden
Hill House Box	Carmody Groarke
Island, British Pavilion	Caruso St John
Support Structures	Celine Condorelli
Wrapped Reichstag	Christo and Jeanne-Claude
Scaffolding	Enrique Walker
Storming the Campo Vaccino': British Architects and the Antique Buildings of Rome	Frank Salmon
Maintenance Architecture	Hilary Sample
How to with John Wilson: How to Put Up Scaffolding	John Wilson
Monumentaries: Towards a Theory of the Apergon	Jorge Otero-Pailos
The Notre-Dame Effect	Jorge Otero-Pailos
Plaster Monuments, Ch.1: Travels in the Provinces of Reproductions	Mari Lending
Scaffolding - the Handbook for Estimating and Product Knowledge	Michael Terry Marks
Of Other Spaces, Principles 3-6	Michel Foucault
FCA 2015	MMX
The Stairs to Criterion	MVRDV
Marble Arch Hill	MVRDV
Two Years Later, Here's the Latest With Notre-Dame's Restoration	Nadja Sayej
Scaffolding	OMA
Hórama Rama	Pedro y Juana
Punto de información en Glòries	Peris + Toral
Bamboo Theatre	Raymond Fung
Historic Structures: Planning and Implementation of Fixed Scaffolding Systems	Ronald D. Staley
Scaffmag	Scaffmag
拆棚 (Dismantling the Scaffold)	Spring Workshop
Access Scaffolding	Stewart Champion
Notre Dame de Paris: the medieval cathedral and its 19th century restoration	Tom Nickson
A Treatise on Safety Engineering Applied to Scaffolds	Travelers Insurance Company
Urban Umbrella	Urban Umbrella
開工:中國傳統花牌 (Good Job: Theatre + Festival Signage)	viuTV
開工:搭棚 (Good Job: Bamboo Scaffolding)	viuTV
Scaffold	Wiktionary
Intl Patent Classification: Section E	WIPO
戲棚 (Bamboo Theatre)	卓翔 (Cheung Cheuk)

List of resources / further reading.

Year	Medium	Conceptual	Historical	Cultural	Pragmatic/Material	Architectural	Other	URL
2019	Essay	☑	☐	☐	☑	☑	☐	https://www.e-flux.com/architecture/overgrowth/221616/architecture-s-scaffolds/
1982	Book	☐	☐	☐	☑	☐	☐	https://archive.org/details/conservationofhi00feil/page/n3/mode/2up
2019	Building	☑	☐	☐	☐	☑	☐	https://www.archdaily.com/920640/the-hill-house-box-carmody-groarke
2018	Pavilion	☑	☐	☐	☐	☑	☐	https://carusostjohn.com/projects/island-venice-architecture-biennale/
2009	Book	☑	☐	☐	☐	☐	☐	https://www.sternberg-press.com/product/support-structures/
1995	Installation	☑	☐	☐	☑	☐	☐	https://christojeanneclaude.net/artworks/wrapped-reichstag/
2014	Essay	☑	☑	☐	☐	☑	☐	https://www.jstor.org/stable/43630888
1995	Essay	☑	☐	☐	☐	☐	☐	https://www.jstor.org/stable/1568626
2016	Book	☑	☑	☐	☐	☑	☐	https://mitpress.mit.edu/books/maintenance-architecture
2020	Short film	☑	☐	☐	☐	☐	☐	https://www.imdb.com/title/tt10801534/episodes
2015	Essay	☑	☑	☐	☑	☐	☑	https://www.e-flux.com/journal/66/60754/monumentaries-toward-a-theory-of-the-apergon/
2021	Essay	☑	☐	☑	☐	☐	☐	https://www.jstor.org/stable/10.5749/futuante.17.1.0iii
2017	Book	☐	☑	☐	☑	☑	☐	https://press.princeton.edu/books/hardcover/9780691177144/plaster-monuments
2016	Book	☐	☐	☐	☑	☐	☐	https://www.worldcat.org/title/scaffolding-the-handbook-for-estimating-and-product-knowledge/oclc/1012500665&referer=brief_results
–1967	Essay	☑	☐	☐	☐	☐	☑	https://foucault.info/documents/heterotopia/foucault.heteroTopia.en/
2015	Pavilion	☐	☐	☐	☐	☑	☐	https://www.dezeen.com/2015/06/15/mmx-scaffolding-canvas-cluster-origami-like-pavilions-zocalo-plaza-mexico-city-feria-de-las-culturas-2015/
2016	Pavilion	☑	☐	☐	☐	☑	☐	https://mvrdv.nl/projects/238/the-stairs-to-kriterion
2021	Pavilion	☐	☐	☐	☐	☑	☐	https://www.youtube.com/watch?v=lxfZlG9PHNs
2021	Article	☐	☐	☑	☐	☑	☐	https://www.architecturaldigest.com/story/two-years-later-heres-latest-notre-dames-restoration
2017	Exhibition	☐	☐	☐	☐	☑	☐	https://www.oma.com/projects/scaffolding
2019	Pavilion	☐	☐	☐	☐	☑	☐	https://www.domusweb.it/en/architecture/gallery/2019/07/02/pedro-y-juanas-pavilion-at-moma-ps1-represents-urban-jungle.html
2013	Pavilion	☐	☐	☐	☐	☑	☐	https://peristoral.com/proyectos/punto-de-informacion-en-glories
2014	Pavilion	☐	☐	☐	☐	☑	☐	https://www.designboom.com/architecture/west-kowloon-cultural-district-unveils-pop-up-bamboo-theatre-01-22-2014/
2002	Essay	☐	☑	☐	☐	☑	☐	https://www.jstor.org/stable/1504754
2009–	Magazine	☐	☐	☐	☐	☐	☐	https://scaffmag.com/
2018	Exhibition	☑	☐	☐	☐	☐	☐	www.springworkshop.org/dismantling-the-scaffold-at-tai-kwun
1996	Book	☐	☐	☐	☑	☐	☐	https://www.worldcat.org/title/access-scaffolding/oclc/954299115
2020	Lecture	☐	☑	☐	☐	☐	☐	https://www.youtube.com/watch?v=utRPwAKWfxs
1915	Book	☐	☑	☐	☑	☐	☐	https://archive.org/details/atreatiseonsafe00compgoog?ref=ol&view=theater
2011–	Company	☐	☐	☐	☑	☐	☐	https://www.urbanumbrella.com/story
2021	Short film	☐	☑	☐	☑	☐	☐	https://www.youtube.com/watch?v=VUUj0O1D
2021	Short film	☐	☑	☐	☑	☑	☐	https://www.youtube.com/watch?v=tAWCfPkAIDQ&list=PLTwOnqYHwP73dwpdSrpDXn2XAYpnMohMz&index=7
	Definition	☐	☐	☐	☐	☐	☑	https://en.wiktionary.org/wiki/scaffold
1971–	Legalese	☑	☐	☐	☐	☐	☐	http://www.wipo.int/ipc/itos4ipc/ITSupport_and_download_area/20210101/pdf/scheme/full_ipc/en/ipc_en_e_full_ipc_20210101.zip
2019	Film	☐	☑	☐	☑	☑	☐	https://www.imdb.com/title/tt11080024/

The scaffolding envelops a detached building under renovation that stands by the sea, leaving only its silhouette.

Opaque white tarp that also looks unusually durable encloses the building (presumably due to location). with additional lapping where the wall meets the roof, and sheets are fixed to each other. The tarp is also banded, possibly for rigidity. Glimpses of the ends of the steel scaffolding underneath is visible at the base.

The roof of the building is exposed.

ref. no:

001

location:
Akershusstranda 19

scale of repair / work:
whole building

primary function:
protection

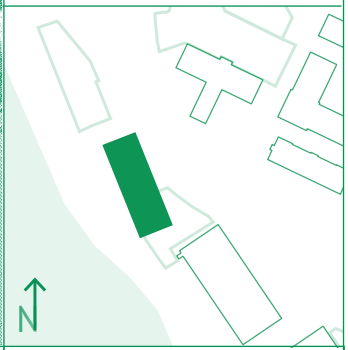
additional features:
tarp

estimated lifespan:
??

main structure in use?
no

recorded:
2021/08

[situation photo]



[map 1:5000]

The scaffolding is on a stone retaining wall on the eastern side of Akershus Festning.

The scaffolding is extends over the top of the wall and is slightly staggered to suit the slope. The stairs on the south side that lead to the top of the wall is also the roof of a building on the other side (which is higher on the other side and would require less scaffolding), so the structure is probably for works to the wall itself.

Timber boarding around the structure covers most of the side-walk, but it is not an area of high traffic.

ref. no:

002

location:
Kongens gate

scale of repair / work:
section of wall

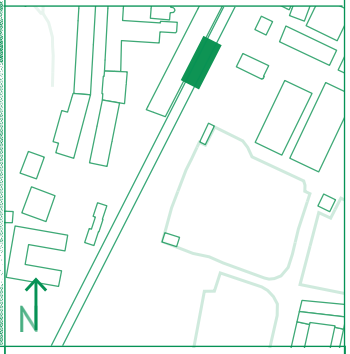
primary function:
access

additional features:
timber boarding

estimated lifespan:
??

main structure in use?
no

recorded:
2021/08



[situation photo]

[map 1:5000]

The scaffolding facilitates work on a roof extension on a 19th century courtyard brick building (bygård).

The scaffolding is slightly less than the width of the narrow courtyard, and accomodates a stair to access the roof. The structure is not enclosed, and various materials look like they are being stored in the yard.

The windows over which the scaffolding is built are closed with the curtains drawn.

ref. no:

003

location:
Munkegata 2

scale of repair / work:
courtyard wall + roof

primary function:
access

additional features:
N/A

estimated lifespan:
??

main structure in use?
yes

recorded:
2021/08

[situation photo]

[map 1:5000]

From the street, the scaffolding looks like a hat over the building.

The structure protrudes over the triangular block and extends to the ground, but is only clad on the top floor and roof. From street level the mesh and tarp are hard to tell apart. Company signage is on the top corner facing westwards, giving good visibility for passerbys and cars.

The structure has no platforms / walkways nor guardrails until the tarp level, which can be seen where the tarp is pulled back as an opening for the external lift. There is a set of ladders adjacent to the lift, probably for emergencies.

ref. no:

004

location:
Schweigaardsgate 63

scale of repair / work:
roof (+upper floor?)

primary function:
protection, access

additional features:
mesh, tarp, lift

estimated lifespan:
??

main structure in use?
yes

recorded:
2021/08

[situation photo]

[map 1:5000]

The scaffold is a strip on the facade with a guard-railed platform at roof level, 1 module wide - the width of 2 windows.

The structure is enclosed with mesh, suggesting works to the section of the facade, the windows, or the roof, though some of the windows inside the scaffolding are open.

The stairs - arranged on alternating sides - are removed at street level for security. The street under the scaffolding continues to be in use, and high-visibility padding around the columns at street level reduces chance of injury.

ref. no:

005

location:
Hagegata 14

scale of repair / work:
strip of facade

primary function:
access, protection

additional features:
mesh, open street

estimated lifespan:
??

main structure in use?
yes

recorded:
2021/08

[situation photo]

[map 1:5000]

The scaffolding at Sentralen facilitates the construction of a new hall and roof terrace, to be completed in October.

The scaffolding doubles as marketing for the project, printed on tarp in full colour with a render and nice photographs. With regular updates on social media, the site has also been used for (recorded) performances and - most recently - a pizza party for the builders and staff.

A service lift on the outside facilitates moving materials without disrupting service internally.

ref. no:

006

location:
Sentralen

scale of repair / work:
roof + top floor

primary function:
access, support, ads

additional features:
(printed) tarp

estimated lifespan:
6 months

main structure in use?
yes

recorded:
2021/08

[situation photo]

[map 1:5000]

The scaffolding envelops the street-facing sides of a corner building of a block.

Sheets of translucent tarp are lashed onto the structure. Where the tarp overlaps and structure is pressed to the tarp, a checkered pattern is visible from a straight-on angle. An opening for the lift breaks up the white facade.

One side of the street remains accessible, while the other is blocked off with fencing for site access.

ref. no:

007

location:
Rådhusgata 17

scale of repair / work:
facade

primary function:
protection, access

additional features:
tarp, lift, open st.

estimated lifespan:
??

main structure in use?
yes

recorded:
2021/08

[situation photo]

[map 1:5000]

OSB boarding as a quick fix over some broken glazing on a (shared?) terrace.

The board looks to be propped up against the frames of the existing glazing and braced at the top with timber wedges. It does not go all the way to the top.

ref. no:

008

location:
Schweigaardsgate 26

scale of repair / work:
section of fence

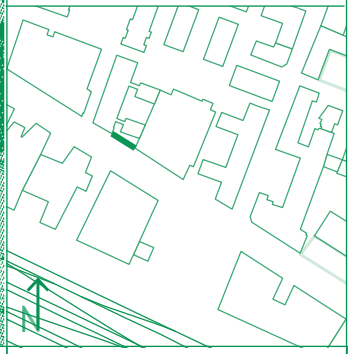
primary function:
safety

additional features:
N/A

estimated lifespan:
??

main structure in use?
yes

recorded:
2021/08



[situation photo]

[map 1:5000]

The scaffolding allows access to front and back facades of this listed building (under Byantikvaren i Oslo) for restoration works.

The structure extends slightly over the width of the building. In addition to the mesh enclosing the scaffolding, tarp is laid over the top of the structure and at street level, and also used to seal up facade openings. On the front, signs attached to the structure through the mesh advertises the company and the role of Kulturminnefondet in the restoration.

Over the building entrance is an awning with a gestural form.

ref. no:

009

location:
Østfoldgata 2

scale of repair / work:
facade

primary function:
access, protect, ads

additional features:
awning, signage

estimated lifespan:
??

main structure in use?
yes

recorded:
2021/08

[situation photo]

[map 1:5000]

The building is a single block with scaffolding all around for restoration works.

This side of the building is exposed - probably because of the open space around. Tarp is laid around the top, and the scaffolding curves along the form of the building. Multiple stair core modules are placed around the structure due to its size.

*See related ref. 011 for the building's western elevation.

ref. no:

010

location:
Enebakkveien 25 (S)

scale of repair / work:
whole building

primary function:
access, signage

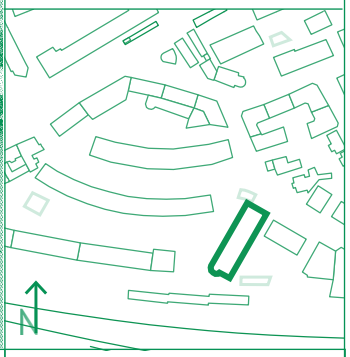
additional features:
tarp

estimated lifespan:
??

main structure in use?
no

recorded:
2021/08

[situation photo]



[map 1:5000]

The building is a single block with scaffolding all around for restoration works.

This side of the building is behind a mesh - probably because of its proximity to the street and adjacent buildings - each sheet is the width of 1 module and lashed to a column. Uncertain of why there is a change in mesh material but is unusual enough to stand out (and could be used intentionally in other ways)

The scaffold over the building entrance is bounded by OSB.

*See related ref. 100 for the building's southern elevation.

ref. no:

011

location:
Enebakkveien 25 (E)

scale of repair / work:
whole building

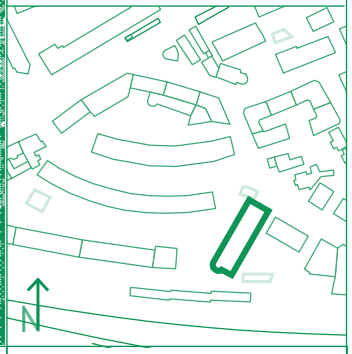
primary function:
protection

additional features:
two types of mesh

estimated lifespan:
??

main structure in use?
no

recorded:
2021/08



[situation photo]

[map 1:5000]

10 windows on 5 storeys of a student housing block (1 studio per 2 windows) are blocked off with a heavy gray fabric (tarp?) for 2 days, probably to repair some damage to the brick facade.

The fabric is fixed to horizontal beams protruding from the facade fixed to exposed structural columns on the facade.

ref. no:

012

location:
Sognsveien 89

scale of repair / work:
section of facade

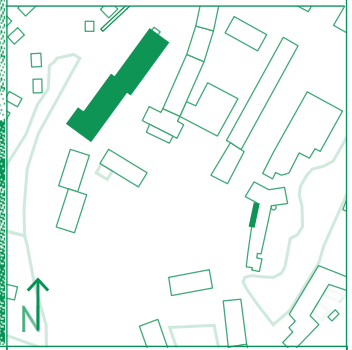
primary function:
protection (?)

additional features:
N/A

estimated lifespan:
2 days

main structure in use?
yes

recorded:
2021/08



[situation photo]

[map 1:5000]

A block of shared student flats are vacated and closed off for full internal renovations.

Scaffolding is purely for access and is limited to the stair modules, aligned with the strip of the facade with french windows for entry to each floor.

Because there are no major changes to the facade and has a setback of 2.0m from the road on all sides, other typical functions like protection or structural support is not required.

ref. no:

013

location:
Sogn studenby

scale of repair / work:
whole block

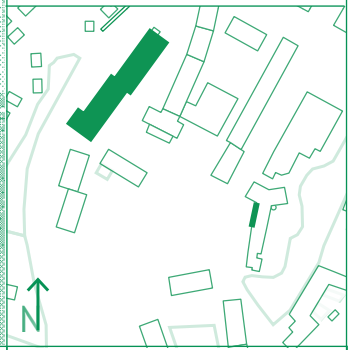
primary function:
access

additional features:
N/A

estimated lifespan:
18 months (until

main structure in use?
no

recorded:
2021/08



[situation photo]

[map 1:5000]

The scaffolding is on the short end of the university building, over where alternating panels of glazing and corrugated cladding are positioned.

Two lifts have been installed, one for access onto each level of the scaffolding, and the other from the ground to the roof.

At ground level the site is fenced off with a lightweight metal fence, where a raised platform built for the lift is visible. The structure's steel footings stand on thick slabs of timber, to improve stability of paved setts (brolegning) around the perimeter of the building.

ref. no:

014

location:
UiO

scale of repair / work:
strip of facade

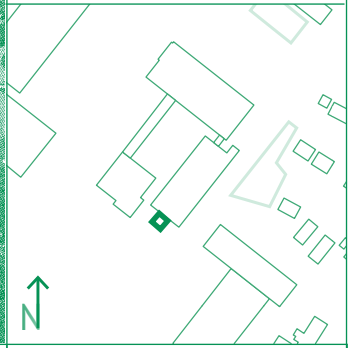
primary function:
access, protection

additional features:
tarp, lift

estimated lifespan:
??

main structure in use?
yes

recorded:
2021/08



[situation photo]

[map 1:5000]

The scaffolding is on the southern end of Havnelageret, wrapping up and around the dome of one of its towers.

Although the building has 11 floors, there are 17 flights of stairs on the scaffolding. The uppermost level of the scaffolding is blocked off with OSB boards. Vertical signage hangs from the guardrail of the 14th level.

The lift, loaded with lengths of metal, is parked at the top of the structure.

ref. no:

015

location:
Havnelageret

scale of repair / work:
tower, roof

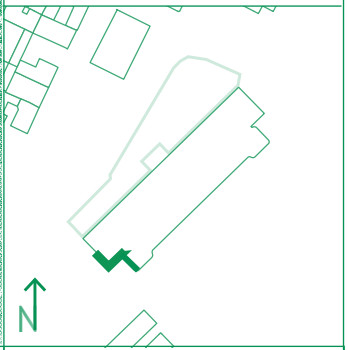
primary function:
access

additional features:
lift

estimated lifespan:
??

main structure in use?
yes

recorded:
2021/08



[situation photo]

[map 1:5000]

The pediment and cornices of Nationaltheatret are covered, wrapped up in tarp and netting.

Possibly a measure to prevent further deterioration of historic architectural features, or anti-bird measures. A walkaround on Google streetview indicate that these features have probably been wrapped up at least since May 2017.

ref. no:

016

location:
Nationaltheatret

scale of repair / work:
features

primary function:
protection

additional features:
tarp, netting

estimated lifespan:
4+ yrs (c. 2017)

main structure in use?
yes

recorded:
2021/08

[situation photo]

[map 1:5000]

There is scaffolding over the recessed windows and frieze at the entrance to Rådhuset. A double-height tent has been constructed between the two fountains.

At ground level, the footprint of the frieze scaffolding is small and against the side of the entrance onto the balcony in the recessed space. It does not go across the width.

Passing through the square several times in the summer, photographs of and against the building's striking silhouette continue undeterred.

ref. no:

017

location:
Rådhuset

scale of repair / work:
around entrance

primary function:
protection, access

additional features:
tarp

estimated lifespan:
??

main structure in use?
yes

recorded:
2021/08

[situation photo]

[map 1:5000]

The scaffold envelops the whole of the building and its mirrored counterpart as part of a full-scale renovation project of the quarter.

The eastern elevation faces a street that is still in operation. Fencing over water-filled barricades close the block off at street level, but a generously-sized opening has been made for the overhead streetlight. A play on easement rights?

ref. no:

018

location:
Tordenskioldsgate 12

scale of repair / work:
whole buildng

primary function:
protection, access

additional features:
mesh, lift

estimated lifespan:
est. 2 yrs

main structure in use?
no

recorded:
2021/08

[situation photo]

[map 1:5000]

From the street, the scaffolding is on and over a structure on the roof terrace, forming a strong silhouette against the sky.

The tarp is pulled taut over the roof and draped more loosely over the structure and existing underneath. The company signage has made the most of the sightlines from the pedestrian passage on the street, or from the skywalk.

ref. no:

019

location:
Pilestredet 20

scale of repair / work:
section of top floor

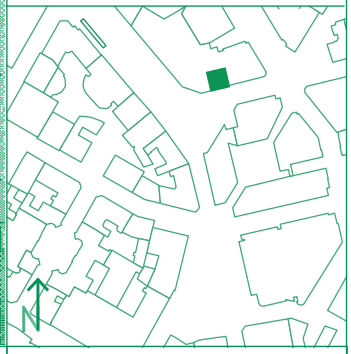
primary function:
protection

additional features:
tarp, ads

estimated lifespan:
??

main structure in use?
yes(?)

recorded:
2021/08



[situation photo]

[map 1:5000]

Scaffolding is installed over a strip of windows on the facade of this three-storey building.

The scaffolding platform has a trapdoors for ladders. The footing of the structure has three legs on the street and one leg on the staircase.

ref. no:

020

location:
Damplassen 22

scale of repair / work:
strip of facade

primary function:
access

additional features:
N/A

estimated lifespan:
??

main structure in use?
yes

recorded:
2021/08

[situation photo]

[map 1:5000]

In 2018-2019 scaffolding enveloped the Historical Museum, one of the few buildings in Oslo built in Jugendstil.

The museum remained open to the public during the works. The scaffolding over each face of the building had a 1:1 drawing of the corresponding elevation printed on it - a substitute facade that could allow the building to be recognisable.

See 022 for similar strategy of printed facades at Regjeringskvartalet.

(Image is from google streetview, dated 2019/09)

ref. no:

021

location:
Kulturhistorisk museum

scale of repair / work:
building envelope

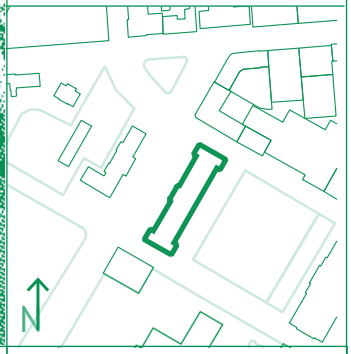
primary function:
protection

additional features:
printed tarp

estimated lifespan:
apx. 18 months

main structure in use?
yes

recorded:
2019/09, gmaps



[situation photo]

[map 1:5000]

A printed facade hangs over the width of the main facade of Høyblokken.

Høyblokken's design and unpretentious facade represented the hope for a fairer future. The building was bombed and has not been in use since the 22 July attacks, subsequently acquiring new meaning as a reminder of the event.

The scaffolding is the printed tarp, showing the facade as it was before, putting up a front literally to protect the building while the site is being developed, but also could be read figuratively as hiding the damage / trauma from view.

See 021 for similar strategy of printed facades at Kulturhistorisk museum. See 023 for scaffolding around the mural Fiskerne on the same site.

ref. no:

022

location:
Regjeringskvartalet

scale of repair / work:
whole quarter

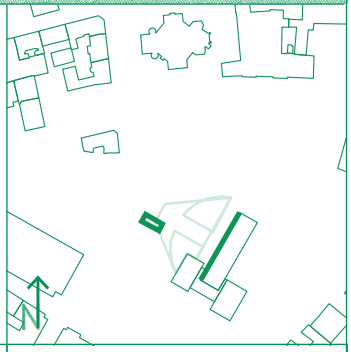
primary function:
protection, symbol

additional features:
printed tarp

estimated lifespan:
>10 years (est.2029)

main structure in use?
no

recorded:
2021/03



[situation photo]

[map 1:5000]

The wall with Fiskerne is detached from Y-blokken and housed in a free-standing scaffolding.

Fiskerne is the most high-profile and visible piece of art in Regjeringskvartalet. One of many sandblasted murals in the quarter executed by Nesjar, its association to Picasso probably bestowed value to be exempted from demolition along with the rest of Y-blokken.

Peeking over the hoarding of the site, the scaffolding is free-standing, providing structural support to the wall and is fully enclosed for protection during redevelopment. A window with lighting on part of the scaffold preserves some view of the mural.

See 022 for scaffolding over Høyblokken at the same site.

ref. no:

023

location:
Regjeringskvartalet

scale of repair / work:
whole quarter

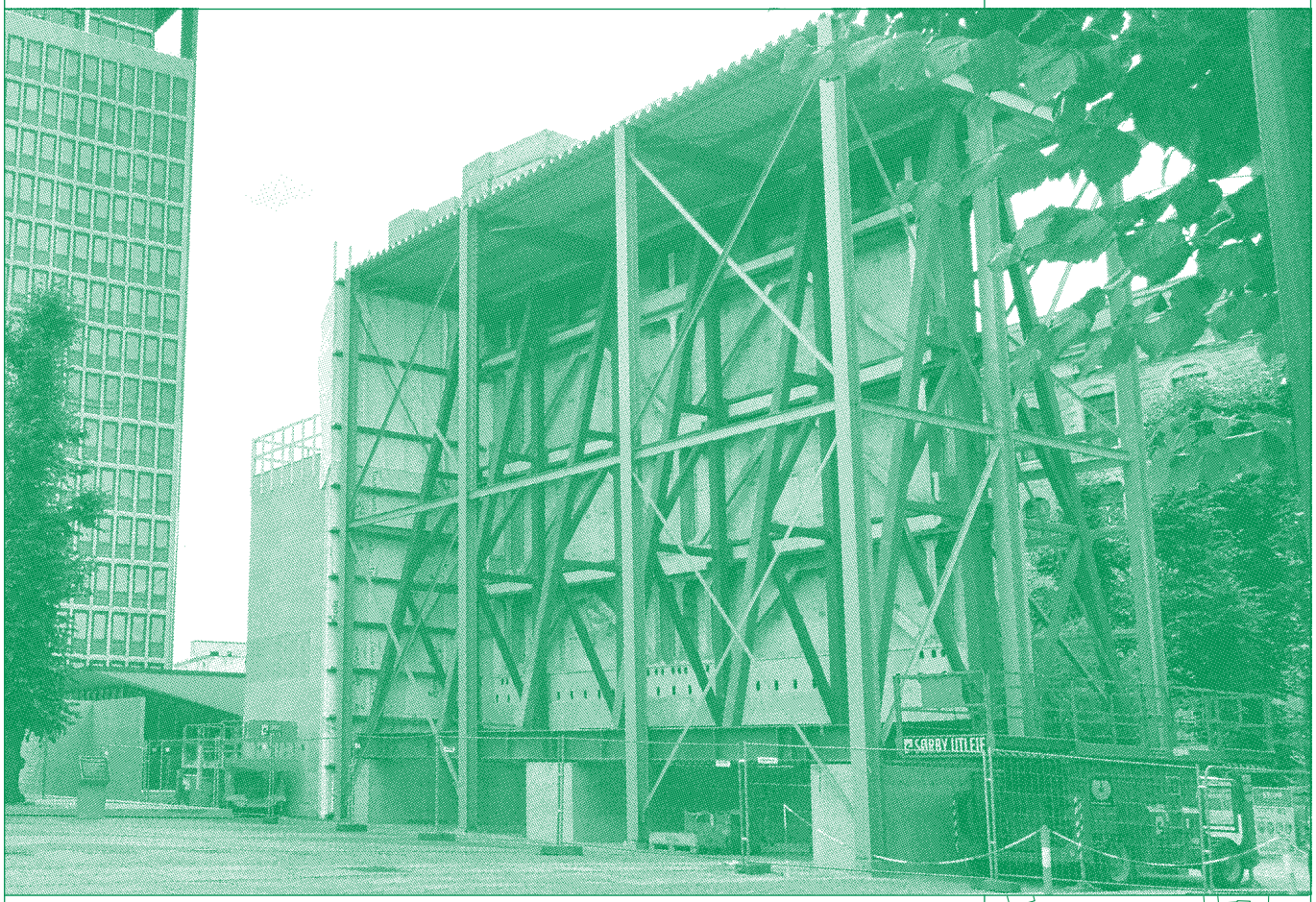
primary function:
support, symbol

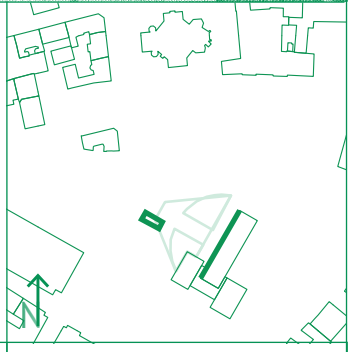
additional features:
hoarding, lighting

estimated lifespan:
8 years (est.2029)

main structure in use?
no

recorded:
2021/03





Scaffolding is constructed around the patina-cladded parts of the entrance to Klingenberg cinema.

The scaffolding is three storeys high, and is laid over and protrudes from the overhanging entrance. The street level is open, and the padding around the bars is black and made visible with reflective ties. Above it, the overhead platforms are used as storage.

A lift to the side provides access to the roof.

ref. no:

024

location:
Klingenberg kino

scale of repair / work:
facade

primary function:
access, storage

additional features:
lift, open street

estimated lifespan:
??

main structure in use?
yes

recorded:
2021/09

[situation photo]

[map 1:5000]

Mesh fencing on one side of the square in front of Nasjonal-museet is covered in a mesh with a mock stone texture.

Standard mesh fencing is used to create storage space for construction equipment and materials, and has an extra layer of mesh printed with a grey stone texture to obscure it more. While Nasjonalmuseet has a grey stone finish, the mesh pattern is comparatively rustic.

The mesh is semi-opaque, casting a dappled shadow on a sunny day.

ref. no:

025

location:
Nasjonalmuseet

scale of repair / work:
portion of square

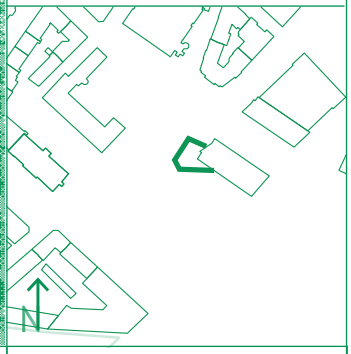
primary function:
separation

additional features:
printed mesh

estimated lifespan:
??

main structure in use?
yes

recorded:
2021/09



[situation photo]

[map 1:5000]

Hoarding separates the car and pedestrian parts of the road at a bridge over Akerselva at Nydalen.

The construction is entirely in timber sections and OSB. All along the length of the pedestrian side is marketing for a new housing development in the area.

An LED light strip stuck on the underside of the top bar illuminates the ad all day long.

ref. no:

026

location:
Gullhaug bro

scale of repair / work:
road on bridge

primary function:
separation

additional features:
lighting, ads

estimated lifespan:
??

main structure in use?
no

recorded:
2021/09

[situation photo]

[map 1:5000]

Stair scaffolding modules are being built along the street-facing facade of this long apartment complex.

Scaffolding is being built, piece by piece. A pulley system is used to move components from ground level to two workers at the top of the WIP structure, which looks like it is self-supported and without cross-bracing - The tiltedness of the free-columns at the top demonstrate how scaffolding platforms keep the structure stable and in tension when assembled.

Outside of the left side of the picture, a module with a lift has been completed.

ref. no:

027

location:
Kristoffer Aamots gate

scale of repair / work:
facade / roof?

primary function:
access

additional features:
lift

estimated lifespan:
??

main structure in use?
yes

recorded:
2021/09

[situation photo]

[map 1:5000]

Wire netting covers the length of a retaining wall in Ny-dalen.

The wire netting has multiple purposes - a kind of support / scaffold for the retaining wall, but also as a framework to encourage plant growth.

ref. no:

028

location:
Kristoffer Aamots gate

scale of repair / work:
retaining wall

primary function:
support, hide

additional features:
planting

estimated lifespan:
??

main structure in use?
N/A

recorded:
2021/09

[situation photo]

[map 1:5000]

A single metal guardrail is placed on the concrete footing of the now-removed ticket machine at Ullevål station.

The barrier is chained to pegs stuck in the concrete footing to prevent its removal. A power outlet and hollow tube is visible at the base - probably indicating it will be reused for something else in the (near?) future.

ref. no:

029

location:
Ullevål station

scale of repair / work:
machine footprint

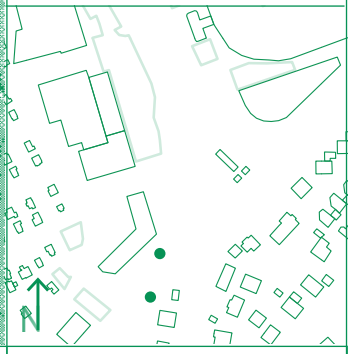
primary function:
separation

additional features:
N/A

estimated lifespan:
??

main structure in use?
N/A

recorded:
2021/09



[situation photo]

[map 1:5000]

New cladding is being installed on the extension of Sofienberg skole to improve building performance.

The structure of the building remains unchanged. The new cladding is attached to a frame attached to the existing wall, with a few new openings being made. There is hoarding around the perimeter of the site.

The principle of applying a layer of protection over an existing building is comparable to techniques of scaffolding, only in this case it is more permanent. It should be noted that modular cladding options with their own structural logic are not uncommon in contemporary architecture in general.

ref. no:

030

location:
Sofienberg skole

scale of repair / work:
block

primary function:
improvement

additional features:

estimated lifespan:
??

main structure in use?
no

recorded:
2021/09

[situation photo]

[map 1:5000]

A temporary footbridge is built over the road at Rådhusplassen, which will be closed off for the Oslo marathon on the weekend.

The structure is freestanding. It does not span the whole width, but has two pairs of standards with bracing down the middle of the underpass. A pile of ballast on the side will probably be attached at the base for support later.

Larger modular scaffolding companies (Layher, Haki, Safway) often also have a series of components for staging and temporary constructions for non-maintenance uses that are compatible with their normal systems.

ref. no:

031

location:
Rådhusplassen

scale of repair / work:
street

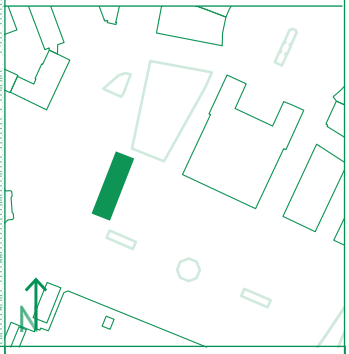
primary function:
access, substitution

additional features:
viewing

estimated lifespan:
1 weekend

main structure in use?
yes

recorded:
2021/09



[situation photo]

[map 1:5000]

An sculpture-in-progress displayed at Vigelandmuseet has a jig on which a sculpting tool has been attached.

The jig is made of metal poles attached with tube couplers, and screwed into the base of the sculpture and at marked points. Although the component dimensions are not the same as typical scaffolding, the assembly method is the same.

Scaffolding to buildings, and jigs to objects, are similar in the way they both support a function with the intention of it being removed on completion.

ref. no:

032

location:
Vigelandmuseet

scale of repair / work:
sculpture

primary function:
measuring, precision?

additional features:
N/A

estimated lifespan:
??

main structure in use?
N/A

recorded:
2021/09

[situation photo]

[no map]

Access scaffolding to the rear forms a volume around a new-build on an infill site.

A new 7-storey residential building is built over a former carpark. The superstructure is completed, and scaffolding wraps around the rear. Standards on the west side steps over the boundary wall and into the adjacent site.

The lift is on the street side and the stairs are positioned in the courtyard.

The scaffolding around this building and courtyard is used as an example for a volume / inventory study and test site in the chapter lifespan value (temporariness).

ref. no:

033

location:
Grønlandsleiret 16

scale of repair / work:
whole infill

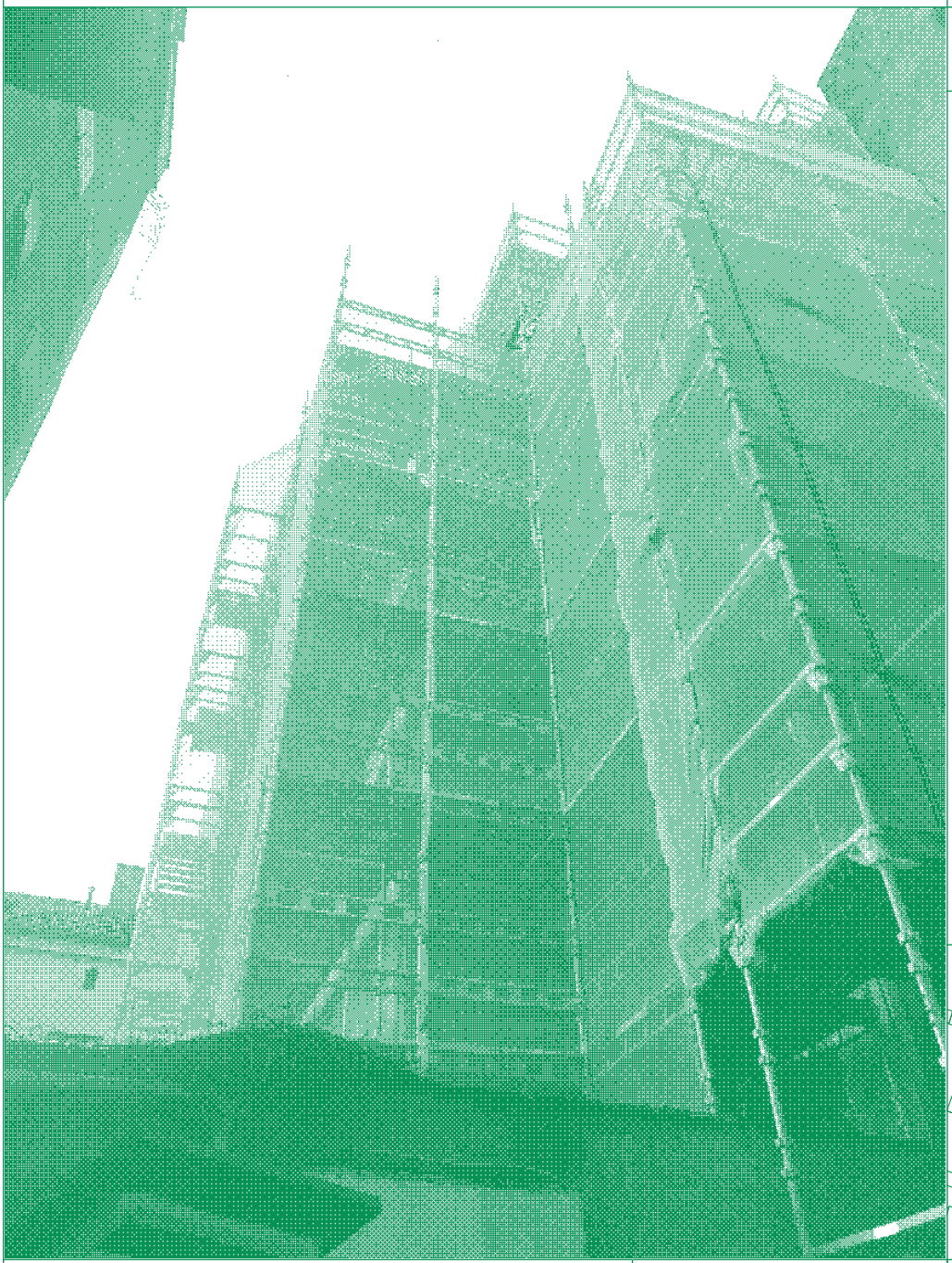
primary function:
access

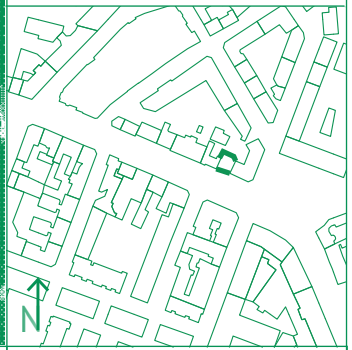
additional features:
mesh, lift, storage

estimated lifespan:
??

main structure in use?
N/A

recorded:
2021/09





[situation photo]

[map 1:5000]

An infill residential development with is under construction, partly new-build, partly reusing existing structures.

A modular scaffolding system is used, and an opening on the street face lets trucks into the building site. On one end a lift component is installed - the lift controls on each floor have their footprint extended with a pole and coupler system (for safety?).

The existing structures are not enclosed, and the scaffolding forms a volume that suggests at the scale of the final building.

ref. no:

034

location:
Akersveien 18-20

scale of repair / work:
new infill + ext bldg

primary function:
access, protection

additional features:
tarp, lift

estimated lifespan:
??

main structure in use?
no

recorded:
2021/09

[situation photo]

[map 1:5000]

Two holes are cut into on an otherwise enclosed cube-shaped scaffold.

An open deck extends out of the tarp, possible for storage and unloading of materials. Peeking through the holes and first floor opening it is possible to see through the scaffolding structure, suggesting it is a birdcage scaffold for a project with significant new elements.

ref. no:

035

location:
Blåsbortveien (E)

scale of repair / work:
footprint

primary function:
access, protection

additional features:
tarp,

estimated lifespan:
??

main structure in use?
no

recorded:
2021/10

[situation photo]

[map 1:5000]

Scaffolding encloses the south elevation (rear) of St Hallvards kirke in Enerhaugen.

The standards have footings with adjusted heights to suit the sloping, unpaved ground. The access stair had hoarding around for security but is unusually also enclosed in tarp, an opaque white colour and reflective against the afternoon sun.

Enerhaugen is on a hill, and the building has a view over east Oslo. The leaves have fallen and the printed name of the company is placed so it is highly visible even from the main street below.

ref. no:

036

location:
St Hallvards kirke

scale of repair / work:
1 elevation + roof?

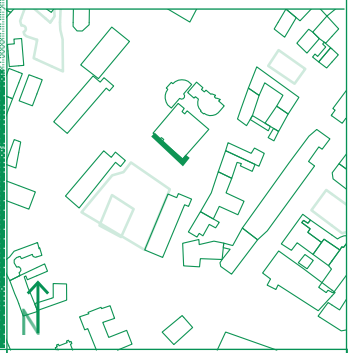
primary function:
protection, access

additional features:
tarp, hoarding, ads

estimated lifespan:
??

main structure in use?
yes

recorded:
2021/10



[situation photo]

[map 1:5000]

Scaffolding is built over the street-facing elevations of the office block at Møllergata.

The stairs are placed on the corner. Although the structure covers two elevations, there are only two levels of access platforms near the top of the structure. The street remains accessible.

A small circular sign is suspended in the structure for with the company name.

ref. no:

037

location:
Møllergata 4

scale of repair / work:
upper floors / roof

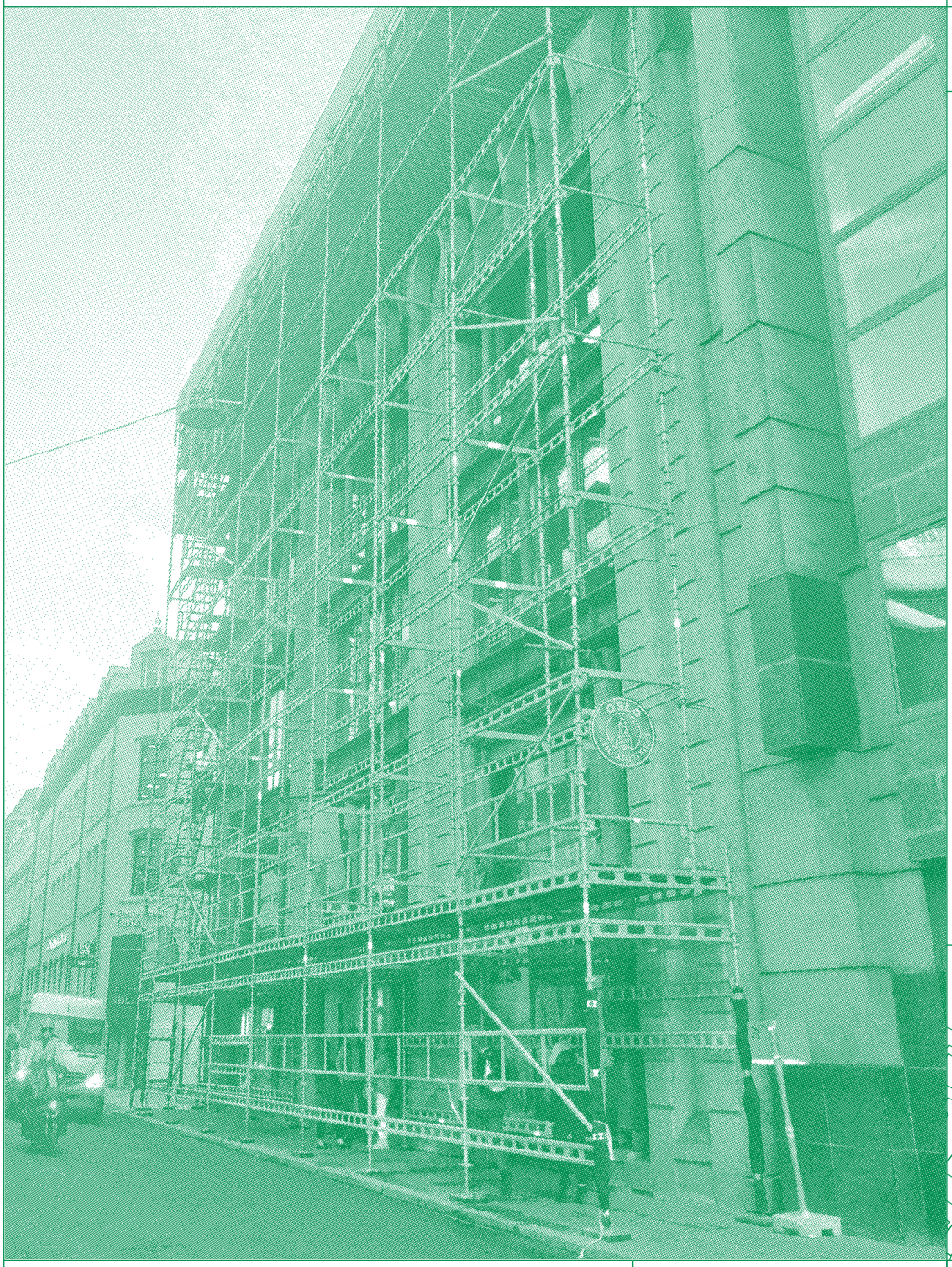
primary function:
access

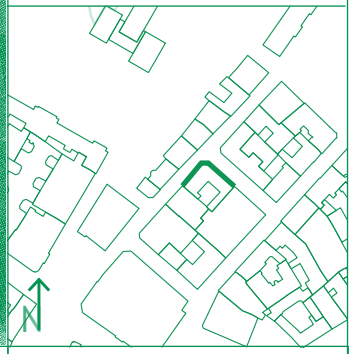
additional features:
signage, open street

estimated lifespan:
??

main structure in use?
yes

recorded:
2021/11





[situation photo]

[map 1:5000]

Scaffolding encloses a portion of the sidewalk and cycling path on the sreeet level of Oslo Kongressenter.

The scaffolding is wider than it is tall but is anchored to the main building. It is open at the top and seems to have an elevated level inside.

All surfaces of the hoarding is covered with various posters.

ref. no:

038

location:
Oslo Kongressenter

scale of repair / work:
portion of facade

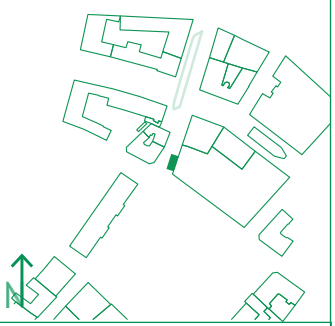
primary function:
storage?

additional features:
hoarding

estimated lifespan:
??

main structure in use?
yes

recorded:
2021/11



[situation photo]

[map 1:5000]

The sea-facing facades of the 8-sided Basilica de Santa Maria della Salute and base of the dome is covered in scaffolding.

Visible from the entrance of the Grand Canal, the church is an iconic landmark of Venice. Printed elevations are hung on the scaffolding to give an indication of how it is supposed to look. However, most of the front entrance elevation has been replaced with a huge ad. Lighting has also been installed over the ad to maintain visibility throughout the day.

Good thing views of the church from the canal have appeared in famous paintings by Turner and Canaletto...

ref. no:

100

location:
Venice

scale of repair / work:
whole building

primary function:
protection, ads, symbol

additional features:
lighting, lift

estimated lifespan:
??

main structure in use?
no

recorded:
2021, Erik Langdalen

[situation photo]

A huge billboard is mounted on scaffolding over the facade of Chiesa di San Moisè in Venice.

An elevation drawing printed onto the tarp that covers the facade can be seen at the top of the scaffold. The highly visible position of the facade at the end of the street is reappropriated for advertising, and even has spotights.

As it happens, the church was criticised by Ruskin in Stones of Venice for its 'manifestation of insolent atheism' - referring to the lack of Christian symbols but abundance of ornaments and sculptures celebrating the patron family who built it.

ref. no:

101

location:
Venice

scale of repair / work:
facade

primary function:
protection, ads

additional features:
lighting

estimated lifespan:
??

main structure in use?
yes

recorded:
2021, Erik Langdalen

[situation photo]

A trompe l'oeil graphic extends across the facade of this building in Italy.

There are two defined layers - the main image 3-storeys high, cut irregularly to look like a fissure in the facade. A 1-storey layer with the same print forms a passage , possibly to another entrance or to the scaffold stairs situated on the end of the building.

An opening in one of the graphic arches is for the entrance to the actual building.

ref. no:

102

location:
Italy

scale of repair / work:
facade + interior?

primary function:
protection?

additional features:
graphic

estimated lifespan:
??

main structure in use?
N/A

recorded:
2021, Erik Langdalen

[situation photo]

The picture below shows ‘baugespann’ on an empty plot in Switzerland.

Baugespann is a step in Swiss planning policy where the extents of a proposal is indicated using slim poles on the actual site.

The intention is to make more clear the impact of a development on its surroundings. The structures are freestanding, with additional components where neccessary when building heights are high. Angles on the tops of the poles indicate the roof and slope. Apparently, these silhouettes stay on site until the project is approved for build.

ref. no:

103

location:
Switzerland

scale of repair / work:
structure footprint

primary function:
representation

additional features:

estimated lifespan:
length of planning

main structure in use?
N/A

recorded:
201x, sivag-luzern

[situation photo]

Scaffolding for bracing spans the width of a demolished terraced building while the site is being redeveloped.

The party walls on either side have been covered with waterproofing and braced with a frame. The scaffolding is not self-supporting, but instead imitates the compression forces of the adjacent buildings.

ref. no:

104

location:
London

scale of repair / work:
whole site

primary function:
structural

additional features:
tarp, boarding

estimated lifespan:
??

main structure in use?
N/A

recorded:
2015

[situation photo]

A bamboo theatre under construction in a sports pitch in Hong Kong.

Bamboo theatres for Cantonese opera pop up all over the city during the summer in open spaces, a tradition tied to the Hungry Ghost Festival. Bamboo is used to form the structure and the stage, and enclosed with sheet metal and textiles. The components can be seen laid out on the ground.

Craftsmen who build bamboo theatres have the skills for scaffolding, but scaffolders don't neccessarily have the skills to build a bamboo theatre. They are not built from drawings or manuals, by a master foreman who gives instructions on site.

ref. no:

105

location:
Hong Kong

scale of repair / work:
Playing field

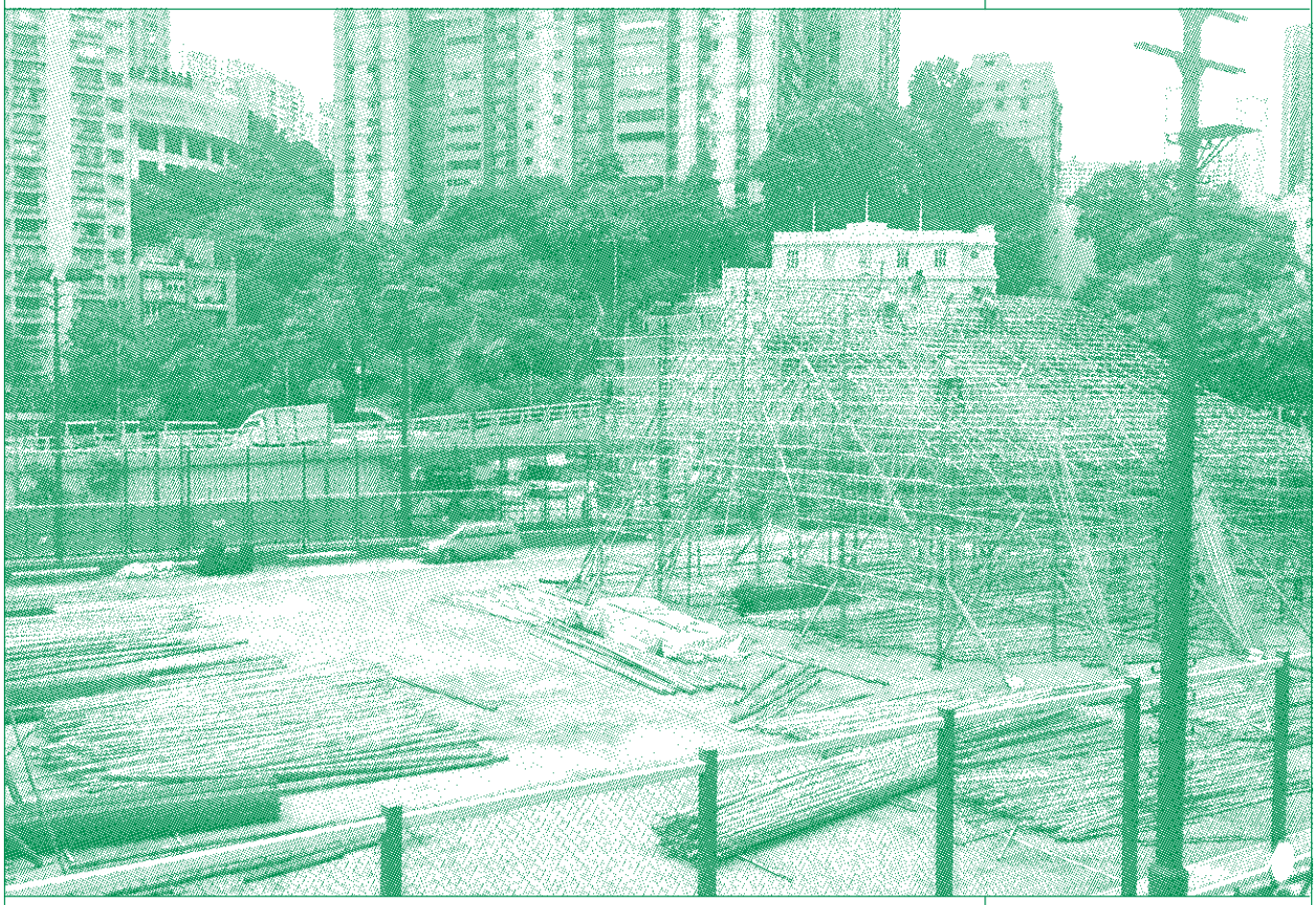
primary function:
theatre

additional features:
waterproofing, decoration

estimated lifespan:
2-3 weeks

main structure in use?
N/A

recorded:
2015



[situation photo]

Access scaffolding encloses one of the turrets at Berliner Dom.

Access stairs and a lift stands at ground level along the side of the building, before wrapping around the turret in 7 levels of platforms, which peeks out over the top of the scaffold.

A 12m tall advertisment hangs from the stairs. A comparatively smaller 2m tall sign for the company hangs above it.

ref. no:

108

location:
Berlin

scale of repair / work:
whole building

primary function:
access

additional features:
lift, mesh, signage

estimated lifespan:
??

main structure in use?
yes

recorded:
2021/11

[situation photo]

Access scaffolding around the 63m high tower of Auenkirche in Berlin.

19 levels of platforms from the church roof wrap around the tower, tapering at levels 13 and 16. A crane is parked in the church's front yard, which is set back from the street.

With the tower already being one of the tallest structures in the area with several parks in the vicinity, views from the top must be fantastic.

Compare with 200 - the similar form and intention of the scaffolding around Notre-Dame's spire, taken nearly 170 years ago.

ref. no:

109

location:
Berlin

scale of repair / work:
tower exterior

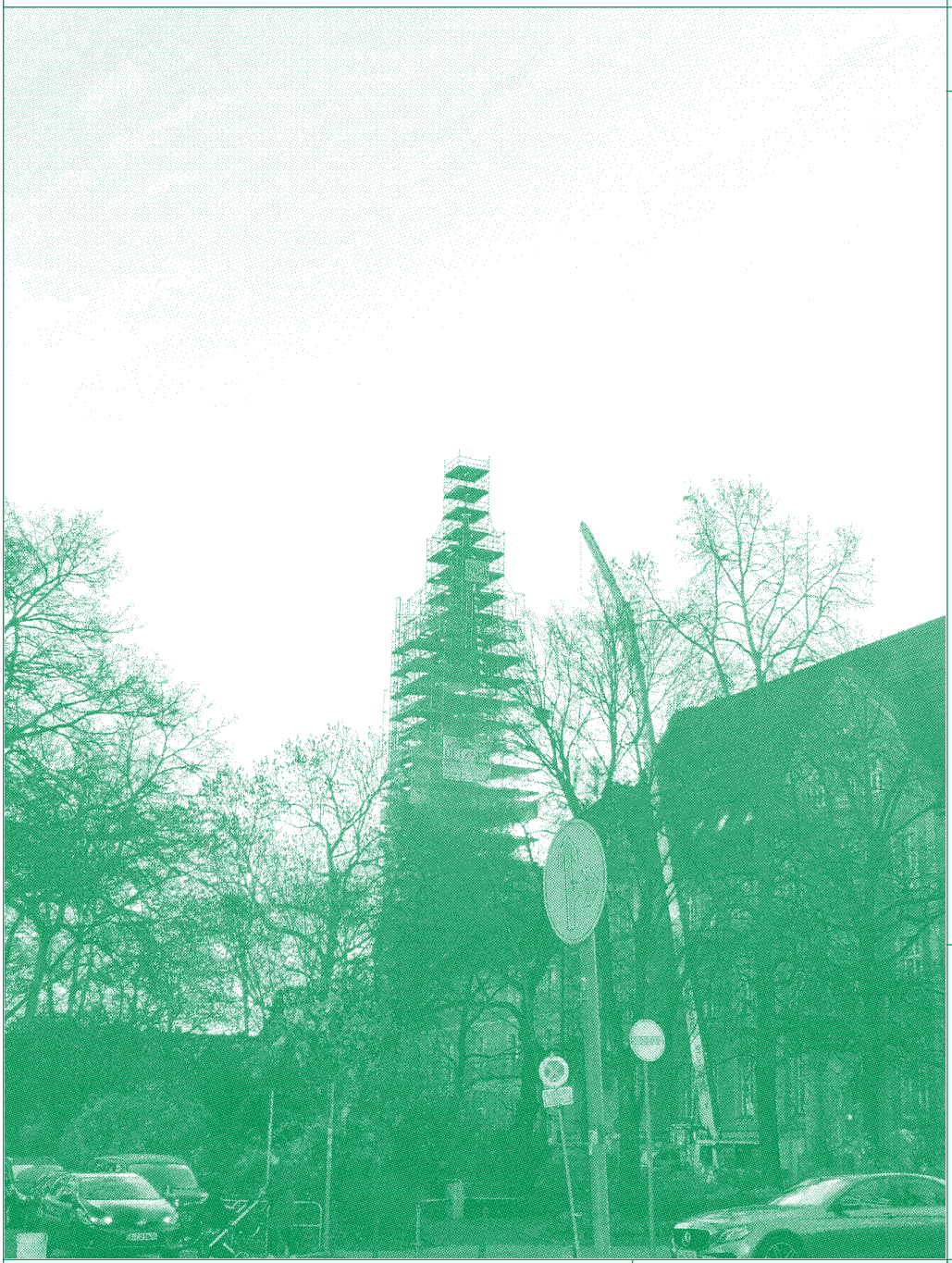
primary function:
access

additional features:
crane

estimated lifespan:
??

main structure in use?
no

recorded:
2021/11



[situation photo]

Birdcage scaffolding runs along the centre of the train platforms at Hauptbahnhof, Berlin.

Standards are grouped in bunches of 4, with cross-bracing between transoms and overhead trusses. Where there are platform exits, the structure has a span of apx. 3m, with shorter poles laid crossways joining trusses overhead.

The scale of the scaffolding is such that looking down the length of the structure, it looks endless, getting denser until the other end is no longer visible.

ref. no:

110

location:
Berlin

scale of repair / work:
station platform

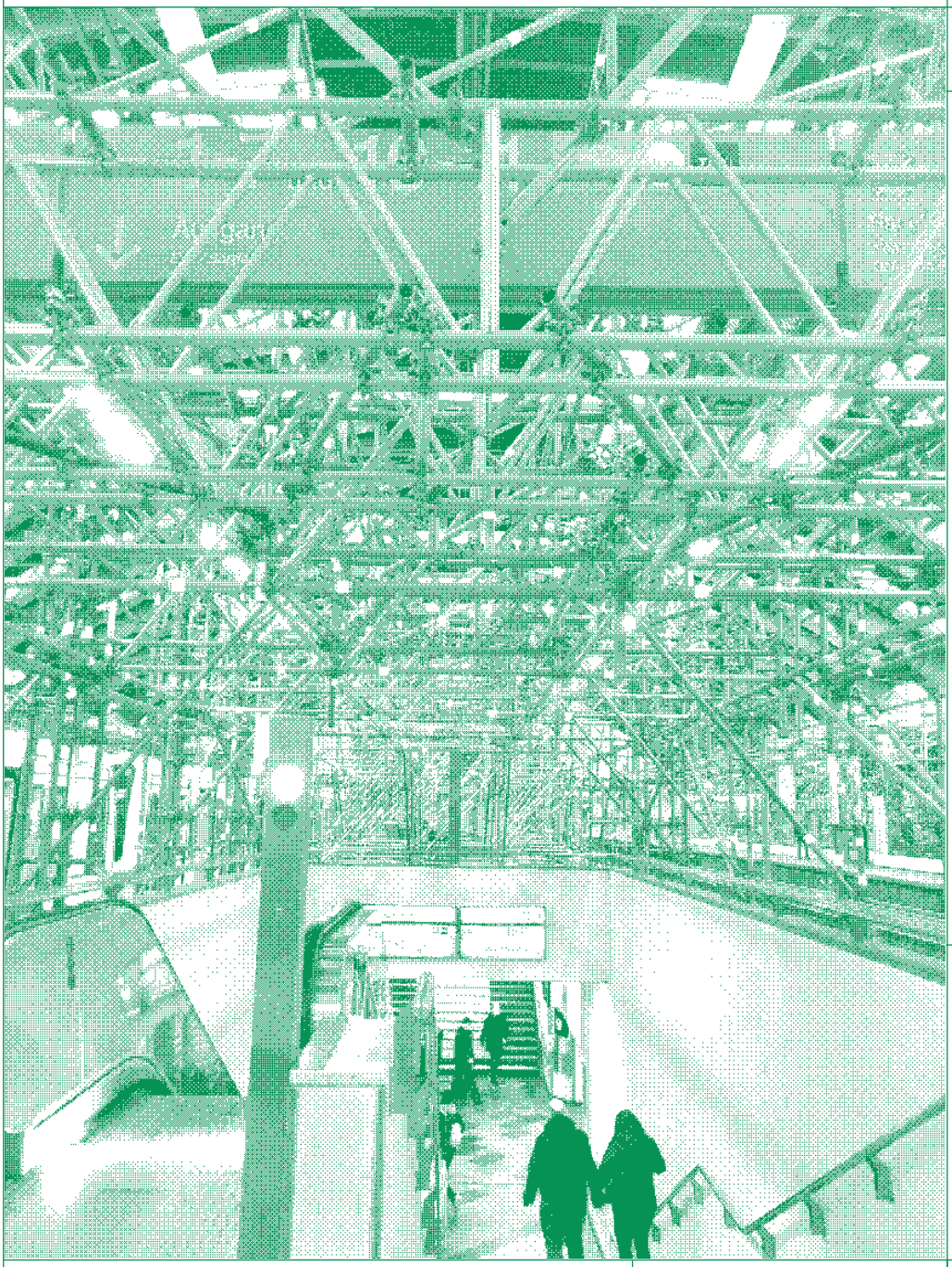
primary function:
structural

additional features:

estimated lifespan:
??

main structure in use?
yes

recorded:
2021/11



[situation photo]

A graphic imitating the facade and roof extension on a project in Kreuzberg, Berlin.

Hanging over the central volume of the building, the graphic has a perspective as seen from street level, hung over the existing third floor.

ref. no:

111

location:
Berlin

scale of repair / work:
whole building

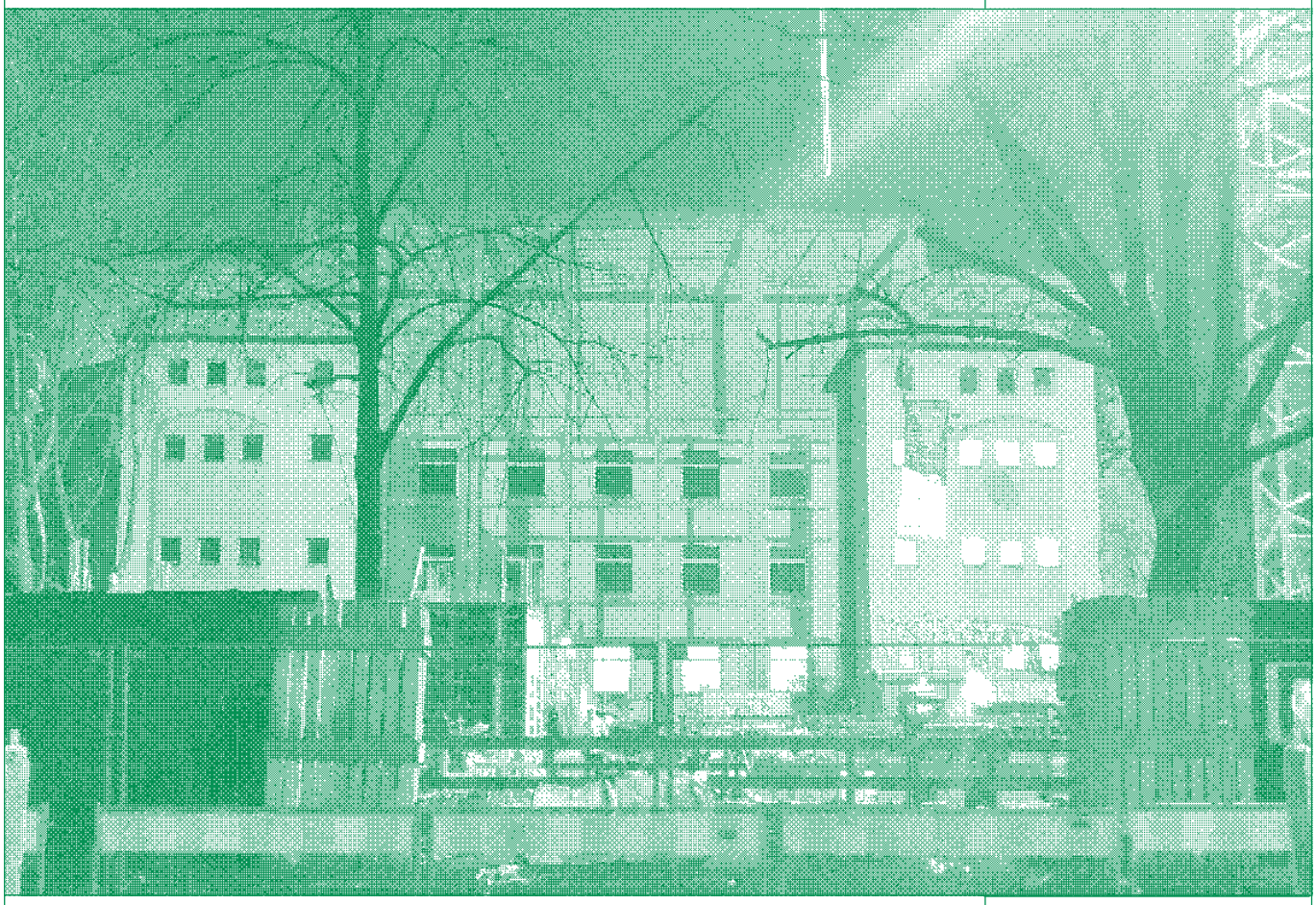
primary function:
protection

additional features:
facade graphic

estimated lifespan:
??

main structure in use?
no

recorded:
2021/11



[situation photo]

A wide-holed mesh encloses the facade over the second floor across this and the adjacent building at Auguststrasse, Berlin.

The building's facade is in poor condition and is crumbling away in some places. The edges of each sheet of mesh is sewed up / attached to each other. The mesh laps around the top of the entrance, fixed to hooks on each corner but avoiding the most intricate ornamentation over the entrance.

A shiny security camera is fixed to the end of the facade but installed over the mesh, suggesting a recent addition.

ref. no:

112

location:
Berlin

scale of repair / work:
whole building

primary function:
protection

additional features:
tarp

estimated lifespan:
??

main structure in use?
no

recorded:
2021/11

[situation photo]

Scaffolding around a new extension to a shopping mall in East Berlin.

Over one elevation the standing trusses have been painted in alternating colours.

ref. no:

113

location:
Berlin

scale of repair / work:
whole building

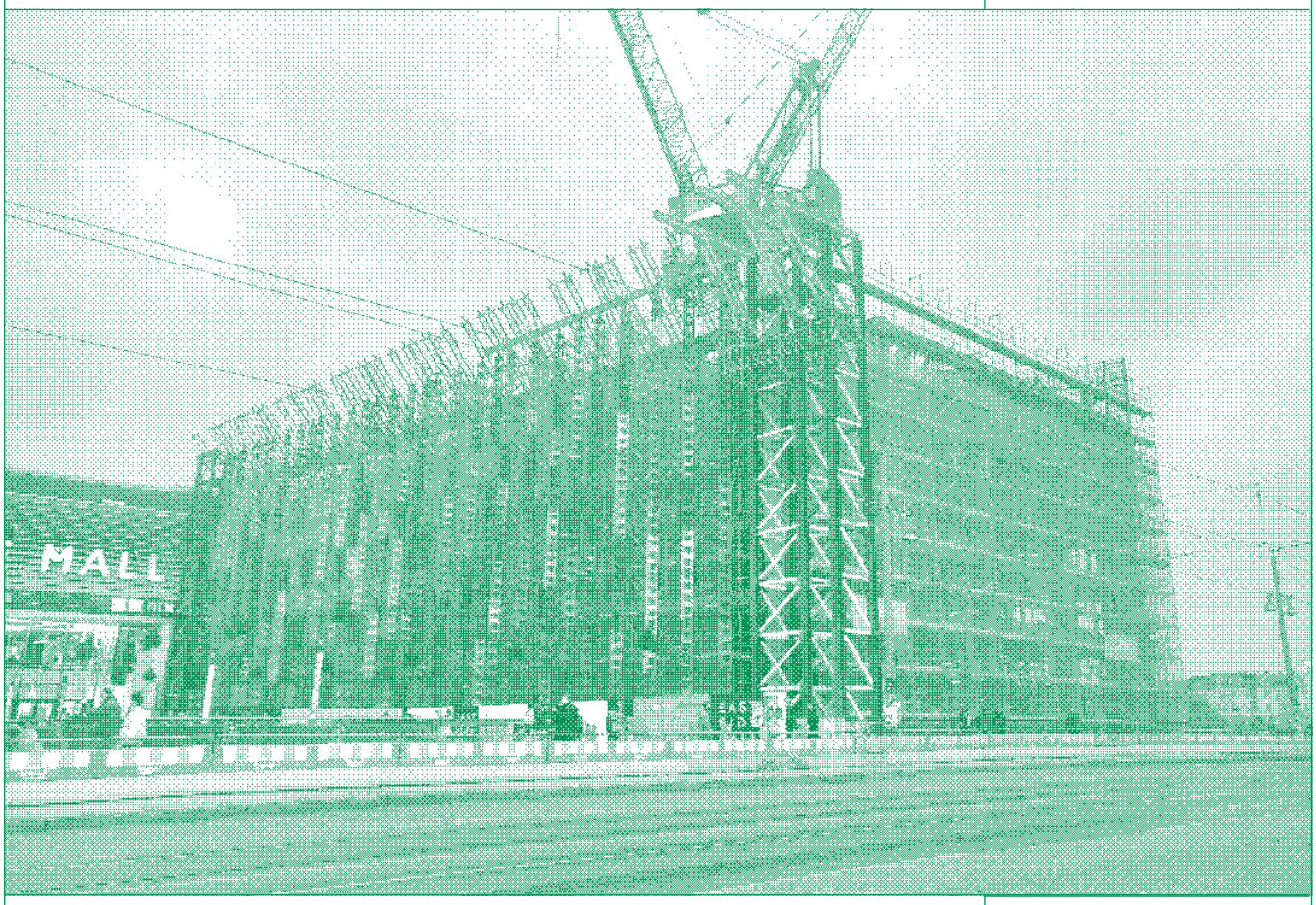
primary function:
protection

additional features:
mesh, crane

estimated lifespan:
??

main structure in use?
no

recorded:
2021/11



[situation photo]

Scaffolding to facilitate the construction of the second generation spire of Notre Dame, designed by Viollet-le-Duc.

The scaffolding is of timber construction, and looks to be resting on timber beams laid over the roof. The ladder at the top of the spire are simply lengths strapped to a cross beam.

The spire was destroyed in the 2019 fire, and in the aftermath structural, protective, and preventative scaffolding was built while a decision was being made on Notre Dame's future. As of April 2021, it is to be rebuilt to Viollet-le-Duc's design.

ref. no:

200

location:
Paris

scale of repair / work:
whole building

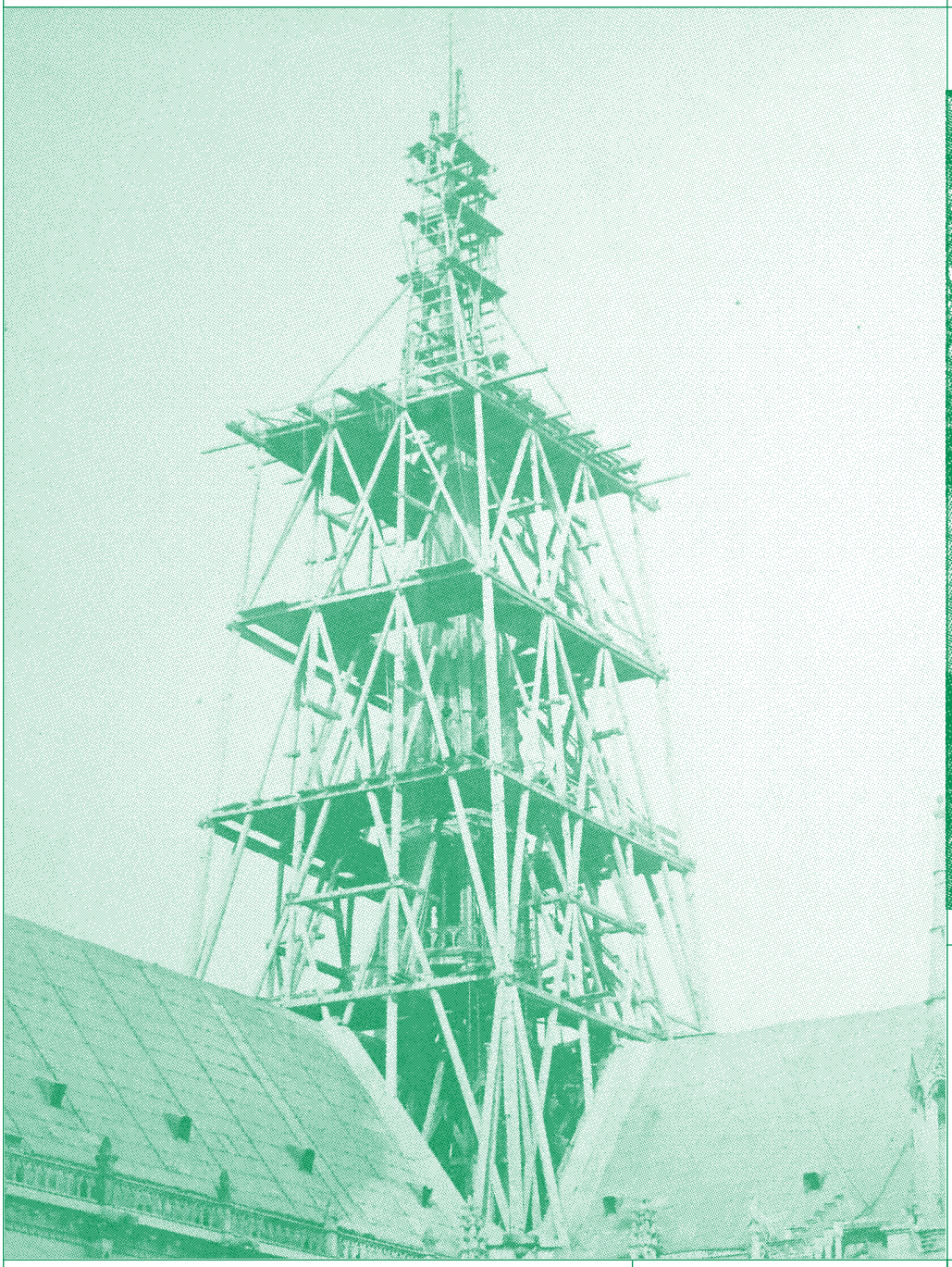
primary function:
access

additional features:

estimated lifespan:
??

main structure in use?
yes

recorded:
c.1853, wikicommons



[situation photo]

[scaffolding 2021]

Timber scaffolding over the facade of an infill building on Karl Johans gate.

Before standardisation of scaffolding was adopted, timber was also an option for construction material. This structure seems to be using two sizes of timber - a squarer one for verticals and putlogs, and a plank-shaped for platforms and guardrails.

At street level there is hoarding that fans out at the top to catch debris, given the proximity of the works to the street.

ref. no:

201

location:
Karl Johans gate

scale of repair / work:
whole building

primary function:
support, access

additional features:
overhang

estimated lifespan:
??

main structure in use?
??

recorded:
1896

[situation photo]

Putlog holes around the entrance of the Torri dei Barbadori.

Putlogs are support components for support structures - basically short poles that are stuck into and cantilevered from the structure to build scaffolding that is supported by the main wall. Putlog holes are found all over Europe and traced back to the Romans.

The complementary image is of Maison du Faucon in Brussels, showing how the putlog holes have been incorporated as a facade ornament.

ref. no:

202

location:
Florence

scale of repair / work:
whole building

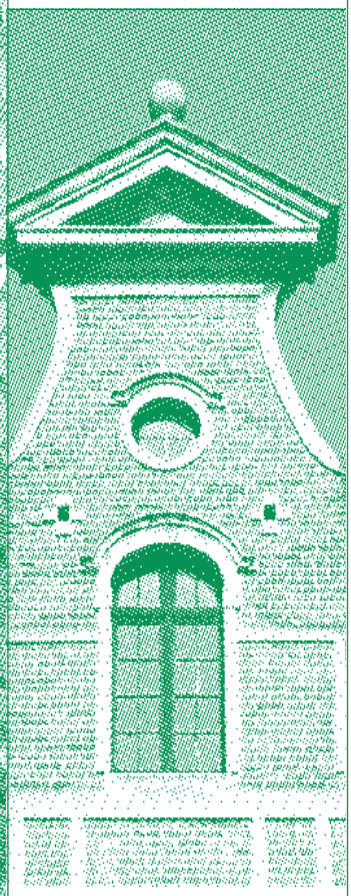
primary function:
support

additional features:
ornamental

estimated lifespan:
same as building

main structure in use?
yes

recorded:
2007, wikicommons



[ornamental put logs]

[situation photo]

The facade of Buckingham Palace is enclosed in timber scaffolding for renovation.

Industrialisation made standardisation at a large scale possible. In 1911 D.P Jones, filed a patent for ‘connecting together scaffolding poles‘ - a joining component made of a metal component and chains instead of ropes. Notably it was used in the scaffolding around Buckingham Palace in 1913.

D.P Jones filed subsequent patents that improved on his design - the 1926 version has no chains and is basically the universal coupler used in many scaffolding systems today.

ref. no:

203

location:
London

scale of repair / work:
whole building

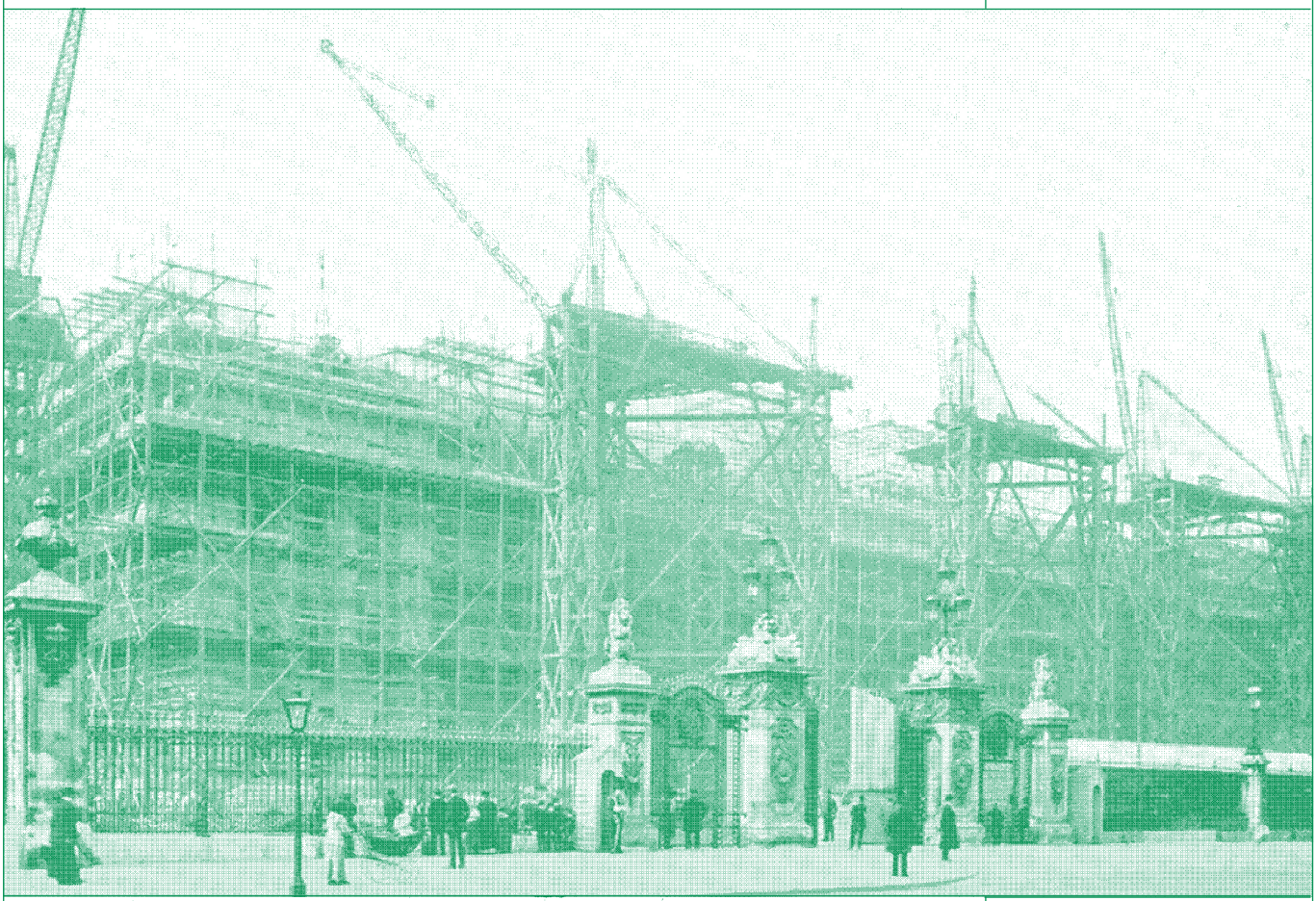
primary function:
structural

additional features:
early coupler

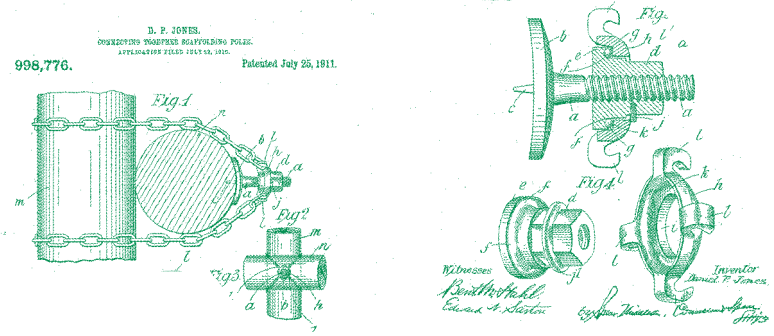
estimated lifespan:
??

main structure in use?
??

recorded:
1913, wikicommons



[situation photo]



[1911 patent drawings]

Structural scaffolding constructed for the raising and placement of a stone block in preparation for Vigelands to sculpt it into Monolitten / The Monolith.

ref. no:

204

location:
Frognerparken

scale of repair / work:
whole building

primary function:
structural

additional features:
ropes

estimated lifespan:
??

main structure in use?
N/A

recorded:
1928

[situation photo]

Scaffolding to facilitate the construction of Rådhuset.

Even before completion the form of Rådhuset is clear. The scaffolding is with timber poles (TBC) and some kind of pulley / lift apparatus is installed. Access between levels is with multi-storey ladders in thickness of the scaffolding.

There is a timeless-ness to the photograph, maybe because the building mass is akin to a skyscraper in the neighbourhood, reminiscent of the cranes used to symbolise the optimism post-war reconstruction.

See 205 for a historic images of Høyblokken, similarly evocative.

ref. no:

205

location:
Rådhuset

scale of repair / work:
whole building

primary function:
access, support

additional features:
symbol

estimated lifespan:
??

main structure in use?
N/A

recorded:
1938, digitaltmuseum

[situation photo]

Scaffolding facilitates the construction of Høyblokken.

Towering over the landscape, the silhouette is clearly defined. Metal poles are used.

See 204 for a historic image of Rådhuset, similarly evocative.

ref. no:

206

location:
Regjeringskvartalet

scale of repair / work:
whole building

primary function:
support, access

additional features:
crane, symbol

estimated lifespan:
??

main structure in use?
N/A

recorded:
1957, digitaltmuseum

[situation photo]

Birdcage scaffold in a new tunnel built for the eastern end of lines 1 and 2 of Oslo's metro system.

ref. no:

207

location:
Furuset

scale of repair / work:
metro line

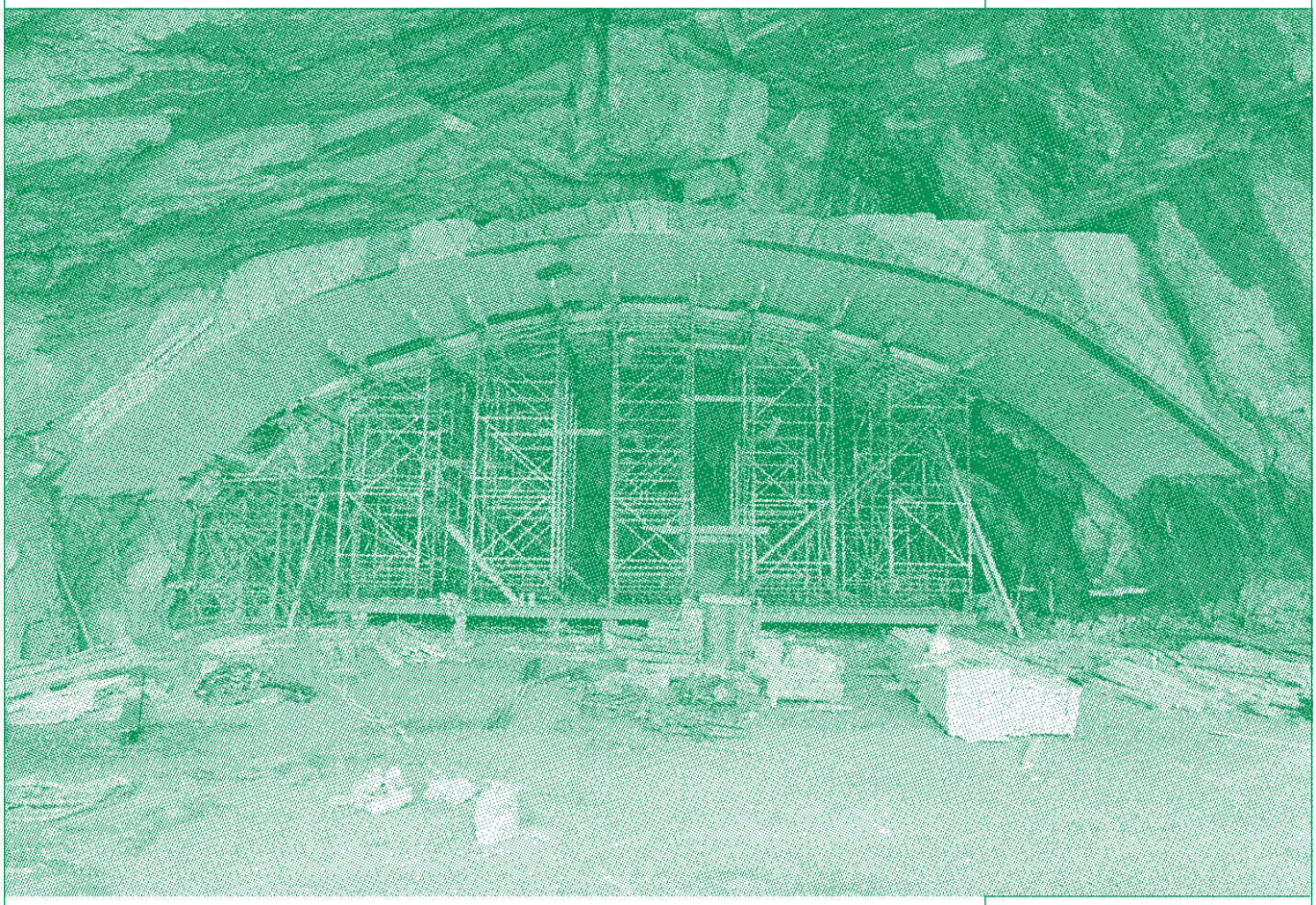
primary function:
structural, access

additional features:

estimated lifespan:
??

main structure in use?
N/A

recorded:
1975, digitaltmuseum



[situation photo]

REPAIR AS VALUE

From March 2021, REPAIROLOGY will be released on a weekly basis for 8 weeks during the duration of the pre-diploma. Each issue will focus on a topic from - or related to - repair.

It is hoped that by tracking, recording, and collating where repair pops up in and around architectural discourse, existing principles can begin to be pulled together and synthesised in a new way to form part of a more anticipatory approach to architecture.

WHAT GETS REPAIRED?

The idea of repair floats somewhere on the periphery of the field of architecture. Outside of architecture, repair manifests in different ways. In construction it appears as 'snagging', usually a checklist of unresolved issues produced in a visual survey in the last part of the building contract before occupation. In post-occupation it is quick fixes by inhabitants, or more complex fixes by technicians / craftsmen. In the case of infrastructure, cyclical maintenance is required to enable safe, continued use.

In architectural preservation, it is a method of restoration, which has physical (how can we reuse what is already there?) and / or ideological (what state do we return it to?) considerations that generally require an assessment of what has value, which consists of - but is not limited to - artistic, historic, cultural, and contextual values.

In this issue, I have chosen three frameworks that assess value at different scales and how they explicitly / implicitly suggest approaches to repair:

» General: Alois Riegl's 'Cult of Monuments', which introduced the idea that the value of a monument is not inherent, but subjective. As a method of restoration, repair can accentuate or detract depending on which values are important.
» General principles: ICOMOS' Venice Charter, a set of principles which discouraged reconstruction and encouraged repairs to be clearly distinct from the object / monument. Its generalised approach to all historic monuments has been acknowledged as problematic by ICOMOS in subsequent years.
» Case-by-case: Historic England, who maintain the national register of listed buildings and the protection of built heritage. Value assessment and methods of repair are specific to building types and elements.

REPAIR (EN) / REPARERE (NO) / 修理 sau1lei5 (ZH)

1. ETYMOLOGIES

- REPAIR and REPARERE have origins in Latin REPARO. In English the word travelled through Middle English, Middle French from Latin.
- The Latin REPARO is composed of RE-, backwards / again, and PARO, to prepare / provide. REPARO also meant obtaining something through exchange. REPAIR does not have this direct meaning, but the ACT OF REPAIR usually requires exchanging / replacement of something.
- 修理 sau1lei5 means REPAIR. Individually, 修 sau1, a verb that means repair, and 理 lei5, a verb meaning to manage / take note. But 理 lei5 can also used as a noun modifier relating to systems of reason / logic (eg. physics - 物理 mat6lei5, psychology - 心理 sam1lei5). Through association 修理 sau1lei5 could be wordplay analogous to 'REPAIR-OLOGY'.

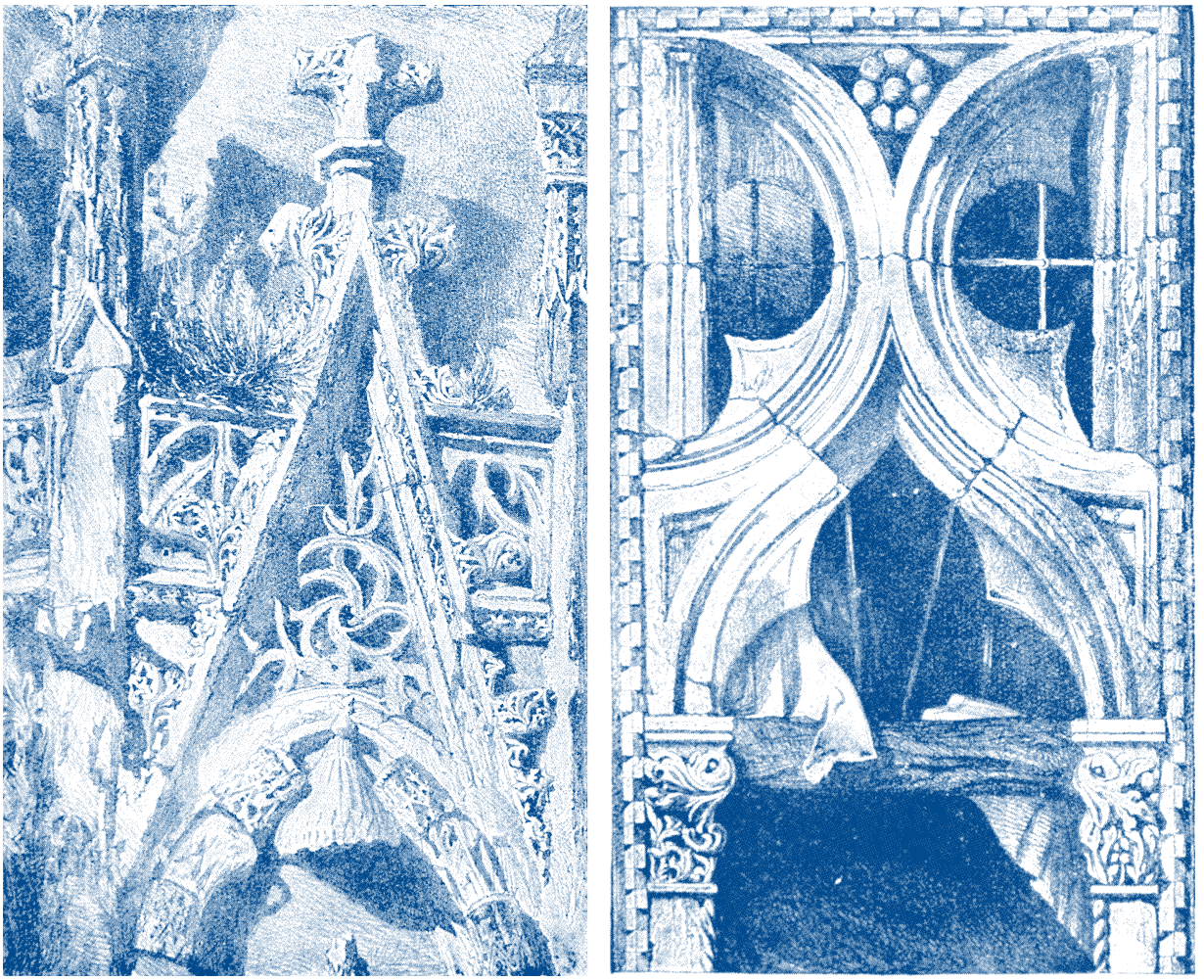
2. USAGE

- Generally speaking, REPAIR is used when done directly on the object, and implies reversing it to a previous state.
- Objects and concepts at all scales - clothes, computers, relationships and monuments - can be REPAIRED. Irreversible situations that are harder to intervene in - an injury, damage to natural landscapes - are not REPAIRED but MENDED / RENEWED. (?)
- Degree of intervention. 修理 sau1lei5 is one of a few words for REPAIR. 修復 sau1fuk6 suggests HEAVY REPAIR, 補 bou2 and 整好 zing2hou2 in contrast, suggests LIGHT REPAIR.

3. ATTITUDES IN ARCHITECTURE

- 19th century, Viollet-le-Duc's approach to restoring French monuments - compare with Ruskin, who valued ruins. (REPAIR to restore it to ideal)
- 19th - 20th century, modernism's emphasis on breaking with the past. (no value in REPAIR)
- 1968 - 1972, Whole Earth Catalog compiled by Stewart Brand, as a reference to explaining how to find out how things worked. (REPAIR as part of DIY movement)
- 21st century, adaptive reuse of buildings (REPAIR to enhance value)

Exercise 0: Tracing etymologies of repair, its usage, appearances in architectural discourse.



Plates 2 (left) and 8 (right) from John Ruskin's *7 Lamps of Architecture* [3]. The drawings are studies of building elements in a state of decay and even the small plants growing over the detailing have been drawn in. Ruskin notably used photographs in making these drawings and called them 'precious historical documents'.

THEORIES OF REPAIR

THE MODERN CULT OF MONUMENTS

In the history of architectural preservation, Alois Riegl's 'The Modern Cult of Monuments: Its Character and Origin'[1] introduces the idea of value not as something inherent, but dependent on the relationship between object and observer. He begins by defining the monument as '*a work of man erected for the specific purpose of keeping particular human deeds of destinies alive and present in the consciousness of future generations*', and notes the maintenance of these '*deliberate*' monuments.

[1] Riegl, Alois. "The Modern Cult of Monuments: Its Essence and Its Development." (1903). Original text in German.

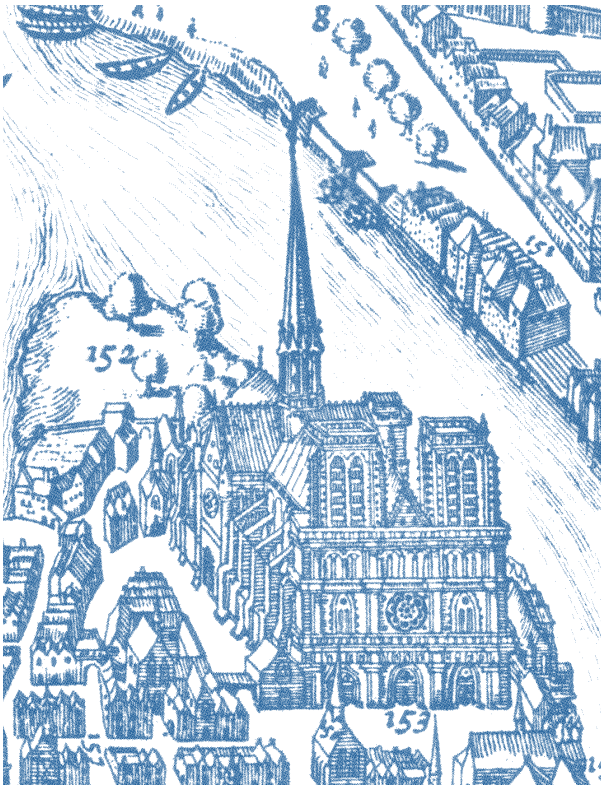
At the time of writing, he had been appointed to the Austrian monuments commission, and the essay was written as an introduction to a draft preservation law.[2] Riegl '*understood art history as the history of perception*', and tried to apply ideas of relative value to monuments, which in turn meant that everything could potentially be have value beyond the objectivity of art history that was accepted at the time. Through the use of anecdotes and questions, he discusses and organises types of values, defining attributes to give parameters of assessing that specific value in a monument.

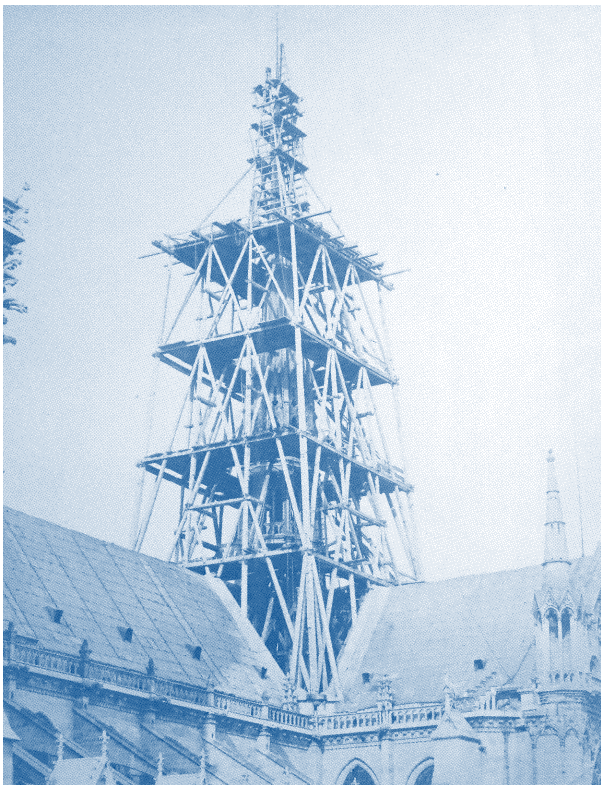
[2] Lamprakos, Michele. "Riegl's 'Modern Cult of Monuments' and the Problem of Value." (2014).

In Riegl's framework, values are subjective, the type of restoration is dependent on the values that are most important. Therefore repair is not always necessary - for example, age and historic value is increased with visible decay over time (Riegl uses St. Peter's Cathedral as an example), yet aesthetic value might justify demolishing and replacing an element that matches its overall style to achieve stylistic unity (Altmünster parish church's decision to replace its Baroque choir with a Gothic one).

[3] Ruskin, John. "The Seven Lamps of Architecture." (1849). Available online at https://archive.org/details/1920sevenlampsof00ruskuoft/page/xviii/mode/2up

Furthermore, because values are subjective, they can come in conflict





Map from 1618 showing Paris' Notre-Dame with its spire, built in the 1200s and removed in the 1790s due to damage. In 1844 Jean-Baptiste Lassus and Eugène Viollet-le-Duc won a competition for the restoration of Notre-Dame, proposing to rebuild the spire in a different design. That spire was destroyed in the 2019 fire. A competition for the restoration was announced shortly after[4] - intended to determine the nature of the restoration as well as whether the spire should be reconstructed or redesigned[5] - or rebuilt at all.

with each other, and so the method of repair is not always entirely clear. Should the repairs be focused on restoring an object to an original state, or should it focus on creating stylistic unity / meeting an unrealised ideal?

> *If, for example, a Gothic town hall were to lose the crown of its baldachin in a highly visible place, the proponents of age value would certainly prefer to allow the trace of age to remain undisturbed. Today, however, it does not cause any real controversy when, in the name of decorum, the adherents of newness value advocate the restoration of the crown to its (indisputably verified) original form....This controversy concerns monuments that have not been entirely preserved in their original form, but have, through the course of time, been subjected to various stylistic additions through the hand of man.*[3]

The expansion of value as a subjective quality implied that value was not inherent in the object, and that the modifications - some of which may have been done as repair - also added to the perceived values of an object.

[4] Fulcher, Merlin. "Notre-Dame: France announces international competition to rebuild spire." (2019). Available online at https://www.architectsjournal.co.uk/news/notre-dame-france-announces-international-competition-to-rebuild-spire

[5] Among the preliminary proposals for the redesign, Foster + Partners have proposed to use glass and steel...as they have done with the Reichstag in Berlin, the British Museum in London, the Hearst Tower in New York... is restoring buildings with glass / steel some kind of one-size-fits-all approach (for metropolises)?

Conseil International des Monuments et des Sites ICOMOS International Council on Monuments and Sites

INTERNATIONAL CHARTER FOR THE CONSERVATION AND RESTORATION OF MONUMENTS AND SITES (THE VENICE CHARTER 1964)

IInd International Congress of Architects and Technicians of Historic Monuments, Venice, 1964.

Adopted by ICOMOS in 1965.

Imbued with a message from the past, the historic monuments of generations of people remain to the present day as living witnesses of their age-old traditions. People are becoming more and more conscious of the unity of human values and regard ancient monuments as a common heritage. The common responsibility to safeguard them for future generations is recognized. It is our duty to hand them on in the full richness of their authenticity.

It is essential that the principles guiding the preservation and restoration of ancient buildings should be agreed and be laid down on an international basis, with each country being responsible for applying the plan within the framework of its own culture and traditions.

By defining these basic principles for the first time, the Athens Charter of 1931 contributed towards the development of an extensive international movement which has assumed concrete form in national documents, in the work of ICOM and UNESCO and in the establishment by the latter of the International Centre for the Study of the Preservation and the Restoration of Cultural Property. Increasing awareness and critical study have been brought to bear on problems which have continually become more complex and varied; now the time has come to examine the Charter afresh in order to make a thorough study of the principles involved and to enlarge its scope in a new document.

Accordingly, the IInd International Congress of Architects and Technicians of Historic Monuments, which met in Venice from May 25th to 31st 1964, approved the following text:

DEFINITIONS

Article 1.

The concept of a historic monument embraces not only the single architectural work but also the urban or rural setting in which is found the evidence of a particular civilization, a significant development or a historic event. This applies not only to great works of art but also to more modest works of the past which have acquired cultural significance with the passing of time.

Article 2.

The conservation and restoration of monuments must have recourse to all the sciences and techniques which can contribute to the study and safeguarding of the architectural heritage.

Article 3.

The intention in conserving and restoring monuments is to safeguard them no less as works of art than as historical evidence.

CONSERVATION

Article 4.

It is essential to the conservation of monuments that they be maintained on a permanent basis.

Article 5.

The conservation of monuments is always facilitated by making use of them for some socially useful purpose. Such use is therefore desirable but it must not change the lay-out or decoration of the building. It is within these limits only that modifications demanded by a change of function should be envisaged and may be permitted.

Article 6.

The conservation of a monument implies preserving a setting which is not out of scale. Wherever the traditional setting exists, it must be kept. No new construction, demolition or modification which would alter the relations of mass and colour must be allowed.

Article 7.

A monument is inseparable from the history to which it bears witness and from the setting in which it occurs. The moving of all or part of a monument cannot be allowed except where the safeguarding of that monument demands it or where it is justified by national or international interest of paramount importance.

Article 8.

Items of sculpture, painting or decoration which form an integral part of a monument may only be removed from it if this is the sole means of ensuring their preservation.

RESTORATION

Article 9.

The process of restoration is a highly specialized operation. Its aim is to preserve and reveal the aesthetic and historic value of the monument and is based on respect for original material and authentic documents. It must stop at the point where conjecture begins, and in this case moreover any extra work which is indispensable must be distinct from the architectural composition and must bear a contemporary stamp. The restoration in any case must be preceded and followed by an archaeological and historical study of the monument.

Article 10.

Where traditional techniques prove inadequate, the consolidation of a monument can be achieved by the use of any modern technique for conservation and construction, the efficacy of which has been shown by scientific data and proved by experience.

Article 11.

The valid contributions of all periods to the building of a monument must be respected, since unity of style is not the aim of a restoration. When a building includes the superimposed work of different periods, the revealing of the underlying state can only be justified in exceptional circumstances and when what is removed is of little interest and the material which is brought to light is of great historical, archaeological or aesthetic value, and its state of preservation good enough to justify the action. Evaluation of the importance of the elements involved and the decision as to what may be destroyed cannot rest solely on the individual in charge of the work.

Article 12.

Replacements of missing parts must integrate harmoniously with the whole, but at the same time must be distinguishable from the original so that restoration does not falsify the artistic or historic evidence.

Article 13.

Additions cannot be allowed except in so far as they do not detract from the interesting parts of the building, its traditional setting, the balance of its composition and its relation with its surroundings.

HISTORIC SITES

Article 14.

The sites of monuments must be the object of special care in order to safeguard their integrity and ensure that they are cleared and presented in a seemly manner. The work of conservation and restoration carried out in such places should be inspired by the principles set forth in the foregoing articles.

EXCAVATIONS

Article 15.

Excavations should be carried out in accordance with scientific standards and the recommendation defining international principles to be applied in the case of archaeological excavation adopted by UNESCO in 1956.

Ruins must be maintained and measures necessary for the permanent conservation and protection of architectural features and of objects discovered must be taken. Furthermore, every means must be taken to facilitate the understanding of the monument and to reveal it without ever distorting its meaning.

All reconstruction work should however be ruled out "*a priori*". Only anastylosis, that is to say, the reassembling of existing but dismembered parts can be permitted. The material used for integration should always be recognizable and its use should be the least that will ensure the conservation of a monument and the reinstatement of its form.

PUBLICATION

Article 16.

In all works of preservation, restoration or excavation, there should always be precise documentation in the form of analytical and critical reports, illustrated with drawings and photographs. Every stage of the work of clearing, consolidation, rearrangement and integration, as well as technical and formal features identified during the course of the work, should be included. This record should be placed in the archives of a public institution and made available to research workers. It is recommended that the report should be published.

The following persons took part in the work of the Committee for drafting the International Charter for the Conservation and Restoration of Monuments:

Piero Gazzola (Italy), Chairman
Raymond Lemaire (Belgium), Reporter
José Bassegoda-Nonell (Spain)
Luis Benavente (Portugal)
Djurdje Boskovic (Yugoslavia)
Hiroshi Daifuku (UNESCO)
P.L. de Vrieze (Netherlands)
Harald Langberg (Denmark)
Mario Matteucci (Italy)
Jean Merlet (France)
Carlos Flores Marini (Mexico)
Roberto Pane (Italy)
S.C.J. Pavel (Czechoslovakia)
Paul Philippot (ICCROM)
Victor Pimentel (Peru)
Harold Plenderleith (ICCROM)
Deoclecio Redig de Campos (Vatican)
Jean Sonnier (France)
Francois Sorlin (France)
Eustathios Stikas (Greece)
Gertrud Tripp (Austria)
Jan Zachwatovicz (Poland)
Mustafa S. Zbiss (Tunisia)

Venice Charter for the Conservation and Restoration of Monuments and Sites, 1964

THE VENICE CHARTER, 1964

The Venice Charter[6] was drafted up by a 23-person international committee though its membership was skewed towards European nations, as discussed later - and adopted by ICOMOS in 1965 as a set of guiding principles for the protection of historic sites.

From this, several principles for the repair of monuments and sites have been extracted:

- Frequency: Maintenance should be on a permanent basis. *(Article 4)*
- Visibility: Any extra work which is indispensable must be distinct from the architectural composition and must bear a contemporary stamp. Replacements must integrate but be distinguishable as so to not falsify artistic / historic evidence. *(Articles 9, 12, 13)*
- Method / approach: Where traditional techniques prove inadequate, the consolidation of a monument can be achieved by the use of any modern technique for conservation and construction. *(Article 10)*
- Massing, colour: No new construction, demolition or modification which would alter the relations of mass and colour must be allowed. *(Articles 6, 11, 12, 15)*
- Additions: Allowed except in so far as they do not distract from the interesting parts of the building, its traditional setting, the balance of its composition and its relation with its surroundings. *(Article 13)*
- Reconstruction: All reconstruction work should be ruled out 'a priori'. Only the reassembling of existing but dismembered parts can be permitted. *(Article 15)*
- Documentation: There should always be precise documentation. Every stage of the work, as well as technical and formal features identified during the course of the work, should be included. *(Article 16)*

Today, the Venice Charter remains a significant document as a but also has acquired new meaning as a historic document that demonstrates modernist - and perhaps also Euro-centric - preservation principles.

[6] ICOMOS. "International Charter for the Conservation and Restoration of Monuments and Sites (The Venice Charter 1964)" Available online at https://www.icomos.org/charters/venice_e.pdf Original text in French.

THE VENICE CHARTER UNDER REVIEW, 1977

As early as 1977, Cevat Erder who founded the Department of Conservation of Historic Monuments at METU, Turkey (who would later become Director-General of ICCROM in 1981) wrote a critical review of the Venice Charter[7], in which he argued its principles were heavily influenced by modernist attitudes towards preservation, and were not universal nor relevant enough to the growing field of preservation around the world, nor keep up with technological change. Another problem pointed out by aiming for universality was the issue of translation - meaning could be distorted and / or lost in translation. Erder himself identified four to five different versions of the Charter in Turkish that had already been translated once.

[7] Erder, Cevat. "The Venice Charter under Review." (1977). Available online at https://www.icomos.org/venicecharter2004/erder.pdf

Some points and counterpoints in Erder's critique of the Charter's which are relevant to the field of repair have been noted:

» Frequency: In agreement - maintenance following restoration should be a part of all projects, the lack of which could either fail to conserve or cause actual damage.

» Visibility: Mixed response - Erder points out that this was a principle aimed to prevent idealised reconstructions (like the restoration work of Viollet-le-Duc) but the emphasis on differentiating style has led to 'hurried restoration projects' where the restoration work is inconsistent and not complementary

» Method / approach: In agreement - the application of modern methods has lead to instances (Parthenon) where it has facilitated decay rather than reinforcing it.

» Massing, colour: Mixed response - as with visibility, differenciating style was to prevent a restoration that worked towards 'a unity of style' that was based off a single idealised state, but the vagueness of terms used in the Charter led to ambiguousness and contradicting implementation.

» Additions: Mixed response - Erder emphasizes that preservation is a multi-disciplinary field, and stresses the neccessity of cooperation for architects to make a well-informed design that respects all values of the monument. He comments that the difference in scale and complexity for historic centres / settlements makes the Charter's principles hard to apply.

» Reconstruction: Mixed response - rhe a priori stance towards reconstruction was written explicitly for the reconstruction of archeological sites, but Erder notes that it disregards preservation methods applied during the process of excavation as something with value.

» Documentation: In agreement.

With so many variables and areas of expertise being recognised, Erder predicted that revising (repairing?) the Venice Charter could be a '*demanding and perhaps unneccessary task*.' Instead, he proposed that the Charter be preserved as a historic document due to its influence on the field(s) of preservation, and that the focus should be on developing methodology rather than trying to perfect basic principles.

Thirty years from the adoption of the Venice Charter in 1995, Raymond Lemaire - a member of the original committee - also called for a reevaluation of the charter, noting its biases and recognising that '*errors had been perpetuated in its name*.'[8] Today, ICOMOS has chapters all over the world, and it has become common practice for national chapters to have Charters that outline principles and methods of restoration specific to their region.[9]

[8] Lemaire, Raymond. "Should There Be a Review of the Venice Charter?". (1995). Available online at https://www.icomos.org/venicecharter2004/lemaire2.pdf

[9] Further reading: documents collected by ICOMOS on the Venice Charter. Available online at https://www.icomos.org/venice-charter2004/

HISTORIC ENGLAND

Historic England is the public body that manages the protection the UK's historic environments. On a national scale they are responsible for historic sites, but they also keep a register of listed buildings, monuments and places in the UK. The list originated in 1882 and has over 400 000 entries[10]. When working with listed buildings, the approach of Historic England is takes a more advisory role and moves from the general to the specific.

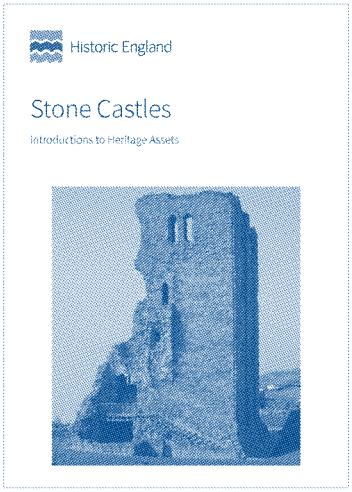
[10] Historic England. "What We Do." (Accessed 2021). Available online at https://historicengland.org.uk/about/what-we-do/historic-englands-role/

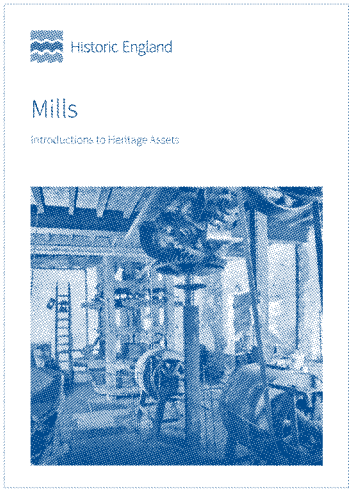
Like Riegl and the Venice Charter, values are understood as subjective and so principles of repair are also specific to different buildings. Historic England has produced a range of general guidance documents, available freely from their website[11] and intended for actors / stakeholders / architects who might not have a background in preservation to understand the value of preserving historic environments.

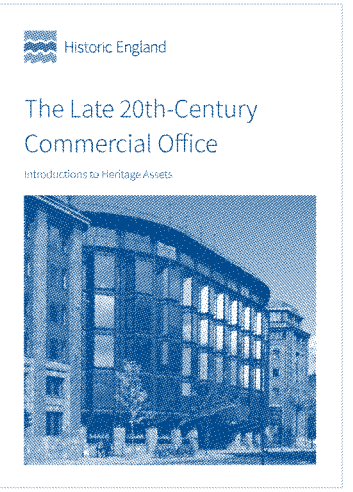
[11] Historic England. "Current Guidance and Advice." (Accessed 2021). Available online at https://historicengland.org.uk/advice/find/a-z-publications/

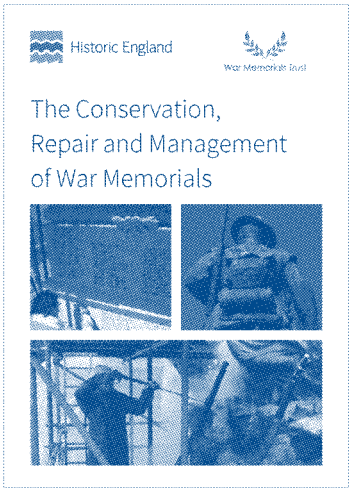
These guidance documents I have organised into four broad categories:

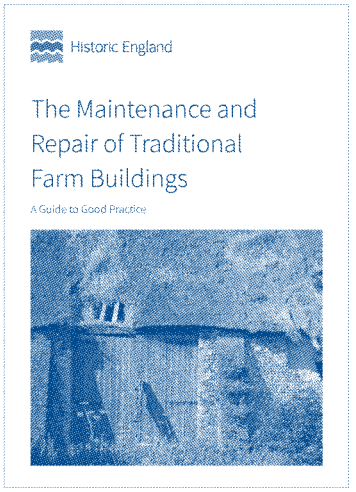
» Types of buildings, generally specific to a time period. The historical development, unique qualities, and areas of improvement are identified, as well as suggestions for suitable adaptive reuse.[!]
» Elements of the built environment and how they might be maintained / repaired without compromising the character of the site.[!]
» Contextual information that considers the historic building / structure in the wider context of its environment.
» Survey techniques and methods.

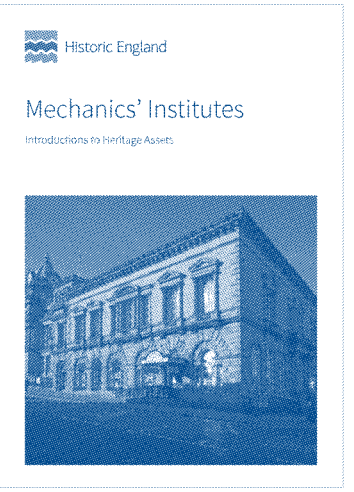


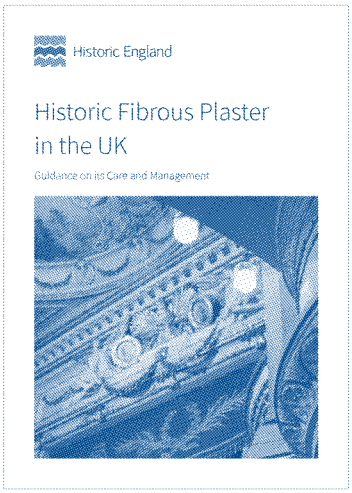


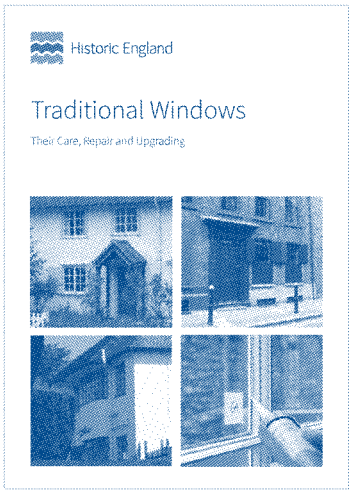












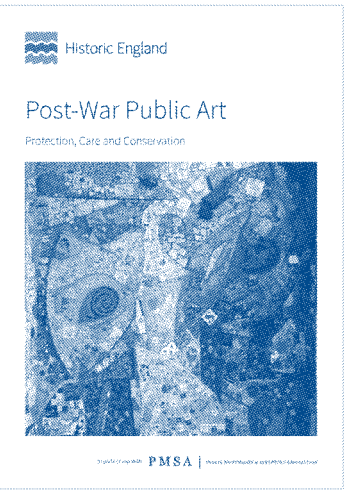


Fig. x: Guidance documents demonstrating ways of categorising historic structures / elements

4. Pre-app meeting + revised brief

4.1. Pre-app meeting

A meeting with Historic England and Medway council took place on site on 2 July 2018. The following concerns and advice was given:

- The rear elevation and roof form are very prominent in views looking from Rochester Castle to the High Street, so proposals should complement the historic landscape.
- Improvements to external form of lower rear additions welcomed.
- As a listed building it is expected that some internal mouldings should be preserved and integrated into design.
- Existing circulation can be improved with new staircore in location that minimises impact on areas of interest within building.
- New access from Epaul Lane / rear of site is acceptable but arrangement of different programs needs to be considered.
- Pavilion should seek to minimise impact on buried archaeological remains. Visualisations to assess impact / screening recommended.
- Consider ways to reveal medieval gateway and wall with proposal, while preserving Victorian-era wall as example of attitudes towards conservation during that time.
- Archaeological assessment (desktop and possibly intrusive works) required.
- Heritage assessment required.
- Contamination desktop assessment required due to existing use as carpark.

4.2. Our response

Our design development has been aimed at addressing the aforementioned issues in the following ways:

- The rear elevation of no. 38 incorporates less glazing and will not be stepped. The mansard of no. 40 is preserved and the roof of no. 38 is similarly unobtrusive.
- Roof of extension to be rebuilt
- Mouldings and architectural features are preserved and, where practical, original partitions will be retained.
- A new staircore to access upper floors will be built between nos. 38 and 40, and a new, separate staircase to the rear will connect the restaurant / retail areas (basement, ground floor, 1F extension). The existing stairs to the basement will be retained.
- Access to restaurant is possible from High Street and Epaul Lane. A separate entrance for residential units above will be provided.
- Pavilion is lightweight and low-lying. Views into and out of the yard, including views from the castle and protected views have been included.
- The pavilion skirts around remains of medieval gatehouse, following the boundary of the victorian walling and ensuring the envelope of the rear will be preserved.
- An archeological desktop and heritage assessment has been commissioned and submitted with this application
- A desktop contamination assessment has been commissioned and submitted with this application.

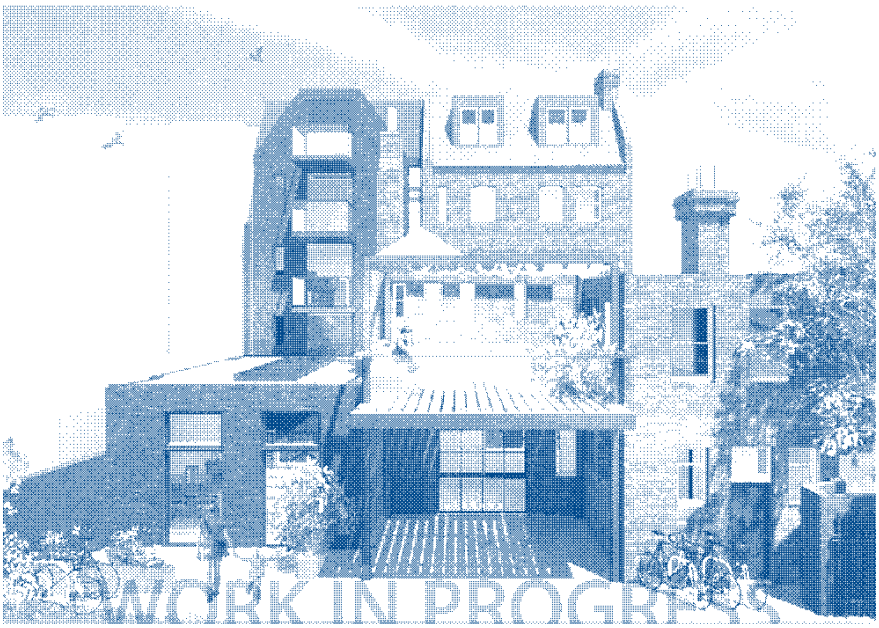
CASE STUDY - CORRESPONDENCE WITH HISTORIC ENGLAND

Within the context of the planning process, a separate heritage consent application must be made for listed buildings and Historic England will advise the applicant - perhaps an architect or a client who has hired an architect - to assess the proposal and provide guidance specific to the site.

The page opposite[12] is an exerpt from a report submitted as part of a planning application for the extension and renovation of a listed building that was formerly a bank. Many original features of the bank - including an oculus in the roof - were preserved under a dropped ceiling but had to be repaired as part of the renovation. To the rear of the site was a medieval-era wall first repaired in the Victorian era and again needed to be repaired.

The project was assigned historians who advised on important aspects of the building after a site visit. Their comments are extracted from a site visit and presented in the planning application.

[12] Stolon Studio. "Rochester High Street: Design and Access Statement." (2019).



« Excerpt from Design & Access Statement submitted as part of planning application.

» Visualisation of project showing new-build infill to the left, new roof, and patio extension.

From March 2021, REPAIROLOGY will be released on a weekly basis for 8 weeks during the duration of the pre-diploma. Each issue will focus on a topic from - or related to - repair.

It is hoped that by tracking, recording, and collating where repair pops up in and around architectural discourse, existing principles can begin to be pulled together and questioned in a new way to form part of a more anticipatory approach to architecture.

SCAFFOLDING

SCAFFOLDING

Scaffolding is the temporary structures that surround buildings and monuments to faciliate repair. It separates the built from its environment, for protection, support, safety and access.

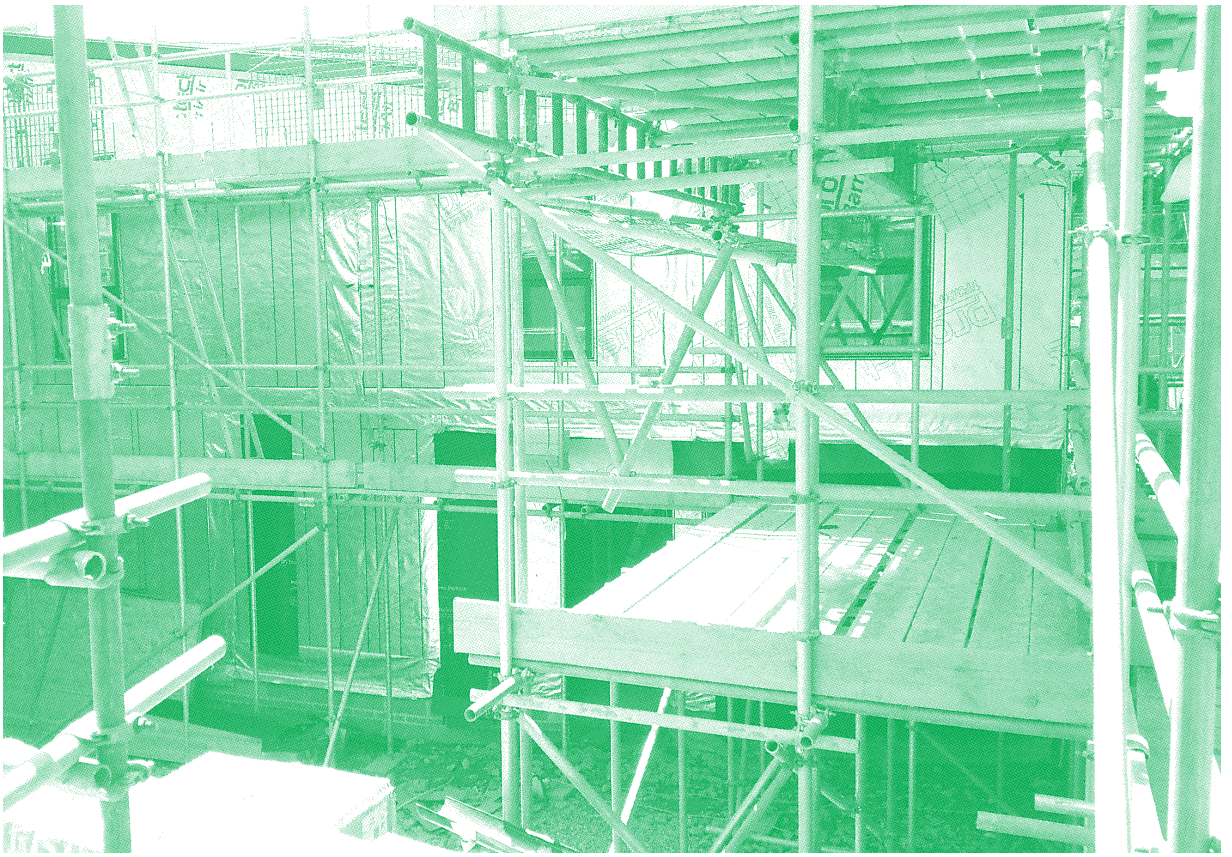
Visually, the presence of scaffolding is an indicator that something is being repaired or undergoing change. This metaphor has been used in installations. It is generally intended to be secondary to what is already there - its form is dependent on what is needed, its design based on minimising disruption. In cities, its presence is so commonplace it doesn't even register as something seen,

Even textually, there is no differentiation between the unbuilt components and built versions of scaffolding - unlike buildings and monuments, which only become what they are when built.

This issue documents types of scaffolding, varying in construction and use:

» Instances of 'normal' scaffolding and their contemporary uses
» Instances of bamboo scaffolding - and the related craft of building bamboo theatres in Hong Kong.
» Instances where the language and methods of scaffolding have been used as its own architecture.

The examples presented are not intended to be exhaustive, but rather as a collection that demonstrates the breadth of applications and possibilities of scaffolding.



DESCRIPTION:

Steel scaffolding with timber boardwalk for a new-build residential development in Forest HIll, London, 2018.

FUNCTION + USE:

accessibility

LIFESPAN:

Feb 2018 - Feb 2019 (12 months)

DESCRIPTION:

Bracing scaffolding spanning the site
of a demolished terrace building before rebuild
in Soho, London, 2015.

FUNCTION + USE:

support / reinforcement / not accessible

LIFESPAN:

Apr 2015 - ? (max. 20 months)
(Project completed in Jan 2017)

DESCRIPTION:

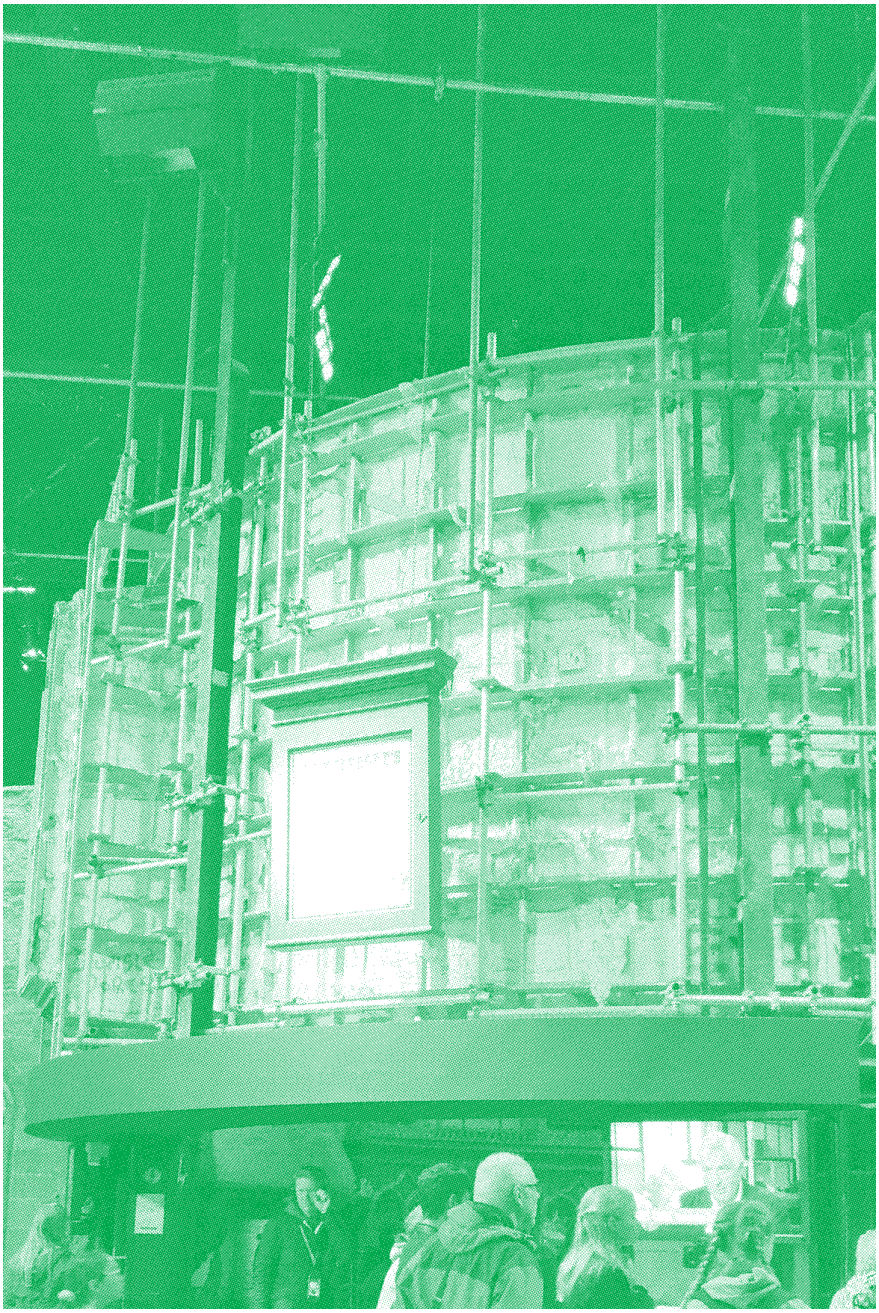
Pipe staging with textile mesh
for facade maintenance of theatre
in London, 2015.

FUNCTION + USE:

accessibility / protection

LIFESPAN:

2014 ? - 2015



DESCRIPTION:

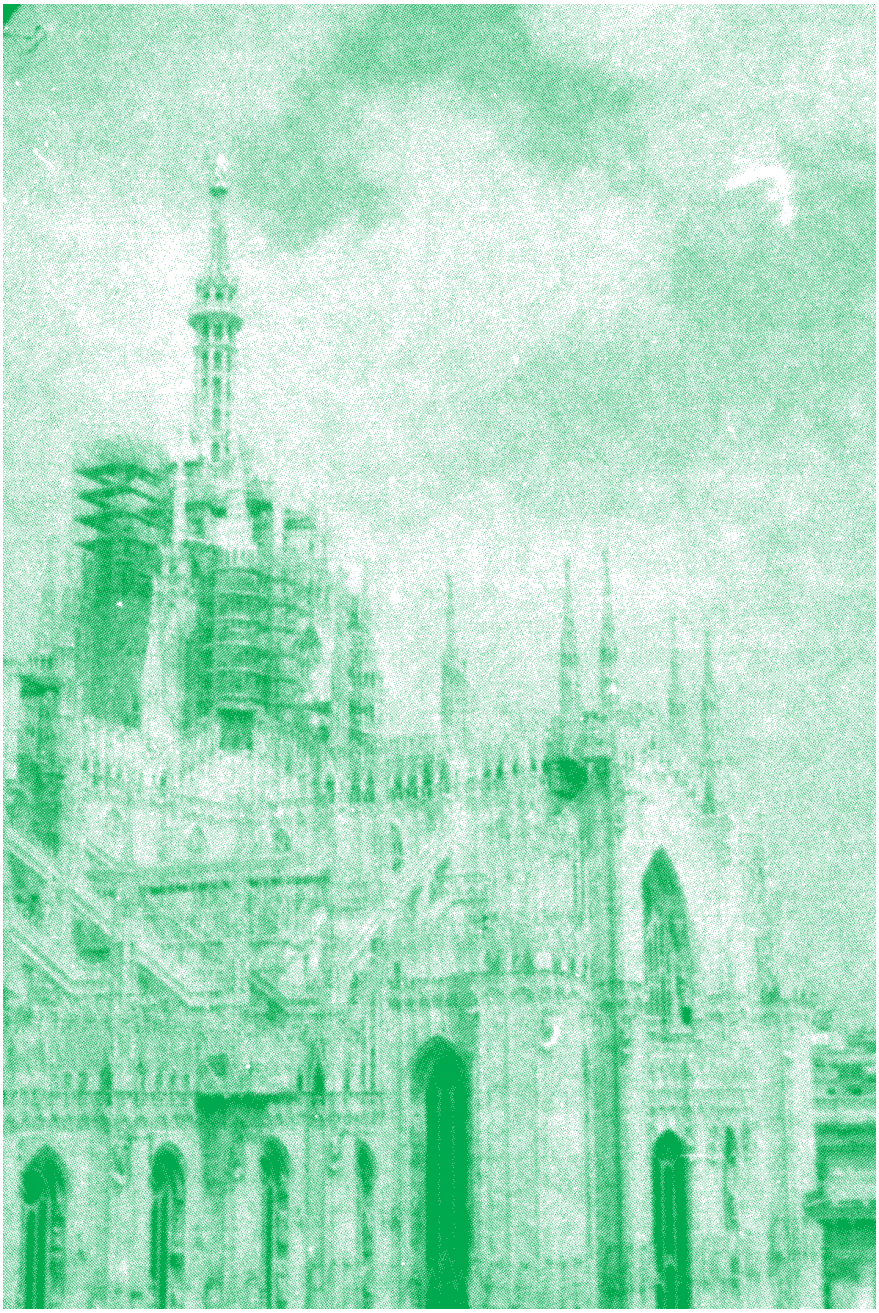
Set scaffolding at Warner Bros Studios, since converted to a tourist attraction in Watford, 2018.

FUNCTION + USE:

structure / not accessible

LIFESPAN:

early 2000s - indefinite



DESCRIPTION:

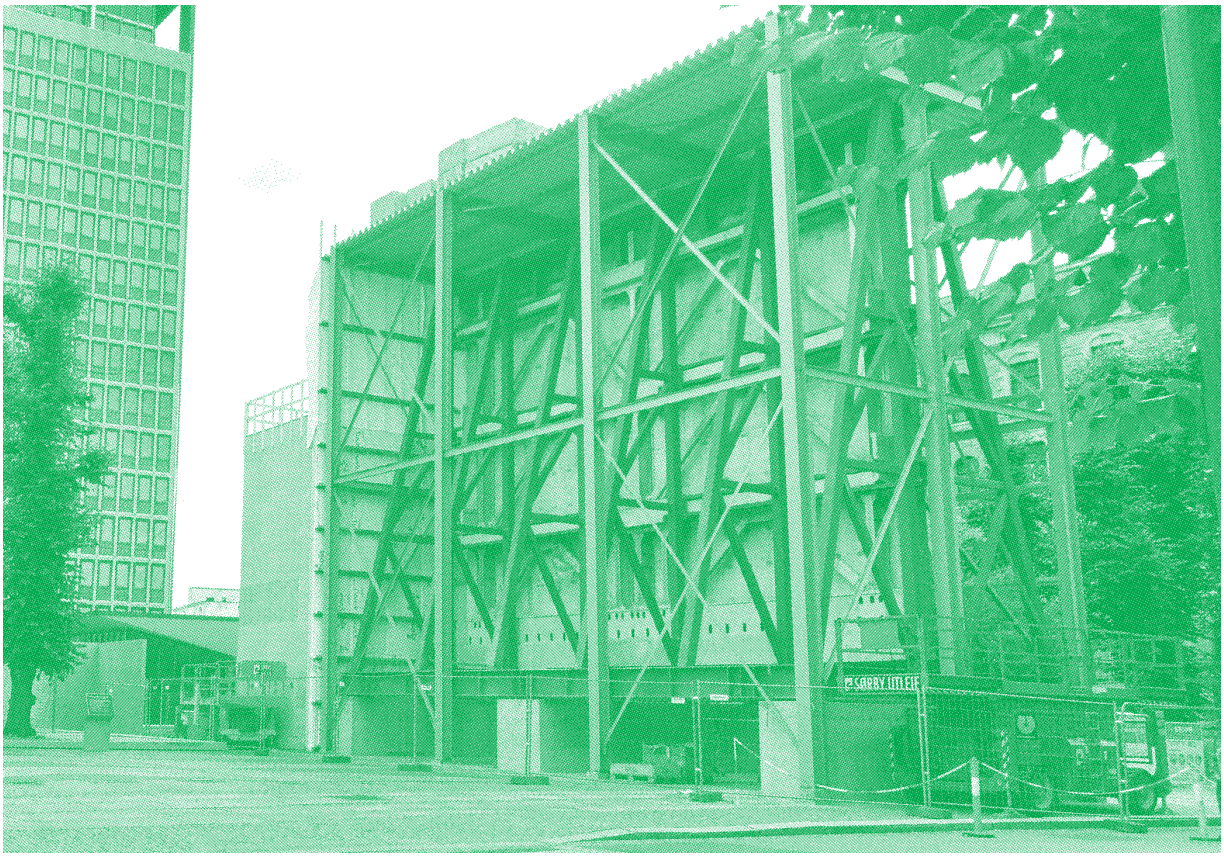
Scaffolding around the one of the 135 spires of Milan Cathedral (Duomo di Milano) in Milan, 2016.

FUNCTION + USE:

accessibility / protection

LIFESPAN:

2009 - ongoing
(Main restoration completed in 2013,
spires ongoing + funded by donationa via 'adoption')



DESCRIPTION:

Long-termcaffolding around Fiskerne, which used to be on a facade of the now-demolished Y-blokka. in Oslo, 2020

FUNCTION + USE:

protection / safety / storage

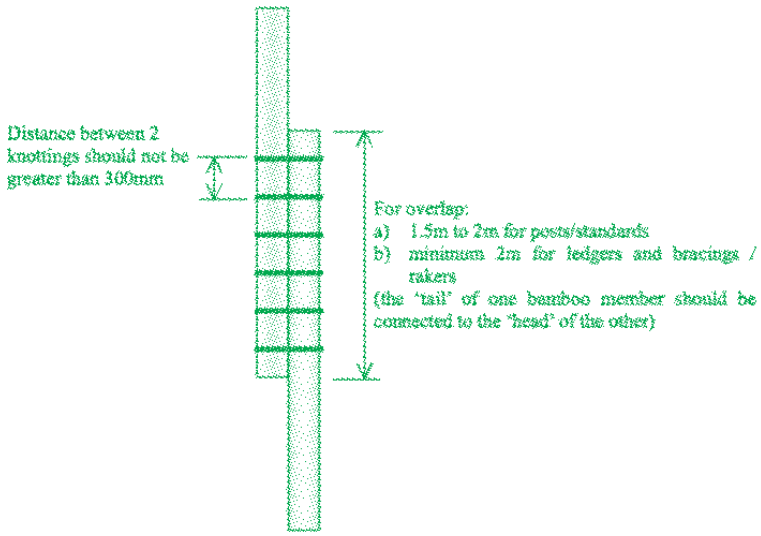
LIFESPAN:

Aug 2020 - ongoing


香港坤泰
海味

竹 BAMBOO
棚 SCAFFOLDING

Bamboo scaffolding is quick to assemble and disassemble, and has been used for hundreds of years all over South + East Asia. In Hong Kong, scaffolding is a specialised, but declining profession (dangerous, difficult, labour-intensive, poorly compensated). The understanding of techniques of scaffolding is taught through experience - it is said the ability of a scaffolder can be assessed by the quality of the knot.



Though passed down in practice, like everything else with the building industry, bamboo scaffolding today needs licenses and has legislation.[1] Standard lengths come in 6m, and are harvested from two species (篙竹 kao jue and 毛竹 mao jue). With structural abilities functionally equivalent to steel if used correctly[2], it is a comparatively unprocessed material, assessed in diameter then for visual deformities and air-dried in a vertical position for 3 months indoors before use. More complex systems incorporate metal bolts, bars, and ties for reinforcement and added support. In terms of scaling, it can form structures from the size of slim plots, to whole blocks, to exhibition centres.

[1] Buildings Department. "Guidelines on the Design and Construction of Bamboo Scaffolds" (2019). Available online at https://www.bd.gov.hk/doc/en/resources/codes-and-references/code-and-design-manuals/GDCBS.pdf

[2] 沉默是銀 / Silence is Silver. "港。講。竹"/ "Hong Kong . On . Bamboo" (2019). Available online at https://www.thestandnews.com/society/%E6%B8%AF-%E8%AC%9B-%E7%AB%B9/

» Diagram of connection from 'Guidelines on the Design and Construction of Bamboo Scaffolds'

« Scaffolding around the demoltion of an infill building in Sheung Wan, Hong Kong. A sheltered passageway of metal at street level is extended to the adjacent building.

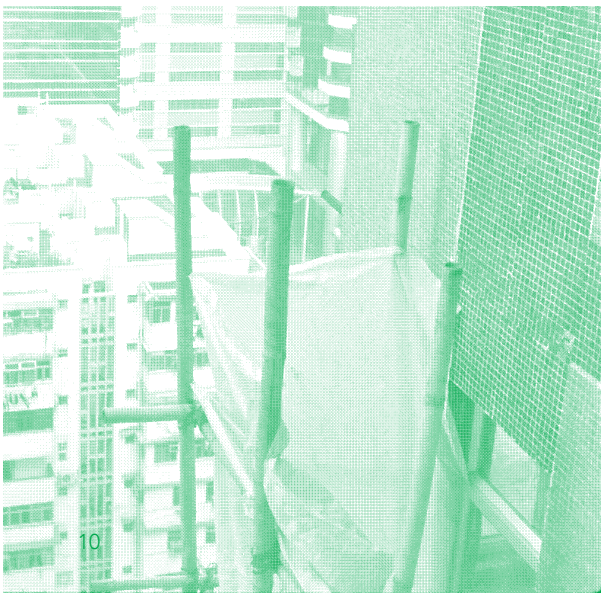
戲棚 BAMBOO THEATRE

Beyond its use in facilitating repair, techniques of bamboo scaffolding have been traditionally used for a variety of temporary structures for festivals in Hong Kong, such as opera theatres - often in less urban areas like villages, market towns, and the outlying islands - for the Hungry Ghost Festival every summer. Yueju (Cantonese Opera) was recognised in 2009 as *Intangible Cultural Heritage* by UNESCO[3], but it's notable that it doesn't cover the tangible structures they take place in - the craft of building bamboo theatres.

Craftsmen who do bamboo theatres have the skills for scaffolding, but scaffolders don't neccessarily have the skills to build a bamboo theatre. An estimate from fourth-generation craftsman Chan Yuk-kwong is that there are roughly 50 independent craftsman in the industry as of 2020.[4] Bamboo theatres are not built from drawings or manuals, by a master foreman who gives instructions on site to workers, who work with their hands and maybe a few hand tools. The profession is tough - technically and physically demanding, and also requires a multitude of licenses for both the companies and the worker.

[3] Four types of Chinese opera have been listed at UNESCO - note only 粵劇 / yueju as protected. There is a large Chiuchow population in Hong Kong and so Chiuchow opera is frequently performed...it's distinct from Cantonese opera. Geographically 潮州 / Chiuchow is part of 廣東 / 'Canton' so I assume it's included. Available online at https://ich.unesco.org/en/RL/yueju-opera-00203

[4] Wei, Clarissa. "Bamboo scaffolding: Why does Hong Kong still use it in construction?" (2020). Available online at https://www.goldthread2.com/culture/bamboo-scaffolding-why-does-hong-kong-still-use-it-construction/article/3080274



As part of the West Kowloon Cultural District - a proposed arts / culture hub whose masterplan was the winner of an international competition - is Xiqu Centre, a permanent space for Chinese opera that opened in 2018. The building is cube-shaped and clad in woven metal panels that reference curtains.

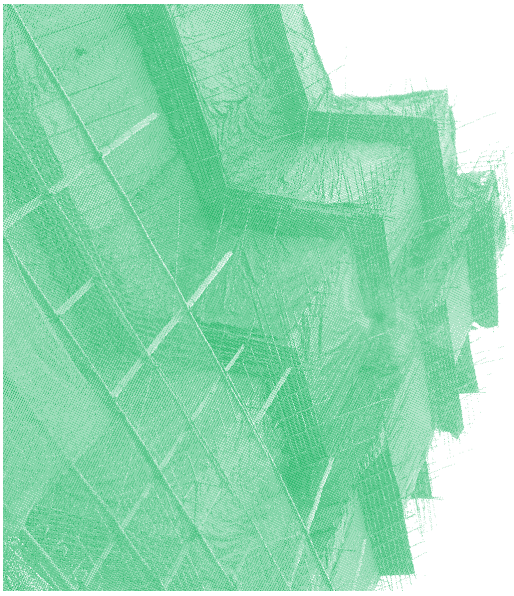
Between 2012 and 2014[5], a bamboo theatre was built for Lunar New Year, first on the site of the permanent centre, until construction began in 2013 and the third iteration of the bamboo theatre was moved to an nearby site. A temporary solution to the permanent centre, it expanded beyond just theatre to include screenings, talks, and commissioned installations. As a vacant plot on which a structure was built to coincide with a festival, I think it was a great situation to demonstrate and legitimise the architectural value of bamboo theatres and how they could be easily modified to suit a variety of cultural programs.

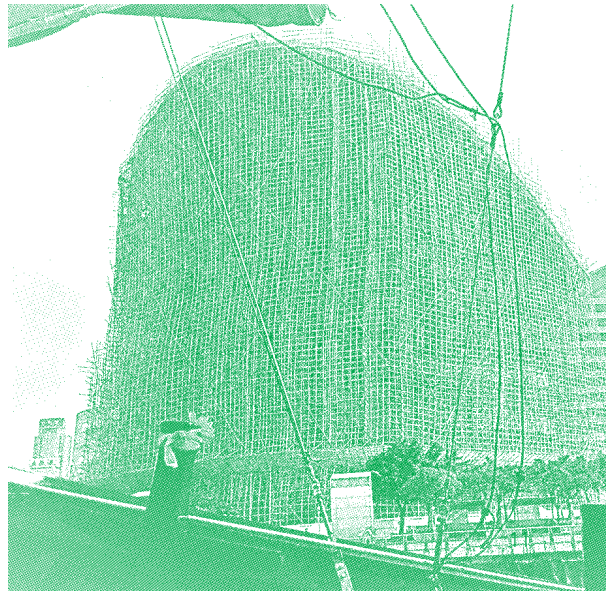
Since then, efforts to sustain + document the craft are largely self-initiated.[6] It's probably not going to get any easier.

[5] WKCD. "West Kowloon Bamboo Theatre". (Accessed 2021). Available online at https://www.westkowloon.hk/en/bamboo-theatre/about-649

[6] 戲棚 / Bamboo Theatre, is a 2019 documentary funded partially by WKCD and filmed over two summers, is a really great film that shows the lives of bamboo theatres.

Images from left, sc. around windows of an apartment to facilitate renovation; interior of bamboo theatre- from 3; sc. around apartment complex slated for demolition; sc. around convention centre for construction. from 2





BAMBOO GRASS-ROOTS

Writing about the use of bamboo in India, Ateya Khorakiwala puts forward the idea that as a material it signifies tradition (scaffolding as craft), poverty (raw appearance, presence on the street), and chic sustainability (marketed as an eco-friendly).[7] These themes are incompatible with each other - from this observation she suggests that bamboo is both literally and textually (in that it reinforces whatever meaning wants to be conveyed) scaffolding. I've pulled out relevant parts from her essay on how bamboo and scaffolding can be useful in thinking about architecture.

[7] Khorakiwala, Ateya. "Architecture's Scaffolds" (2019). Available online at https://www.e-flux.com/architecture/overgrowth/221616/architecture-s-scaffolds/

RELEVANCE OF TRADITION

The idea of the Kinetic City is mentioned, a proposal by architect Rahul Mehrotra as a framework to deal primarily with urbanism in India. He argues that the principles that came out of industrialisation as unable to deal with time and unsuitably 'static' to the context in India.

[8] urbanNext. "Rahul Mehrotra | The Kinetic City" (2017). Available online at https://vimeo.com/187422132

The Kinetic City is based on traditions of Indian festival cities: temporary structures as a possible solution to provide allowances in 'static' cities that would otherwise struggle to accomodate change. Bamboo becomes the main material in building these spaces, and Rahul actually explicitly says in an interview[8] to '*design buildings that have an expiration date...that's a light footprint.*' (!)

The bamboo theatres of HK seem like another example of this - built with no foundations, and only there when in use. I think also that the anticipation that comes with festivals both feeds into and benefits from the presence of temporary structures, making both elements more desirable.

POVERTY, SUSTAINBILITY

It's probably not a coincidence that a search for bamboo on the internet will inevitably refer to it as 'poor man's timber'[9], and that bamboo grows natively in much of the region that has been termed the global south. Le

Corbusier's Chandigarh was not built with machines, but human labour and bamboo scaffolding. This is absent in its most prolific photographs.

Khorakiwala describes bamboo scaffolding as an 'aesthetic of scarcity', seen both as symbol of 'backwardness' but also associated with sustainability when packaged as a commodity internationally. In HK, bamboo is understood in a similar way - respected but sometimes also seen as a profession in its twilight years. Increasingly bamboo scaffolding is facilitated by - or entirely replaced with steel (relative ease of use, material qualities, reusability), especially for big scale projects.

The image of sustainability associated with bamboo is attributed commonly to its fast-growing qualities, but ignores the problems with scaling up - from the complexities of scaling foraging (no longer be sustainable), to allowing it to grow quickly (imbalances ecosystems). In other words, the solution to sustainability isn't in bamboo.

[9]In the spirit of due diligence, I've tried to look up where it comes from but haven't yet found out...

Chandigarh during construction in 1956 by Ernst Scheidegger. Originally intended for a publication but did not happen until 2010.

Photo from https://www.wallpaper.com/architecture/book-chandigarh-1956-by-ernst-scheidegger#0_pic_3

DESCRIPTION:

Bamboo scaffolding for the maintenance of three facades of a corner building in Hong Kong, 2013.

FUNCTION + USE:

accessibility / protection / storage (?)

LIFESPAN:

2013 (3 - 5 months)

NOTES:

A delivery truck brings scaffolding to site and is immediately assembled. Plastic sheets over a fan-like structure put above street level catches rain and debris (and bamboo lengths / materials?). It extends over the street, and allowances have been made to keep shopfronts and overhead signs visible.

DESCRIPTION:

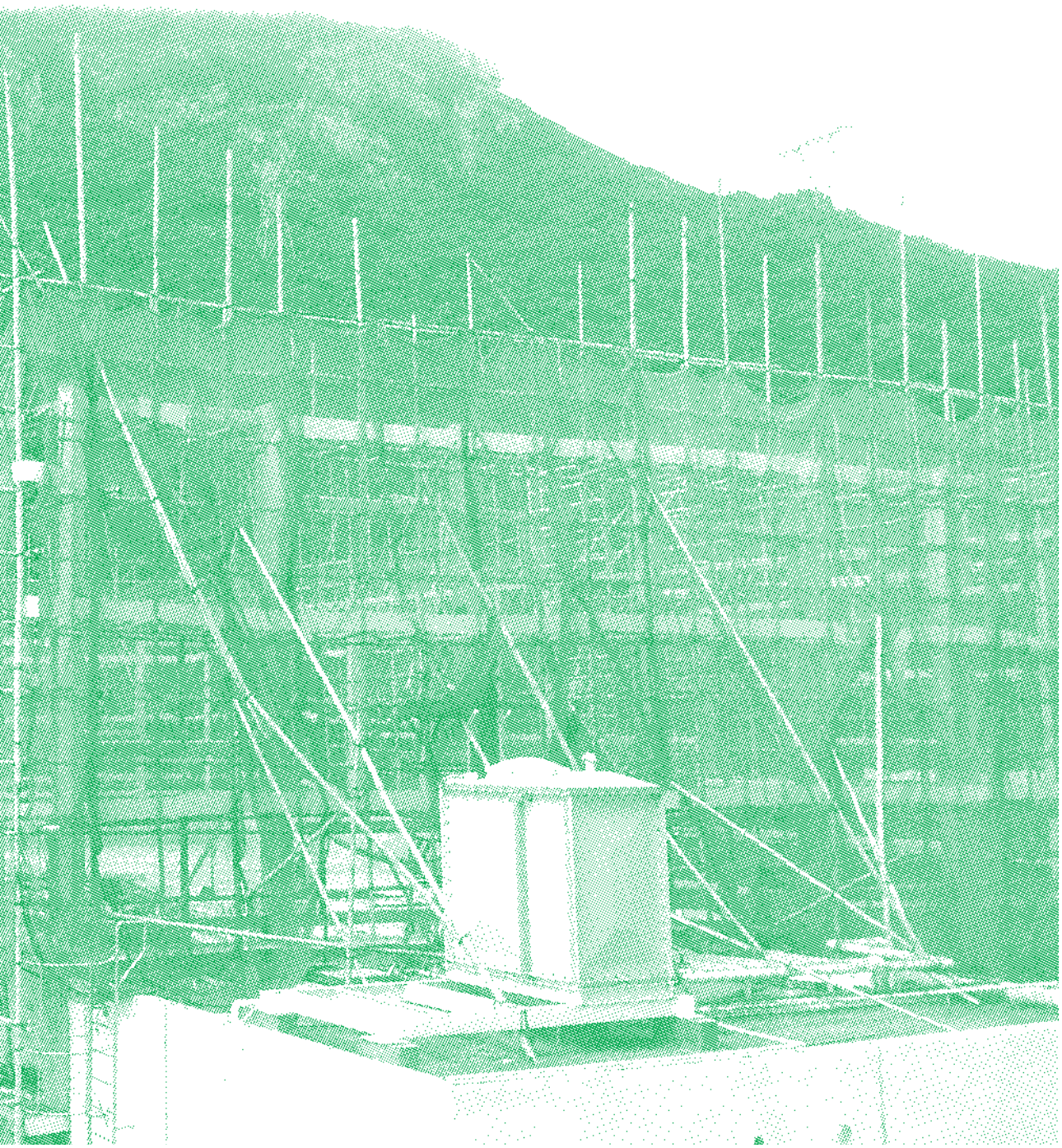
Bamboo scaffolding for roof extension and new access core at a school in Hong Kong, 2013.

FUNCTION + USE:

accessibility / protection

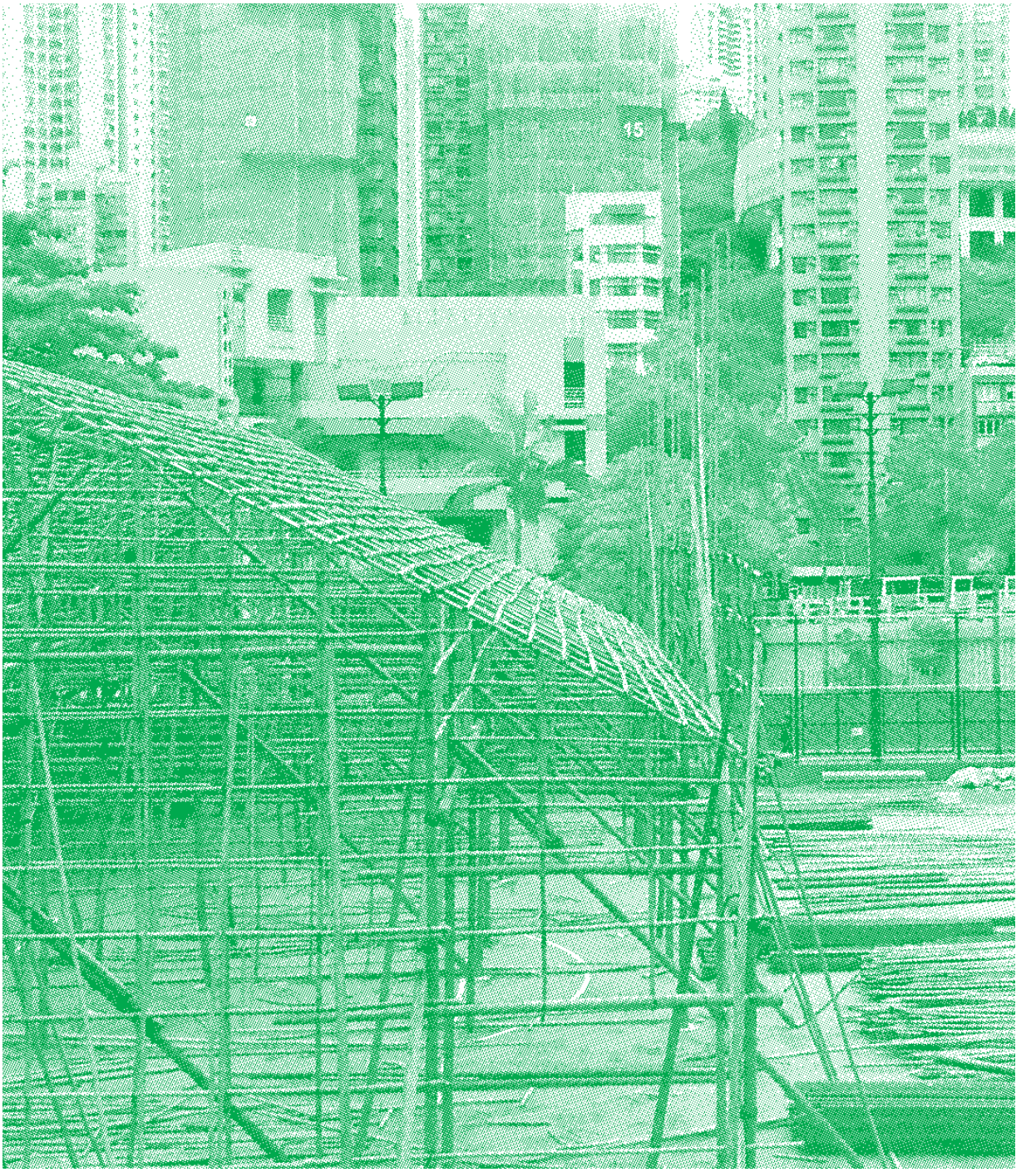
LIFESPAN:

2013 (max. 10 months)



NOTES:

Scaffolding is supported by the metal fencing for the existing sports pitch, and only goes all the way to the ground where the new access core is, about 5 storeys high.



DESCRIPTION:

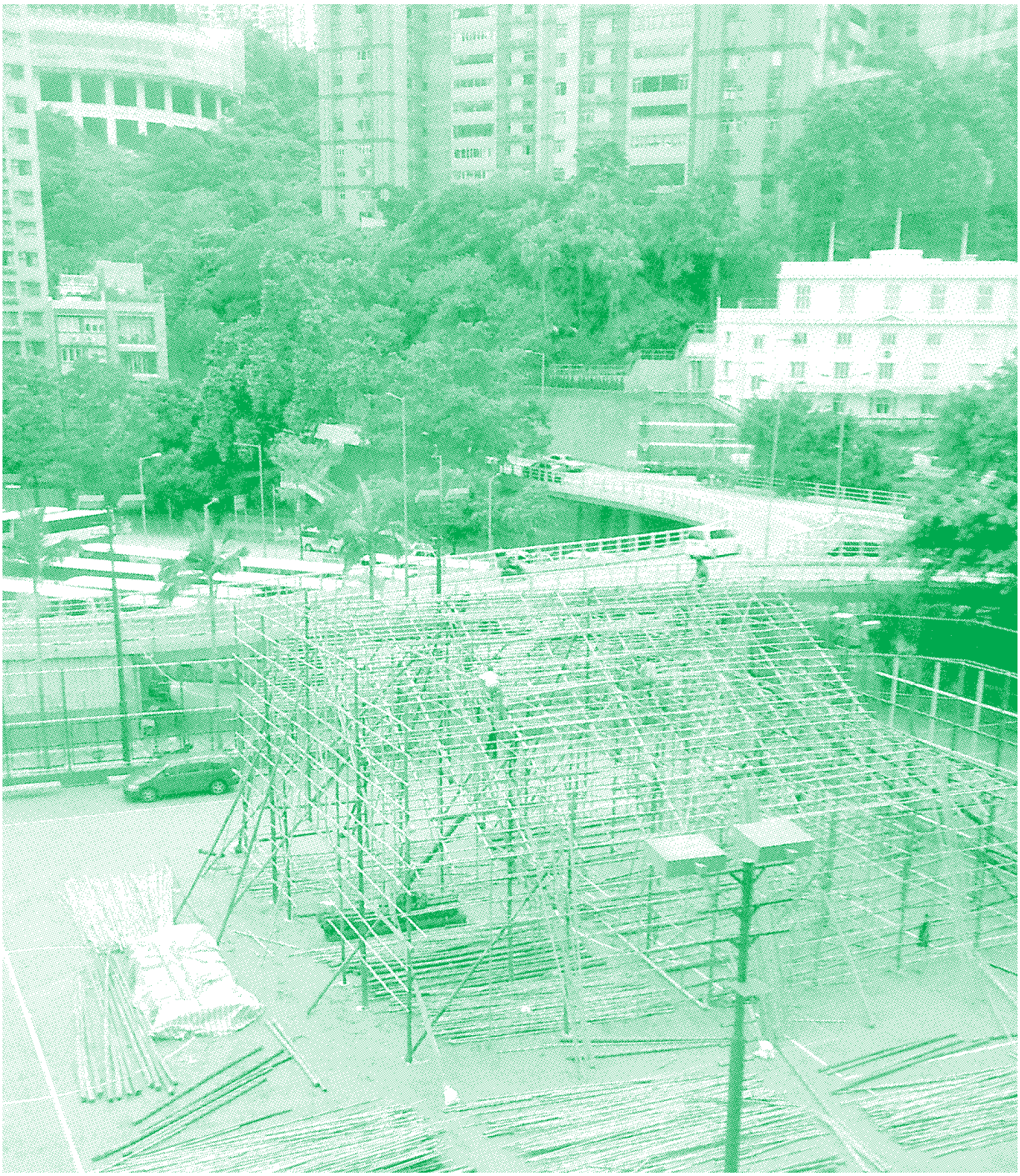
Bamboo theatre for Cantonese Opera
a tradition of the Hungry Ghost Festival
in Hong Kong, 2015.

FUNCTION + USE:

theatre

LIFESPAN:

2 weeks (2 - 3 weeks including construction)



NOTES:

Bamboo theatres pop up all over the city during the summer in open spaces - in this instance it's been set up in a football pitch in Tai Hang. Bamboo is used to form the structure and the stage, and enclosed with sheet metal and textiles (materials laid on ground). The ones shown here is comparitively small.


DEM DEUTSCHEN VOLKE

AESTHETICS OF SCAFFOLDING

In recent years, the architectural qualities of scaffolding have been brought forward and used as its own architecture. The traditional functions of scaffolding are present, together with architectural values in both tangible (visiblity of construction) and ephemeral (impermanence, experience of repair) ways.

WRAPPED REICHSTAG, CHRISTO AND JEANNE-CLAUDE

Scaffolding as spectacle / '*Revelation through concealment*'

For 2 weeks in 1995, Berlin's Reichstag building was draped with a (fireproof) silver shimmering cloth. Under the fabric steel supports were built, and strapped in some areas to give it a silhouette.

The wrapping came right before the restoration of the building, which was completed in 1999. It wasn't practical to the restoration process (though maybe the fabric was used?) but by using the language of scaffolding, it became symbolic of impermanence and a marker of change.

[1] Christo and Jeanne-Claude. "Wrapped Reichstag." (Accessed 2021). Available online at https://christojeanneclaude.net/artworks/wrapped-reichstag/

ISLAND, CARUSO ST JOHN & MARCUS TAYLOR

New access + visual metaphor of being under construction

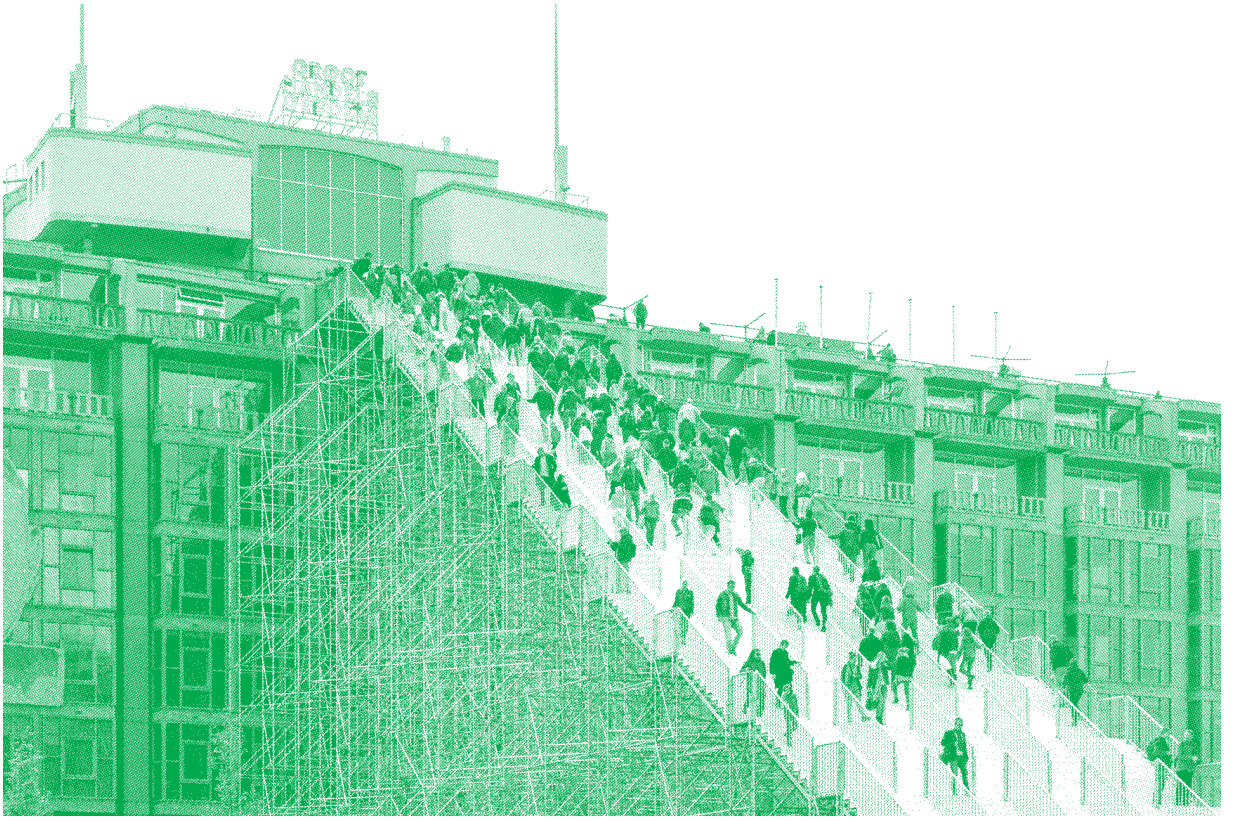
There were no exhibits at the UK pavilion during the 6 month long 2018 Venice Biennale. Instead, the building was enclosed in scaffolding with a platform over the roof, from which visitors could get a new perspective and look out over the lagoon. The experience of encountering a building under scaffolding is extended beyond the visual into something tactile.

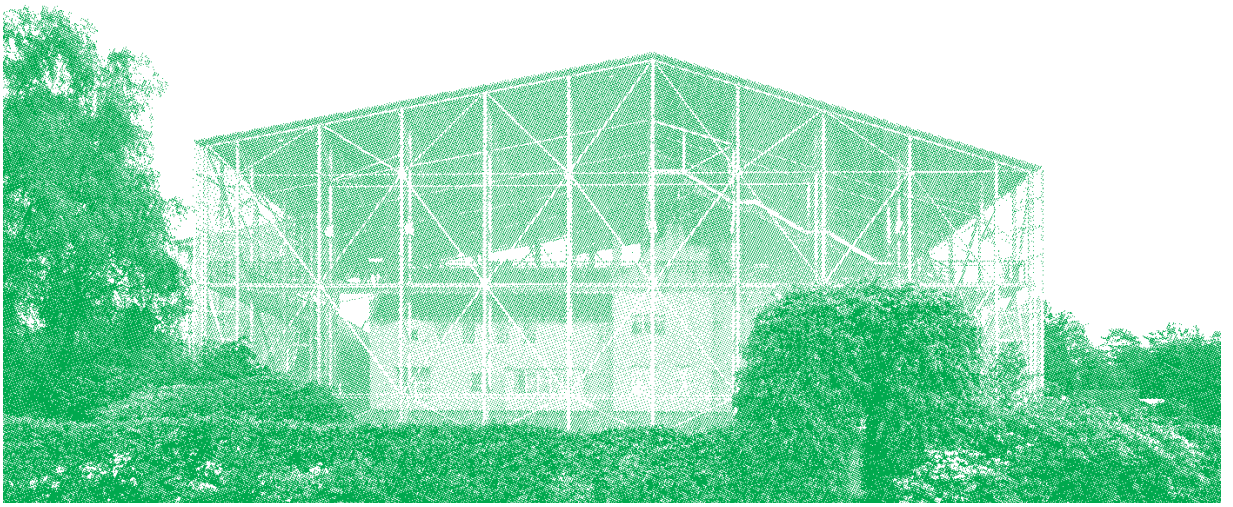
Like *Wrapped Reichstag*, scaffolding is used to symbolise change, but in the context of the UK's Brexit situation the pavilion suggests reassessment too.

[1] Block, India. "Caruso St John builds rooftop "island" above British Pavilion to make statement about Brexit." (2018). Available online at https://www.dezeen.com/2018/05/24/caruso-st-john-islands-british-pavilion-brexit-venice-architecture-biennale/

« Above, workers over the entrance to the Reichstag during installation.

« Below, corridor at the British Pavilion in Venice. Scaffolding casts shadows into the interiors of the building.





STAIRS TO KRITERION, MVRDV

Access as experience

Outside Rotterdam's train station, the Stairs stood for 1 month in 2016 as part of a celebration for the city's 75-years of rebuilding. The project provided direct access the roof of Groot Handelsbouw - described by Winy Maas as '*one of the best buildings of the reconstruction*'. Kriterion - a defunct cinema built on the roof - reopened for the event.

Apparently MVRDV had wanted a permanent escalator, envisioning rooftops as a potential layer in urban planning. The scaffold stairs offered a temporary solution to repair a social building in disuse (Kriterion cinema) without disrupting the circulation of a commercial building in use (Groot Handelsbouw). In this instance, the impermanence of scaffolding can be read as a test run to see if MVRDV's hypothesis works - if it didn't work out (no interest, seen as eyesore, etc), the stakes are not so high.

[1] MVRDV. "Stairs to Kriterion." (Accessed 2021). Note that apparently West8 - another Dutch office - had also built temporary stairs to a rooftop in Rotterdam some years before. Available online at https://mvrdv.nl/projects/238/the-stairs-to-kriterion

[1] Pintos, Paula. "Hill House Box Museum / Carmody Groarke." (Accessed 2021). Available online at https://www.archdaily.com/920640/the-hill-house-box-carmody-groarke

HILL HOUSE BOX, CARMODY GROARKE

Pragmatic protection + experiencing repair

Hill House was completed in 1902. The building is currently owned by the National Trust of Scotland and is one of Cherles Rennie Mackintosh's significant works. Experimental in its design and construction. It's also because of this that the building has had extensive water issues which is projected to take 15 years to repair.

Carmody Groake designed a shed with visitor-friendly walkways that would both protect the building during restoration works and keep the building open during conservation works. The neccessity and impermanence of repair, its value in the context of the life of the building is recognised and made visible to the public,

« Above, climbing Stairs to Kriterion

« Below, Hill House Box

DESCRIPTION:

Tree supported by timber columns tied with knots used also in bamboo scaffolding.

FUNCTION + USE:

support / non-human

LIFESPAN:

--

From March 2021, REPAIROLOGY will be released on a weekly basis for 8 weeks during the duration of the pre-diploma. Each issue will focus on a topic from - or related to - repair under the following categories:

theories of repair / process of repair /
approaches towards maintenance / barriers to repair.

It is hoped that by tracking, recording, and collating where repair pops up in and around architectural discourse, existing principles can begin to be pulled together and questioned in a new way to form part of a more anticipatory approach to architecture.

CLEANING

WHAT GETS CLEANED?

Cleaning can be read as a kind of repair because it has to do with preventing decay. From vacuuming the corners of your flat, to sweeping corridors, to polishing facades of skyscrapers - entire occupations are devoted to cleaning.

However, clean buildings are not always desirable. Surfaces change over time, intentional or otherwise. Patina is an easy signifier of age value - the green of oxidised copper, the silver of exposed timber cladding, the weathering of brick. Romanticism aestheticised ruin, preferring the authenticity of decay over repair. Even the exposed structures and layers of paint historic conversions is its own aesthetic these days.

Cleaning is a subset of maintenance, the process of keeping something in good / working condition.

This issue considers cleaning and maintenance of the built environment:

» **KEEPING UP APPEARANCES** considers cleaning and maintenance in architectural preservation, and also representations of cleaning and maintenance in art.

» **KEEPING TABS** looks at the architecture's responsibility of taking care of buildings, considering instances where buildings have been revisited by the architects themselves.

(I'm in the library queue for 'Maintenance Art' by Hilary Sample but unfortunately didn't get access to it before doing this week's research.)

Photographs of two facades - one clean and one not yet cleaned - of two otherwise same buildings at the Old Royal Naval College in Greenwich, 2014. The ORNC was originally completed in 1694 as the Royal Hospital for Seamen and in 1873 became home to the Royal Naval College. Since 1997 the grounds have become a tourist attraction (+ designated World Heritage Status by UNESCO).

KEEPING UP APPEARANCES

Facades are the surfaces that often form our first impressions of a building and are the primary way in conveying the visually assessable values of a building / structure. Exposed to the climate, this part of the building is the most susceptible to decay from weathering. In a building assessment, surface decay can both obscure and enhance the values of a building, which is explored in this chapter. Note the removal of graffiti or street art as a form of cleaning is not included in this study.[1]

[1] I also think graffiti / street art removal is distinct from cleaning and should be explored in relation to to issues of power and ownership rather than the mechanics of cleaning. If it becomes relevant in the diploma it should be considered with those things in mind.

In comparison to structural decay, surface decay is easier to manage. Architects are trained to think about program and use in formmaking, but the practicalities and labour of cleaning that sustain the program and use of a building does not generally come up in the design process until the selection of materials.

THE MAINTENANCE OF MONUMENTS

Cleaning and maintenance are more influential in decision-making in architectural preservation. Bernard Feilden's 'Conservation of Historic Buildings' is a reference book covering various aspects of building preservation[1]. In it there are methods of repairing buildings at different scales (detail, component, structure, environment) and by material and structure, but with respect to the topic of cleaning and upkeep.

I've extracted and condensed two chapters (7 and 15) that summarize causes of weathering (creating conditions that need to be repaired / cleaned) and maintenance programming (specialised types of cleaning / repairs for the short- and long-term).

CLIMACTIC CAUSES OF WEATHERING

- Solar radiation: Creates temperature differences which affects the expansion / contraction of materials, resulting in cracks and broken joints. Can also create a humidity difference which leads to condensation and water ingress.
- Frost and snow: Risk of water ingress. Can also create more extreme temperature + humidity differences, resulting in cracks, broken joints, broken materials (eg. masonry). Affects substructure. The buildup of snow can also result in structural damage.
- Dissolved salts: Corrosive chemicals (naturally occuring or result of man-made pollution) carried by wind / rain / etc. that can damage exposed surfaces.
- Wind: Generally accelerates erosion. Wind pressure can detach building components (eg tiles) in more extreme situations.
- Particulates / pollution: Fine particles (eg. soot) settles as dirt, larger particles (sand) can erode over time, causing disfigurement and material decay. May be chemically corrosive to exposed surfaces.

[1] Feilden, Bernard. "Conservation of Historic Buildings." (1982). Chapters 7: Climatic causes of decay and 15: Preventative . maintenance of historic buildings.

These points can form paramaters and a strategy on how to approach the diploma. In addition, this book could be useful after a site has been selected.

GUIDANCE ON MAINTENANCE PROGRAMMING

» Daily + weekly: Clean away dust, be on lookout for visual defects / weird smells (eg. leaky taps, broken switches, fuel smell, fire / security alarms)

» Monthly: As above, clear gutters and drains, check mechanical equipment, QC log books

» Quarterly: As above, survey roof, cleaning glazing, check fire / security routes

» Annual: As above, clean harder to clean places. inspect services (heating, electricity, water), rod through rainwater / soil drainage systems, service lifts,

» 5 years (conservation-specific): Full building inspection and works where required, including unused and rarely accessed spaces. Full Report by architect / surveyor, noting structural defects and updating maintenance plan.

» 30 years (conservation-specific): For larger sites subdivide the site into manageable areas for 5-year inspections, with a big inspection as above every 30 years.

« Opposite page, from left - repointing mortar on chimney, repairing lead gutters

» This page - clearing of accumulated stuff and vacuuming all surfaces of roof space before application of preservatives.

North side of Dresden Frauenkirche, showing the surviving structure and reconstruction that integrates salvaged material with in their original positions.

PATINA

The word patina is used positively to describe surfaces that have aged desirably despite a lack of cleaning. Generally speaking, these surfaces are exterior and protective in function (copper roof, stone walls, corten steel cladding). It is intuitive to say that frequent cleaning of exterior surfaces is impractical anyway, but we see that

PATINA IN CONTEXTUALISING MONUMENTS

The ruins of Dresden Frauenkirche stood for nearly 50 years as a war memorial until 1992, when reconstruction was financially possible and approved by the city council. The principles of the reconstruction was to be faithful to the original design, and to use surviving materials where possible.

The first step was salvaging material from the rubble - 8 390 facing stones, 91 500 back-up blocks, and miscellaneous objects were recovered, surveyed, documented and used as they were.[2] The result was a reconstruction where repair (if you can call it that?) and the reading of two ages was clearly visible - the dark, weathered, salvaged stones looking stark against the light, new sandstone quarried to original specifications (and improved with modern technology where required).

Jorge Otero-Pailos' notion of the monumentary[3] is a combination of the words 'monument' and 'supplementary' (or maybe 'documentary'?), and describes a situation in which the modifications made to a monument provide context and are visibly supplementary, making it easier to recognise or understand, but also to associate or enforce particular ideas.

The idea of modifications appearing secondary to what is being preserved echoes the principles of conservation outlined in ICOMOS' Venice Charter, though Otero-Pailos approaches it not as a means to preserve authenticity, but challenges the assumption that all monuments are generally immediately identified as such.

[2] Frauenkirche Dresden. "The reconstruction of the Frauenkirche: the return of Dresden's landmark" (accessed 2021). Available online at https://www.frauenkirche-dresden.de/en/reconstruction/

Photo from https://upload.wikimedia.org/wikipedia/commons/5/57/FraunkircheSouth.jpg

[3] Otero-Pailos, Jorge. "Monumentaries: Toward a Theory of the Apergon." (2015). Available online at https://www.e-flux.com/journal/66/60754/monumentaries-toward-a-theory-of-the-apergon/

> *In order to recognise something, we must by definition have seen it before. This means that it would be theoretically impossible for use to identify a construction we had never seen before as a monument...Supplements are meant to help monuments do what we expect them to do but cannot do by themselves: to appear a monuments.*[3]

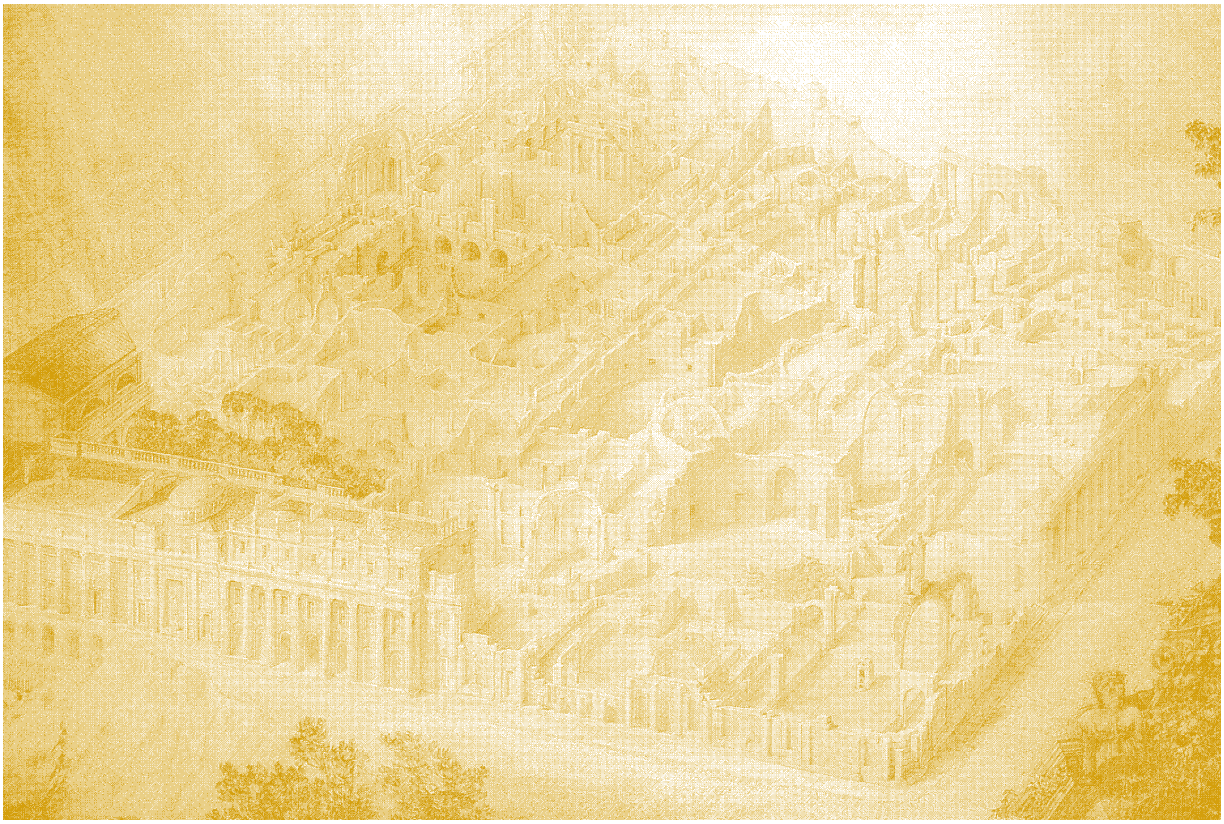
To demonstrate the neccessity of context, he gives the example of a 6000-year old Celtic tomb in Spain which was documented and officially listed as a Resource of Cultural Interest. Without supplements that indicated its value it was '*confused with an old picnic table with broken benches, and with the best of intentions, demolished and replaced...made of shiny new polished granite slabs*' by a municipal maintenance team.

Dresden Frauenkirche is a church, but the light, new stone is also a kind of supplement that contextualises and literally supports the original, patinated stone, allowing it to be read as a reconstruction without needing to see or know that it was destroyed during WWII. By extension, it continues to convey the meaning of a war memorial.

REPRESENTATIONS OF ARCHITECTURE BY ARTISTS

The built environment is a physical and tangible medium that is intended to last a long time, but the emphasis on the 'vision' means representations of architecture by architects frequently ignores the process of decay and the physical work of cleaning to prevent it,

The following pages presents art that comments on maintenance and cleaning.



BANK OF ENGLAND AS A RUIN

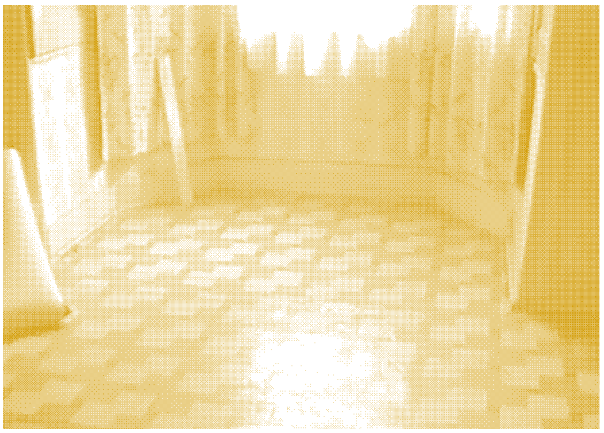
JOSEPH GANDY, 1830

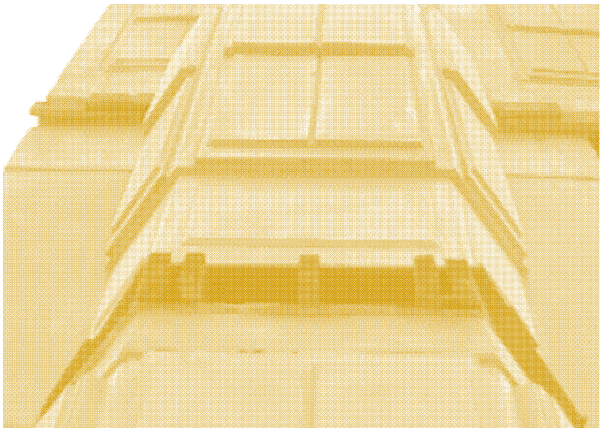
The site of the Bank of England in London has been its home since 1734. From 1788, John Soane oversaw the repairs, upgrading, and expansion of the original building to its current footprint. The project took 45 years - adjacent parcels of land were gradually acquired and developed.The interiors were organised as a series of spaces grand and small, lit by natural light.[4, 5]

Joseph Gandy was a draughtsman who worked frequently with Soane, and both were fascinated by ruins of past civilizations. He drew Soane's shcheme as a watercolour perspective not as it was but as a ruin, romanticising its abandonment and subsequent deterioration as comparable to the ruins of ancient Rome. In reality, it never had the chance - Soane's work was demolished in the 1920s and replaced with a new design by Herbert Baker. Not a trace remains.

[4] Soane.org. "Bank of England, City of London for the Governor and Company of the Bank of England, 1788-1834." (Accessed 2021). Available online at http://collections.soane.org/SCHEME633

[5] Fabrizi, Mariabruna. "Infinite Sequence of Interior Space: John Soane's Bank of England (1788-1833)" (2016). Archived at https://web.archive.org/web/20190305052842/http://socks-studio.com/2016/04/26/infinite-sequence-of-interior-space-john-soanes-bank-of-england-1788-1833/





HOUSE

RACHEL WHITEREAD, 1993

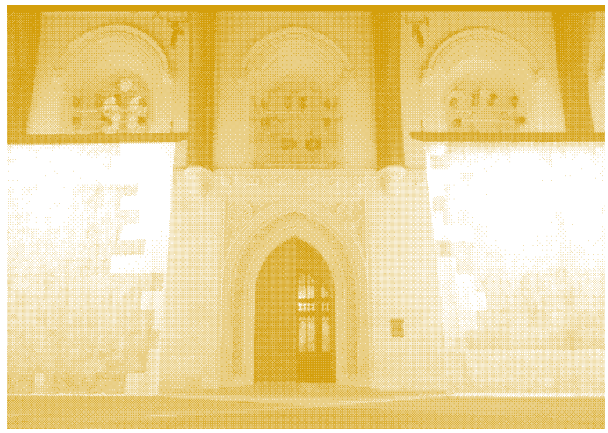
House was a free-standing cast sculpture that used a 3-storey Victorian terraced house scheduled for demolition in London as its mold, completed in October 1993 and demolished after 11 weeks.[6]

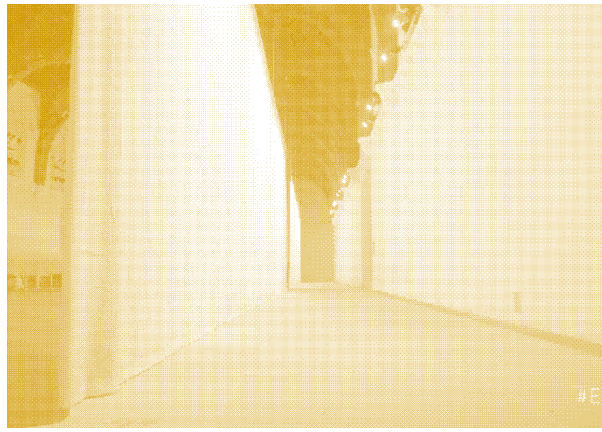
Despite its perceived heaviness, the sculpture is hollow: the surfaces of each room were sprayed with plaster - catching dust and textures - then reinforced with rebar cement. The casts seemed to get dirty from being exposed to the weather and also accumulated several graffiti. A video was released by Artangel (who also commissioned the project) documenting the house, the process, the visitors, and its demolition.

The above video[7] stills show the building's bay window, the cast from the inside, the cast from the outside, and the demolition.

[6] Artangel. "House | Artangel" (Accessed 2021). Available online at https://www.artangel.org.uk/project/house/

[7] Artangel and Hackneyed Productions. "Rachel Whiteread, House (1993)" (1995). Video available online at https://vimeo.com/144731080





THE ETHICS OF DUST (WESTMINSTER CATHEDRAL)

JORGE OTERO-PAILOS, 2016

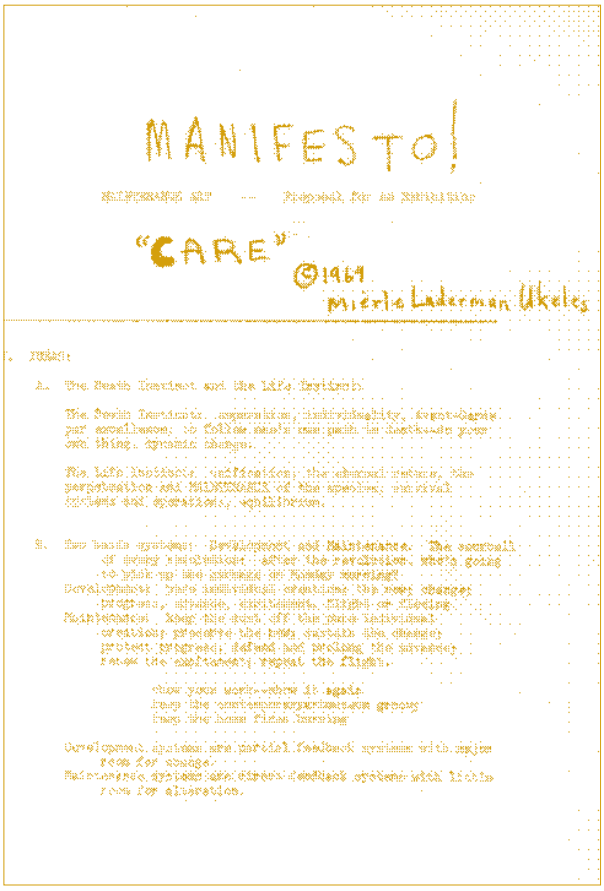
The Ethics of Dust is an ongoing series in which a special kind of latex that absorbs dust as it dries is applied to surfaces of historic / cultural significance, simultaneously cleaning and preserving the accumulation of dust as a physical object. The latex is then peeled off and becomes an object that contains the imprint and dust of the building at that point in time.[8]

London's Westminster Cathedral was cleaned and the pieces exhibited for 3 months from June 2016. The performance of applying latex makes the process of cleaning visible, and the object produced becomes a physical, literal measure of how the debris of historic surfaces can have value..

The above video[9] stills show the application and peeling of latex, and the sheets themselves, 54 metres long.

[8] Artangel. "The Ethics of Dust | Artangel." (Accessed 2021). Available online at https://www.artangel.org.uk/project/the-ethics-of-dust/

[9] Artangel. "Jorge Otero-Pailos: The Ethics of Dust | Behind the scenes." (2016). Video available online at https://vimeo.com/172927123



MANIFESTO FOR MAINTENANCE ART 1969!

MIERLE LADERMAN UKELES, 1969

Manifesto for Maintenance Art is a 4-page text which recognised the necessity of maintenance. Ukeles' literally cleaned art museums - the labour of cleaning - then (and still) seen as something with low cultural value - reframed as a performance and a creative act. Since 1977 she has been the first (and only) artist-in-residence for New York City's Sanitation Department. In 1979's 'Touch Sanitation Performance', she thanked and shook hands with all 8500 sanitation workers in New York City.[10, 11, 12]

'For ——> forever' was a digital message in 2020 shown on advertising displays in metro stations that again thanked and remembered the subway workers who had died from COVID-19. Maintenance has always been essential work, but to be recognised only under these horrible circumstances suggests a systemic issue in representation that needs to be addressed.

[10] Laderman Ukeles, Mierle. "Manifesto for Maintenance Art 1969!" (Accessed 2021). Available online at https://queensmuseum.org/wp-content/uploads/2016/04/Ukeles-Manifesto-for-Maintenance-Art-1969.pdf

[11] Bliss, Laura. "The Artist Who Made Sanitation Workers Worthy of a Museum." (2016). Archived at https://web.archive.org/web/20200518064332/https://www.citylab.com/life/2016/11/the-artist-who-made-sanitation-workers-worthy-of-a-museum/508862/

[12] Quito, Anne. "The most poignant art in New York right now is from the city sanitation department." (2020). Available online at https://qz.com/work/1902042/artist-mierle-laderman-ukeles-salutes-covid-19-essential-workers/

LE BAISER

IÑIGO MANGLANO-OVALLE, 1999

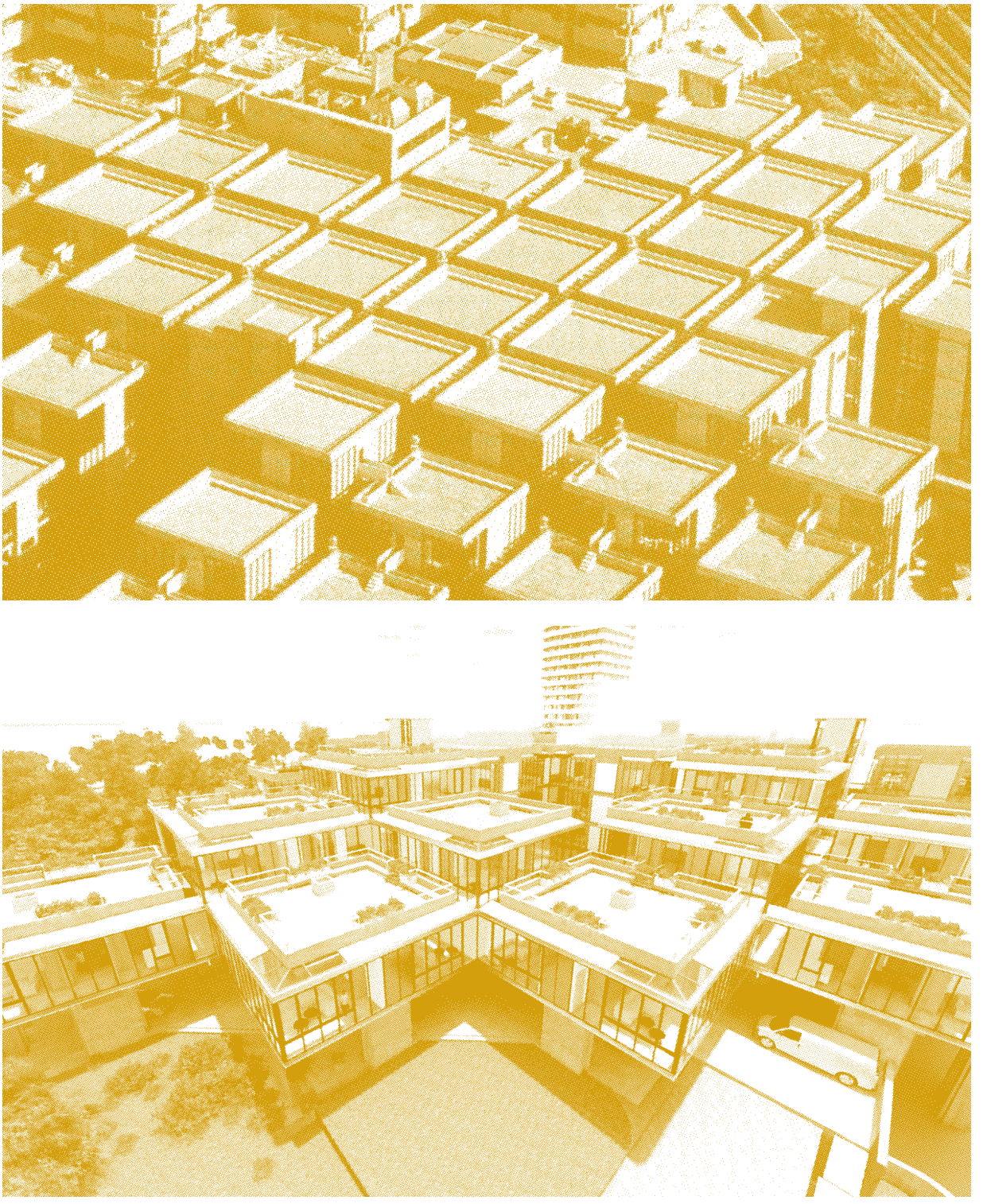
Le Baiser is a performance / video piece in which the artist, dressed in a cleaners' uniform, cleans the windows of Mies van der Rohe's fully glazed Farnsworth? House[14]. Contextually, its status as a historic building signifies the importance of keeping the building preserved in a certain way - something that is only done through frequent maintenance.

Through the glazing, a woman with headphones looks down, focused only on listening to music. She does not react as Manglano-Ovalles cleans the window in front of her, suggesting a wilful ignorance of the labour involved to keep the building operational. Mies himself fell out with the client apparently over disagreements in the way the building should have been used.

Stills from Le Baiser[13] above.

[13] Manglano-Ovalle, Iñigo. "Iñigo Manglano-Ovalle, Le Baiser (The Kiss), 2000" (performed 1999). Video avialable at https://vimeo.com/1890579578

[14] Art21. "Interview Childhood and Influences." (2011). Available online at https://art21.org/read/inigo-manglano-ovalle-childhood-and-influences/



Above, aerial photo of Hertzberger's Centraal Beheer offices, 1972

Below, still from fly-though visualisation of the transformation, renamed Hertzberger Park, 2019

KEEPING TABS

Making buildings is a slow-going, slow-changing, and costly process, and architects don't often have the chance to revisit buildings they have worked on as a project brief. Here, examples where buildings have been revisited are documented, their motivations and consequences examined to make a case for extending the responsibility of architects beyond building completion.

CENTRAAL BEHEER OFFICE / HERTZBERGER PARK, APELDOORN

Program:	commercial > housing
Size:	18 000m^2
Time between:	48 years

The Centraal Beheer offices were completed in 1972 by Herman Hertzberger.[15] The building was conceptualised as an open structure with a variety of interior spaces in different sizes and divisions to create levels of privacy that were still flexible enough to accomodate a variety of tasks, a concept he called 'polyvalence'.

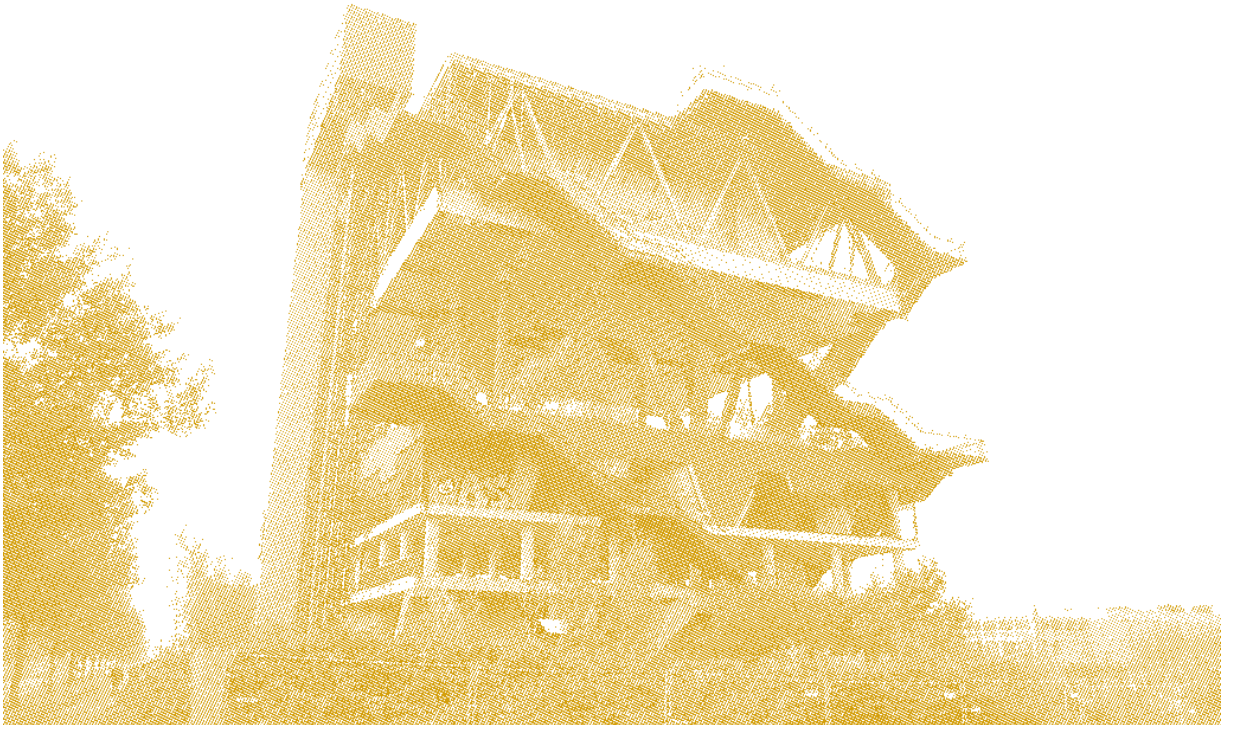
Several alterations and extensions were carried out without much difficulty, because of 'the structure's inherent changeability' offered by the structure, but was vacated in 2013. Hertzberger himself is known to return to his buildings to study how they are being used - sometimes making small adjustments / improvements based on these studies[17].

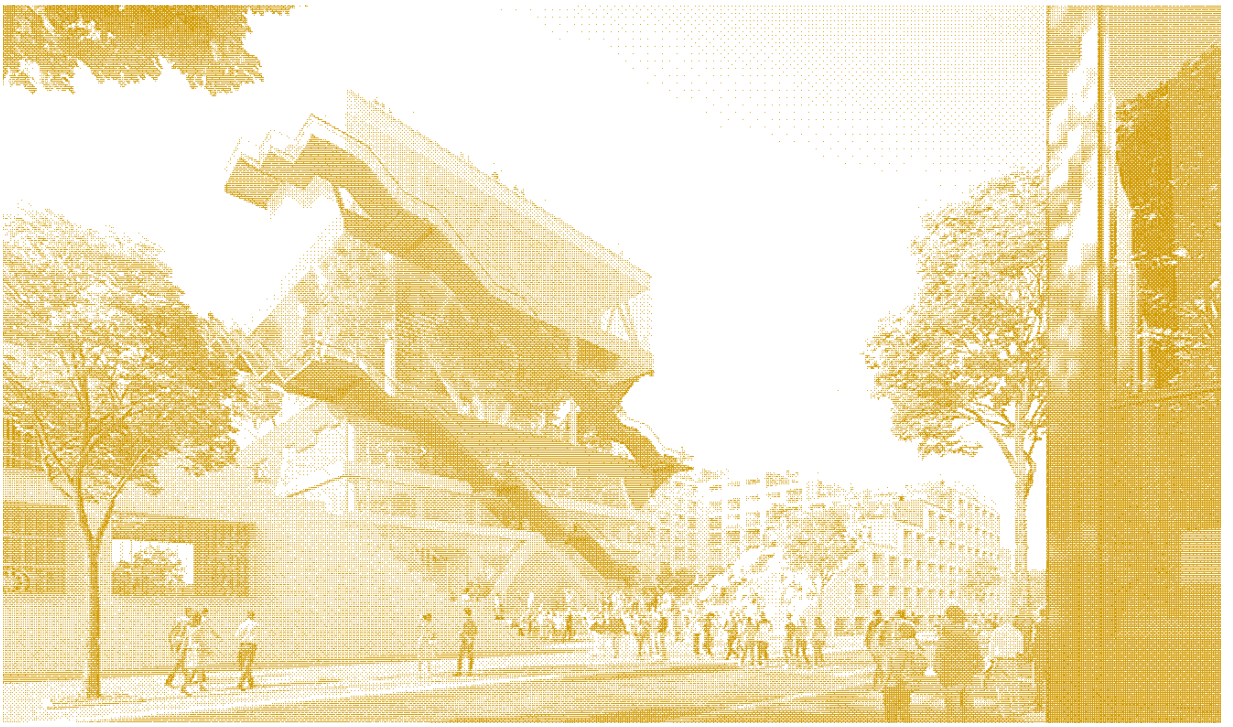
Since 2019 the site is being redeveloped into a residential complex named Hertzberger Park.[16] A fly-through render of the project shows the open structure looking mostly preserved, with new interior finishes and full glazing to the perimeters of the building,

[15] AHH. "Centraal Beheer Offices, Apeldoorn." (Accessed 2021). Available online at https://www.ahh.nl/index.php/en/projects2/12-utiliteitsbouw/85-centraal-beheer-offices-apeldoorn

[16] AHH. "Hertzberger Park, Apeldoorn." (Accessed 2021). Available online at https://www.ahh.nl/index.php/en/projects2/14-woningbouw/83-hertzberger-parc

[17] see: the Apollo school and the now-demolished Drie Hoven elderly housing complex.





Above, abandoned and fenced off, MVRDV's Expo 2000 building in 2013

Below, visualisation of transformation and extension into a multi-use complex, 2020

EXPO 2.0, HANOVER

Program: pavilion > mixed-use (retail, commercial, housing)

Size: 8 000m^2 > 25 200m^2

Time between: 20 years

Originally built as the Dutch Pavilion for the 2000 World Expo in Germany by MDRDV.[18] The pavilion theme was 'Holland creates Space' and conceptualised as the stacking of 6 'Dutch landscapes' onto only a portion of the site assigned as a literal interpretation of density, man, technology, and nature. Built with a budget of 10.8 million euros, the building was originally intended to be dismantled and rebuilt in the Netherlands, but both this option and the alternative of demolishing it were both too expensive, so the building was just abandoned (and minimally maintained by the city of Hanover) upon the conclusion of the (undervisited, deficit-running) 5-month World Expo.[19]

In 2020, MVRDV released plans to turn the pavilion building and its surroundings into a mixed-program complex with two new buildings on either side. The pavilion itself would be transformed into office and retail space, while the unused land during the expo would become two stepped blocks for office, retail, student housing and parking.[20]

MVRDV notes that the revenue from developing the unused land is what makes the repair and renovation of the pavilion structure possible.

[18] MVRDV. "Expo 2000." (Accessed 2021). Available online at https://www.mvrdv.nl/projects/158/expo-2000. Photo from https://archinect.com/news/article/150206369/mvrdv-s-dutch-expo-2000-pavilion-may-receive-a-second-life-after-all

[19] Young, Rob. "Live Fast, Die Young." (2015). Available online at https://www.uncube-magazine.com/sixcms/detail.php?id=15358283#!/page1 The article notes that despite the abandonment of the Dutch pavilion, some of the other pavilions were reinhabited or successfully moved elsewhere for reuse.

[20] MVRDV. "MVRDV to transform Expo 2000 Pavilion, revisiting a world-renowned project from the practice's early years." (2020). Available online at https://www.mvrdv.nl/news/2620/mvrdv-to-transform-expo-2000-pavilion-revisiting-a-world-renowned-project-from-the-practices-early-years

BARRIERS TO REPAIR

From March 2021, REPAIROLOGY will be released on a weekly basis for 8 weeks during the duration of the pre-diploma. Each issue will focus on a topic from - or related to - repair under the following categories:

theories of repair / process of repair /
systems of maintenance / barriers to repair.

It is hoped that by tracking, recording, and collating where repair pops up in and around architectural discourse, existing principles can begin to be pulled together and questioned in a new way to form part of a more anticipatory approach to architecture.

WHY BOTHER REPAIRING?

In the course of the pre-diploma, I have covered:

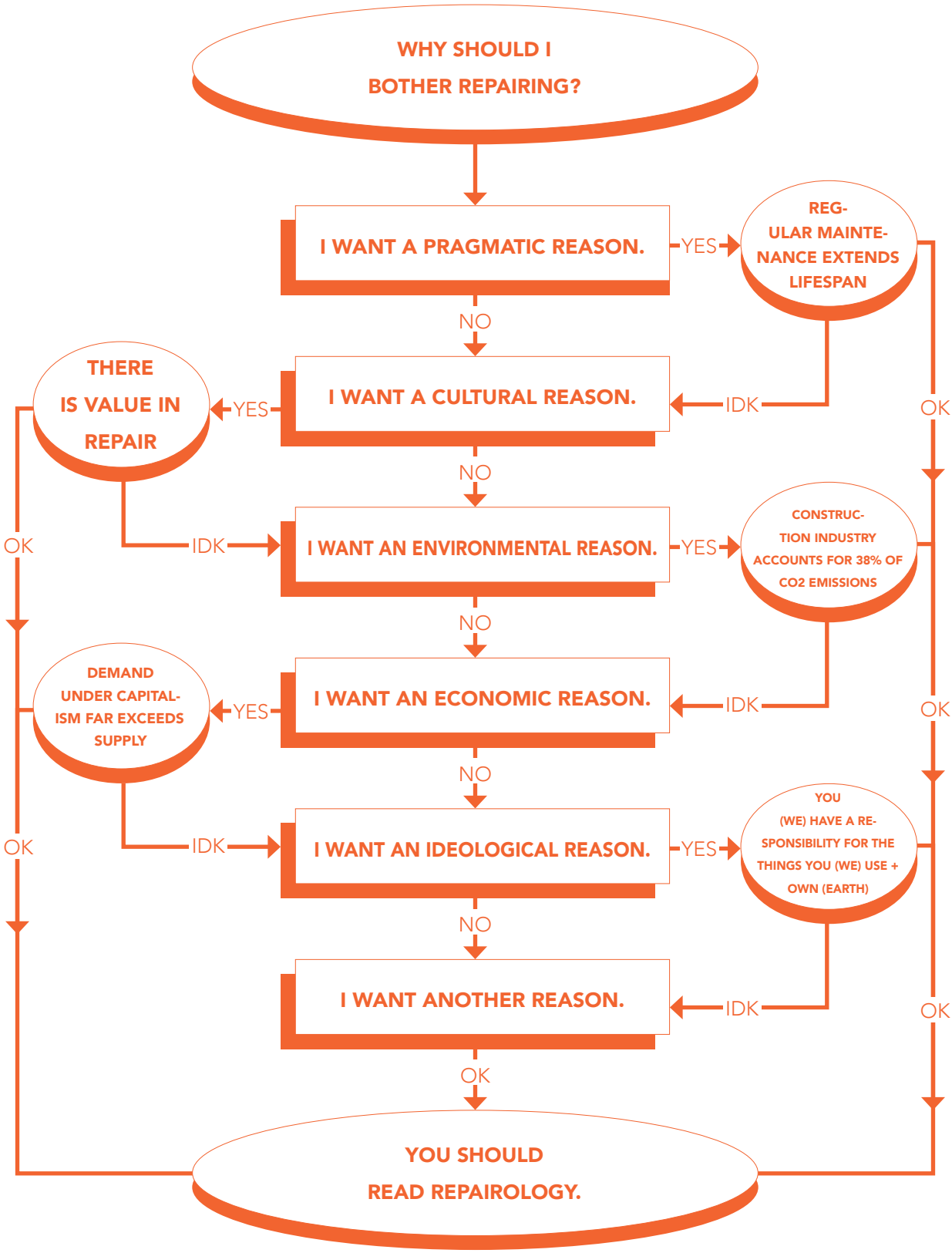
» Theories of repair (#1) - examining the value of repair and how it is discussed in architectural preservation

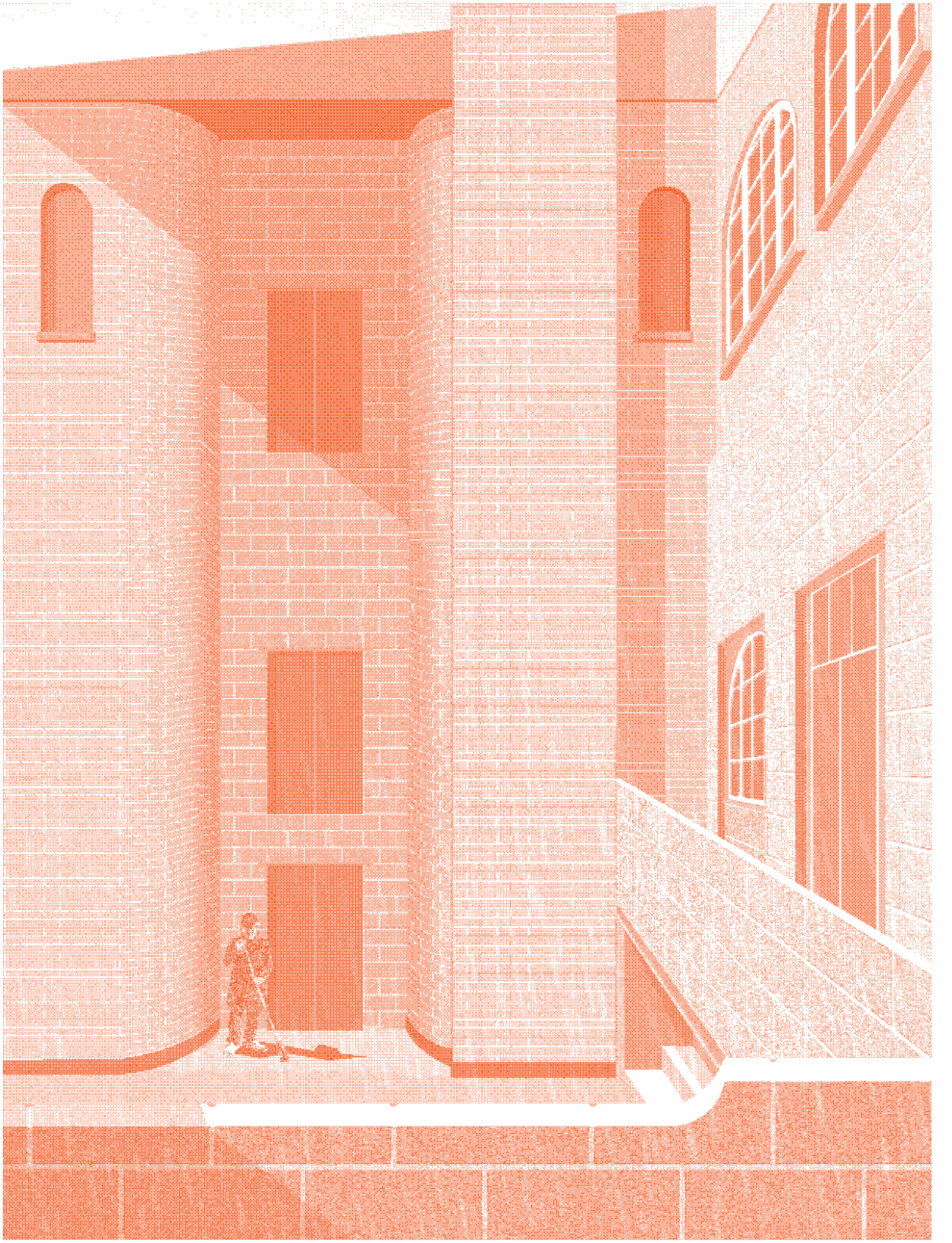
» Processes of repair (#2, #3) - looking specifically at scaffolding (which facilitates repair) and cleaning (an overlooked kind of repair) and their relationship to the built environment as processes with / without an end.

» Systems of repair (#4, #5, #6) - existing / precedent projects and systems sorted by whether maintenance is the responsibility of the architect, the user, or a mix of both.

So why do should we bother repairing?

This issue is a sort of summary issue that tries to identify barriers to repair by examining how the social / economic context in which architecture operates, influences its production. It is hoped the questions forumated from these barriers begin to form parameters for the direction of the diploma.


WHY SHOULD I BOTHER REPAIRING?
I WANT A PRAGMATIC REASON.
YES
REGULAR MAINTENANCE EXTENDS LIFESPAN
NO
I WANT A CULTURAL REASON.
IDK
OK
THERE IS VALUE IN REPAIR
YES
NO
I WANT AN ENVIRONMENTAL REASON.
YES
CONSTRUCTION INDUSTRY ACCOUNTS FOR 38% OF CO2 EMISSIONS
IDK
OK
NO
DEMAND UNDER CAPITALISM FAR EXCEEDS SUPPLY
YES
I WANT AN ECONOMIC REASON.
IDK
OK
NO
I WANT AN IDEOLOGICAL REASON.
YES
YOU (WE) HAVE A RESPONSIBILITY FOR THE THINGS YOU (WE) USE + OWN (EARTH)
IDK
OK
NO
I WANT ANOTHER REASON.
IDK
OK
OK
YOU SHOULD READ REPAIROLOGY.



ARCHITECTURE IN A WIDER CONTEXT

As mentioned in the first issue, repair of the built environment is an interesting topic because it exists both inside and outside architecture. By curating and researching through this unusual lens, I've identified several recurring problems and barriers to repair, as well as they ways they have been addressed.

THE INVISIBILITY OF THE PROCESS OF REPAIR

The work that goes into the repair of the built environment is neccessary in keeping it operational and slowing decay, but maybe not recognised enough.

Take scaffolding, for instance. There are many reasons to use scaffolding but they are often unseen or unseeable unless the viewer has a connection to it. New-build scaffolding obscures. Demolition scaffolding even more so for safety reasons. Renovation scaffolding is seen through and its past / future form visualised.

And although the value of patina cannot be ignored, regular cleaning and maintenance is required to keep that decay limited to a visual aspect. Our built environments would be terrible if no one was (hired to) take responsibility and keep them usable. The same thought forms a principle for ELEMENTAL's incremental housing systems, in which the provision of less public space is (perhaps counterintuitively) better for building maintenance.

Are there other ways to encourage clean / cared-for spaces? Can scaffolding facilitate this + the recognition of repair? How do we turn the qualities of scaffolding - its temporariness and ubiquity - into a value?

«« Previous page, a *suggestive* flowchart that points at why repair is a field worth studying. I hope the pre-diploma work has piqued your interest / convinced you of its value....

« Opposite page, perspective from transformation project for an open-air theatre. The janitor sweeps the stage in preparation for the next performance.

THE MAINTENANCE-FREE ARGUMENT AS A BARRIER TO REPAIR

As pointed out in #3-#6, buildings are never maintenance-free. Construction and project management is a multidisciplinary industry in which architects can rely on suppliers to provide components that meet building standards, and cost efficiency is often a factor in decision-making. Obviously, as standards are updated with technological advancements, our buildings might neccessitate repair before their expected time.

How can architects start thinking about lifespans + future lives of buildings as part of the design process? Can anything be learned from the arguments surrounding the right to repair (eg. appliances and software) in other fields?

THE ARCHITECTURAL PROCESSES AS A BARRIER TO REPAIR

As pointed out #4, the adoption of prefabrication and modularity during the 20th century was intended to increase efficiency and prepare the ground for the future. There was a lot of emphasis on built-in flexibility, from open plan layouts, to movable partitions, to detachable components, to ambigous 'polyvalent' spaces - assuming that users would use the building as the architect envisioned. This didn't quite work out. (no sense of responsibility for replacements, too much of a hassle to move / use movable partitions, not actually flexible).

What things can / can't architects take for granted between the 'vision' and the reality? Perhaps exploring this further can help the design of details that facilitate repair.

LACK OF EXPERIENCE AS A BARRIER TO REPAIR

Addressed indirectly in issue #5, architectural details that 'suggested' how a building could be extended or finished was used in half-build housing. In contrast, architects are trained in reading the language of buildings.

Can we futureproof + design readable spaces / parts that suggest how a structure can be changed for future use?