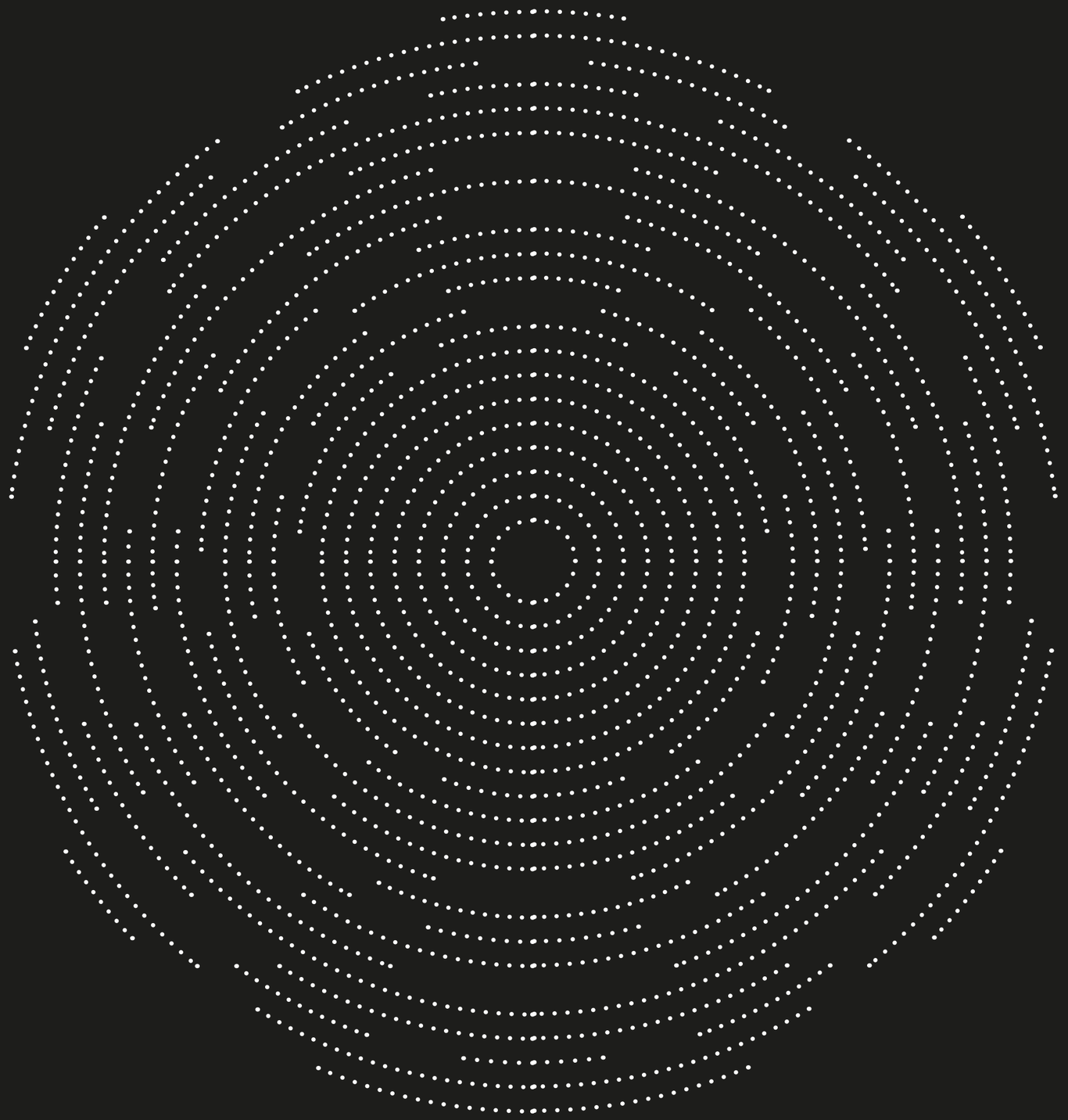
Architectures of Correspondence



Concreted Zurich

A Distortion of Correspondences

—NATHALIE REIZ

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Master Thesis ETH Zurich
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Concreted Zurich
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A large blue crane is hovering proudly over the calm lake water. Graffities in all colours and languages are sprayed on it, like an urban projection screen. Our habitat is talking to us and so are we. Many of the sprayers won't know, that this crane has lifted in the last one hundred years the foundation material of the city of Zurich. Millions and millions of tons of sand and gravel have been unloaded here every day coming from the Upper Lake of Zurich with the so-called "Ledischiff". The days of the "Ledischiff" are over by now. The city is built. Or is it?

Case Study Kibag Concrete Plant Zurich Wollishofen
Behind the obsolete-looking crane, there is still the Kibag site in Wollishofen producing 120'000m^3 of concrete for Zurich every year, enough for 800 new single family houses. In my research I observe this concrete plant closely. From the interior the calmness of the lake vanishes and blurs into a dull humming. Sand and gravel rattle over the conveyor belts, the fine dust of cement is blown through pipes, addititves wait in their tanks to be used and water is rushing into the concrete mixer. The end result is an elegant flowing shapeless grey mass, which will make its way to build the city of Zurich, my habitat. But where does this material come from and how does it correspond to our built environment in the city?

Resource Flows of Concrete: Impacts on Soil & Atmosphere
To investigate this, I look into the resource flows of concrete of the Kibag site. This research takes me to carved-out landscapes, which are blasted open, washed away, dredged out, removed and refilled in an almost brutal act of man-made transformation. The terraced Gabenchopf quarry, which mines limestone and marl for cement production and the gravel pit in Stadel show me how much material humans move every day to further expand their habitat. However, it is not only the soil that is transformed; at the cement plant in Siggenthal it becomes clear how much particulate matter and exhaust gases, the most prominent of which is CO_2, are released into our atmosphere almost without limit. Hundreds of lorries roaring from the extraction sites to the plants, to the cities and back again every day exacerbate this problem by their exhaust fumes and traffic nuisance they create.

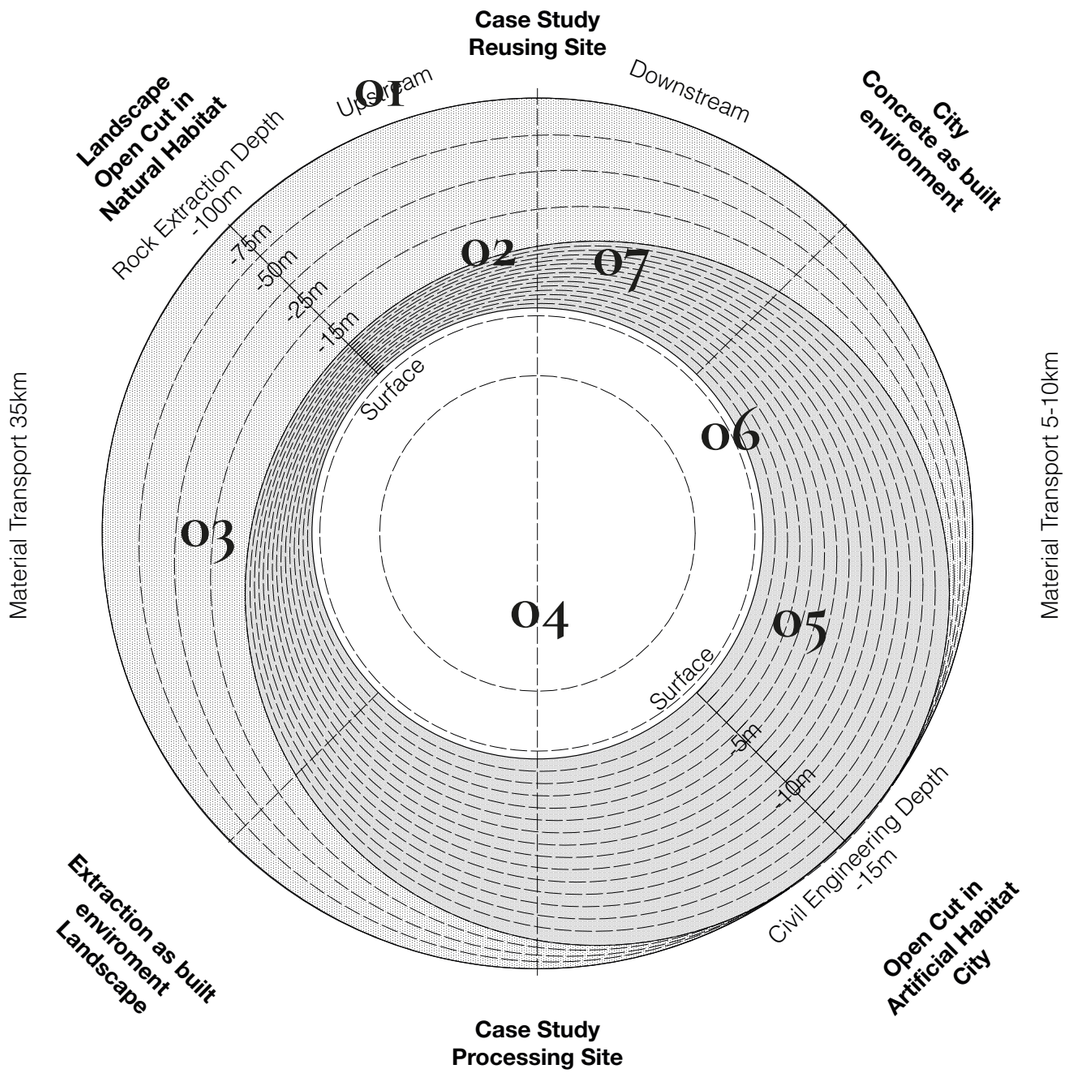
Distortions of our Habitat
Not only is the impact of concrete on our natural habitat evident, but also where the material is used, on our construction sites and our cities. In the course of the 20th century due to the invention of reinforced concrete as probably the most efficient and scalable building material of modern times, huge infrastructures, roads, railroads, residential and commercial buildings are built. In our city, holes are dug, piles of earth are transported away and covered with concrete. As much as we seem to need concrete for our livelihood, it is also the antithesis of everything natural that we know in our habitat. It is the building material that reveals the distorted correspondence between the artificial and natural habitat.

Actors: Conflicts and Negotiations around Concrete Processing
Where such distortions occur, there are various conflicts and negotiations that arise in the processing of this highly conflictual material. To investigate these conflicts and negotiations further, I talk to various actors such as representatives of the planning and construction industry, the responsible authorities, residents, professional associations, but also researchers. Sometimes the actors are not human, like different animal and plant species. I then read about their habitat and how they inhabit these spaces. Sometimes the actors are also not traceable to a single person to be interviewed, but rather found on the site itself, like graffiti or posters or even in a virtual form like comments on the internet.

Possible Approaches to the Current Resource Flow
Nevertheless, it is impossible to imagine our habitat without concrete as a building material. We still pour around 2m^3 of concrete per person per year over Switzerland. This mass of concrete alone, together with the large-scale infrastructure and the local availability of its resources, makes it almost impossible to replace all of it with alternative materials such as wood. In addition, there are also infrastructural buildings or certain public buildings for which concrete is difficult to substitute thanks to its formability, water resistance and durability. Therefore, we must find a solution how to deal with the building material in the future in order to ensure a sustainable and responsible use for all actors and habitats. This is why, in a final research step, I look at the current state of research for more sustainable processing of concrete and try to locate where these approaches act in the whole flow of resources. From approaches like reduction of CO_2 emissions, to circular economy strategies, over to the change of planning standards.

Design Approach: Kibag Site as Recycling and Testing Hub
But where can I act here as a designer? By re-developing the Kibag site into a testing ground for a new concrete economy, where all material flows, challenges and conflicts come together, I act on the entire resource flow. In my design proposal, I provide a new recycling center for the city of Zurich, by reactivating the lake for a transportation system of demolition material. Moreover the area becomes a testing ground for various new technical possibilities of concrete to investigate which architectural form language and type of construction can be applied to it. The Kibag concrete plant remains open too. It promotes the scalability of these concrete processes and brings these tested concrete variants directly to the city. The testing ground, which is located next to very public spaces in the city, should also be opened to the public towards the lake and become a place of exchange for citizens, builders, architects, industry representatives, authorities or any other affected actor. Because every innovation of the material brings new conflicts and negotiations, which need to be elaborated further. With that the Kibag site becomes a space to negotiate and demonstrate the potentials of concreting, showing how this material can again correspond to the habitats it produces.

Studied Sites



01
Quarry Gabenchopf

Quarry for mining limestone and marl for the cement production. Owned and operated by Holcim AG.

02
Cement Plant Siggenthal

Cement plant, where the raw material ggrinded and burned to clinker. Owned and operated by Holcim AG.

03
Gravel pit & plant Stadel

Extraction of gravel in the gravel pit. At the gravel plant the material gets washed & sorted. Operated by Kibag.

04
Concrete Plant Wollishofen

Concrete plant, where all raw materials get mixed in the city of Zurich. Operated by Kibag.

05
Construction /Demolition

Construction site “Haus zum Falken”, where huge civil enigneering and construction activities take place by Kibag.

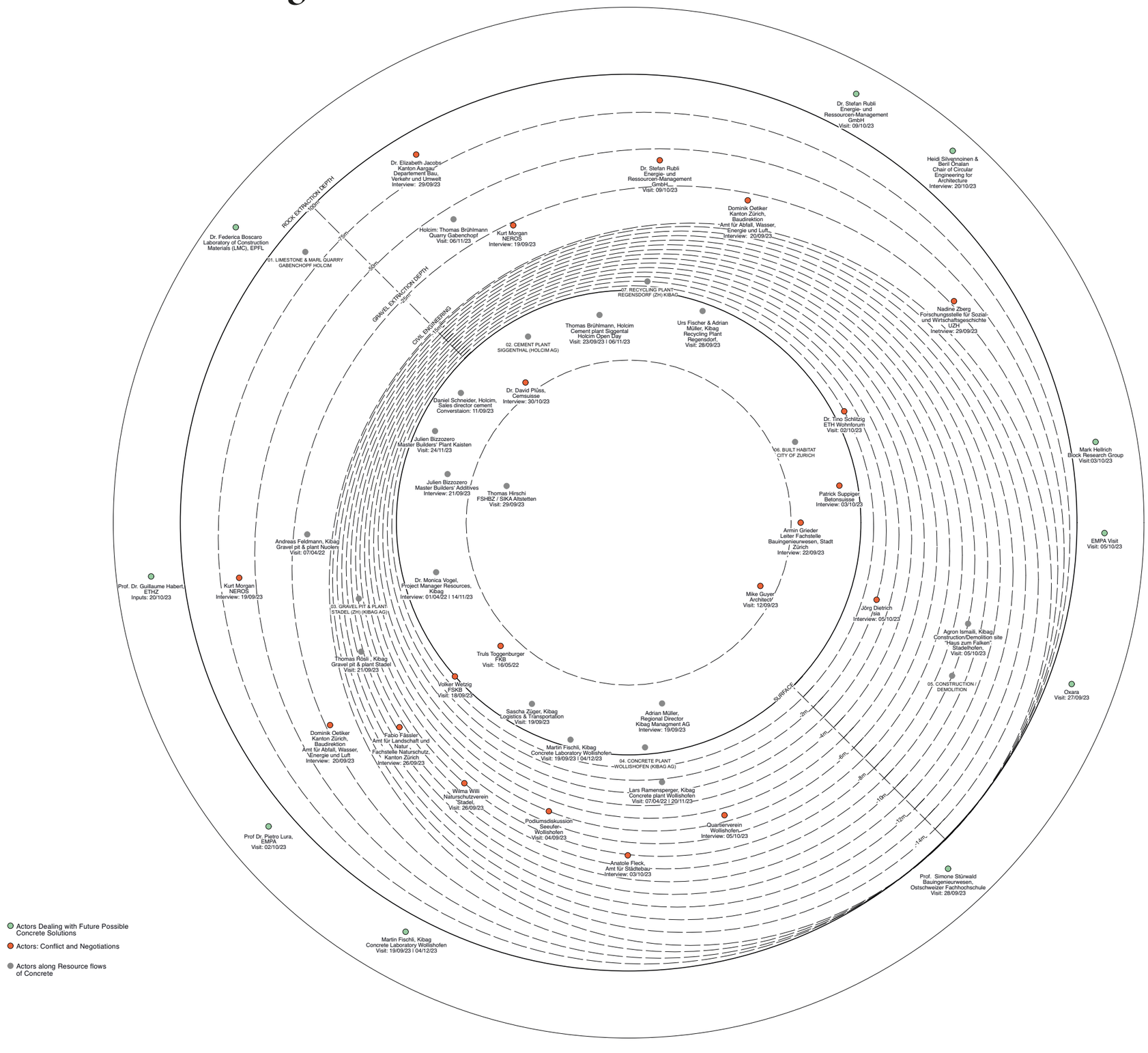
06
Zurich Built Habitat

The influence of concrete on our city and how it corresponds to the nature where its material comes from.

07
Recycling Plant Regensdorf

Recycling plant where demolition material gets re-used in order to close the material cylce. Operated by Kibag.

Actors: Conflicts and Negotiations around Concrete Processing



Possible Approaches to the Current Resource Flow

Cement Plant Imporvements

- Alternative Raw Material
- Carbon Capture and Storage (CCS) & Carbon Capture and Utilization (CCU)
- Alternative Fuels & Optimised Plants

Circular Economy

Reduction of CO_2-Emissions

Cement Composition: Reduce clinker content

- CEM III / B
- LC3
- Holcim Susteno 4
- MOMS Empa
- CSA-Cement EMPA

Circular Economy

Reduction of CO_2-Emissions

Alternative Binders: Concrete without cement

- Re-use of excavation waste Oxacrete Care & Nossim
- Re-use of demolition waste Oxacrete Oulesse

Circular Economy

Reduction of CO_2-Emissions

CO_2 Compensation with the Concrete Mixture

- Klark (Pyrolysed Plants choral)
- Empa (Pyrolysed Waste)

Reduction of CO_2-Emissions

Improvements on the Construction site

- Fibre reinforcement for material savings
- Formwork Block Research Group
- Textile Formwork Block Research Group
- 3D- Printed Formwork Dillenburger
- 3D- printed concrete without Formwork (Empa)

Reduction of CO_2-Emissions

Improvements Demolition Site

- Re-use of structural concrete elements (Juch-Areal & EPFL Prototype Bridge)

Circular Economy

New Architectural Expression: Structural Forms with less material

- RFS-Ceiling (Implementation Crea-Tower)
- Concrete shells: HilO EMPA Block research group

Reduction of CO_2-Emissions

Recycling of Concrete

- Recyclinggranulate for RC-Concrete
- CO_2 Capturing in RC-Material: Neustark
- New Cement out of crushed demolition material: Smart crusher

Circular Economy

Reduction of CO_2-Emissions

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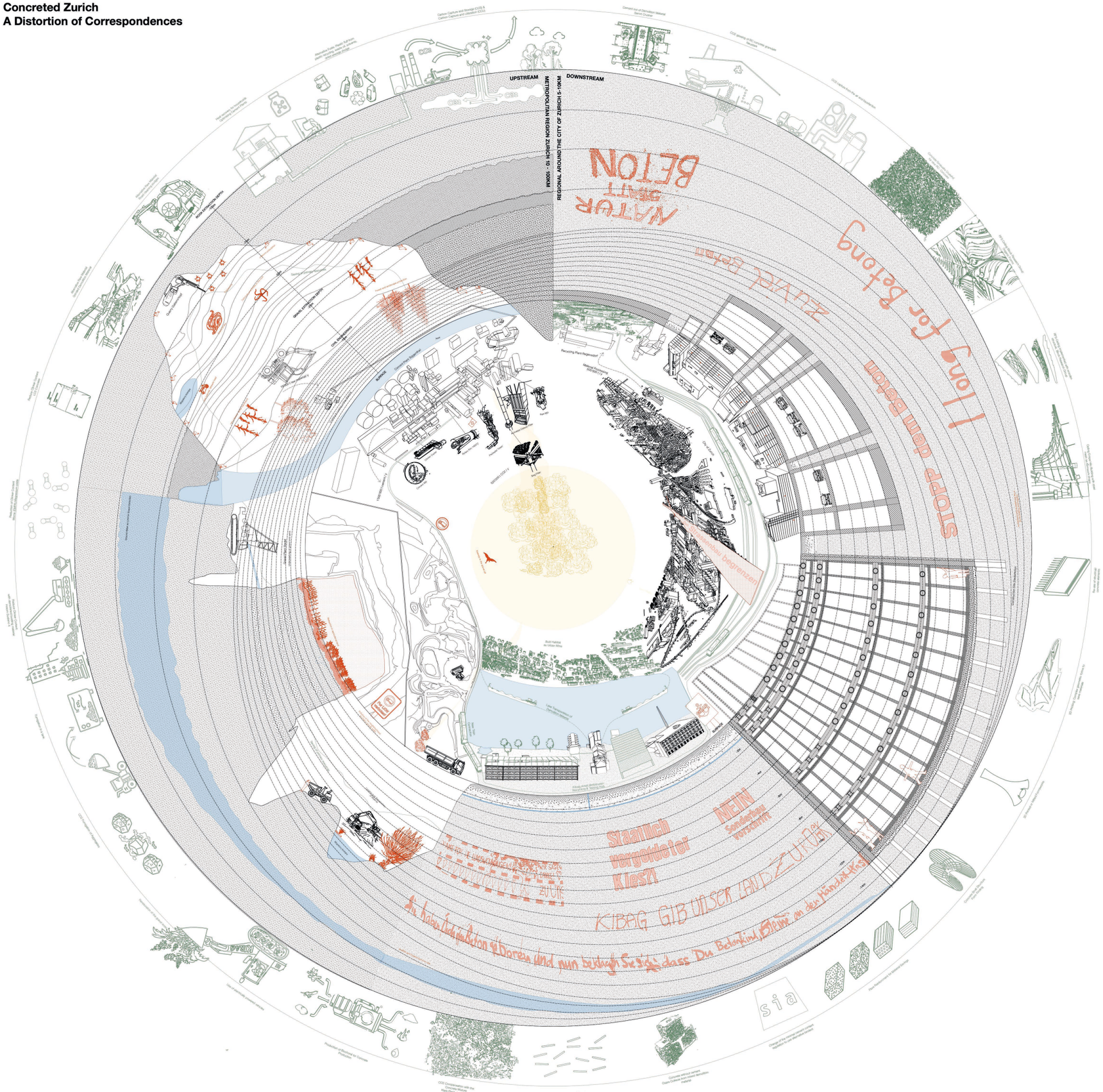

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Architecture of Correspondence

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QUARRY GABENCHOPF (HOLCIM)

"Die Erschliessung neuer Abbaugebiete ist immer eine Interessensabwägung. Hier spielen Grundwasserversorgung, Waldschutz oder Landschaftsschutz eine grosse Rolle. Vor allem die ENHK «Eidgenössische Natur-und Heimatschutzkommission» ist hier bei der Beurteilung von national geschützten Gebieten zuständig. Bei einem ersten Bundesgerichtsurteil zum Abbau von Zementrohstoffen, wurde diese erstmals von nationalem Interesse ausgewiesen. Kies- und Sand is noch genug vorhanden, weshalb hier kein nationales Interesse besteht. Aufgrund immer schwierigeren Bewilligungsverfahren ist gerade bei den Hartstein- und Zementrohstoffen, der Selbstversorgungsgrad in Zukunft nicht mehr unbedingt gewährleistet. Durch all diese Faktoren dauern Bewilligungsverfahren lange und sind durch Bevölkerungs- und Nutzungsdruck immer schwieriger realisierbar."

- Kurt Morgan, Geschäftsführer NEROS

"Es gibt Zielkonflikte im Naturschutz. So haben nicht alle Arten die gleichen Lebensraumansprüche z.B. wenn es darum geht Wanderbiotope zu planen. Hierbei versucht man zu beurteilen, welche Arten schon da sind und wie hoch der Artenwert ist. Der Versuch ist es, möglichst mit einem einheitlichen System eine Priorisierung vorzunehmen, wobei es sich nicht um eine exakte Wissenschaft handelt."

- Fabio Fässler, Kantonales Amt für Landschaft und Natur, Kanton Zürich

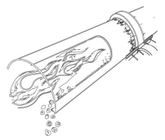
Der Kies, aber auch der Zement, ist ein lokales und ein schweres Produkt, wobei die Transportkosten eine immense Rolle spielen. Sie sind fast die einzigen Rohstoffe in der Schweiz, welche sogar den gesamten schweizerischen Bedarf an Bauvolumen decken können. Ausserdem findet die gesamte Produktion und die gesamte Veredelung lokal statt. Es würde sich bei diesem Material nicht lohnen, aus dem Ausland zu importieren.

- Truls Toggenbruger, Präsident des Fachverbandes für Kies- und Betonwerke Kanton Zürich

CEMENT PLANT SIGGENTHAL

"If we compare 1 t of concrete with the same amount of other building materials, its specific environmental balance is better than for most building materials. The main problem lies in the huge quantities of concrete that are produced. As a result, concrete causes around 8 per cent of CO2 emissions worldwide. Most of this is caused by the production of cement. About two thirds of these emissions are very difficult to reduce because they come from the raw materials that we absolutely need for cement production, namely from the calcination of limestone."

- Pietro Lura, Head of the Concrete and Asphalt Laboratory at Empa and professor at ETH Zurich, Institute of Building Materials



"Der Klinker als Hauptbestandteil von Zement verursacht sehr hohe CO2-Emissionen. Daher is es wichtig, dass weniger Klinker im Zement verwendet wird. Die Zementindustrie ist sich ihrer Verantwortung bewusst. Vor allem werden hierbei CO2 Abschöpfungstechnologien sehr wichti sein, um bis 2050 CO2 negativ zu werden.

Nebst der Verringerung des Klinkeranteils, ist die wichtige Umstellung bei den Zementwerken beim Verbrauch von alternativen Brennstoffen, wobei der Anteil heute bei 70% liegt. Hierbei sir 100% durchaus technisch heute schon möglich, jedoch befindet sich die Zementindustrie bein Zugang zu diesen alternativen Brenstoffen oft in einer Konkurrenzsituation mit anderen Interessenten, wie beispielsweise den Verwertern von Abfall oder biogenen Stoffen."

- David Plüss, Cemsuisse Leiter Kommunikation und Public Affairs

GRAVEL PIT & PLANT (KIBAG AG)

"Beim Kiesabbau wird die Landschaft temporär von Kiesgruben besetzt, welche 15% des ursprünglichen Landwirtschaftslandes als biodiverse Ruderalflächen hinterlässt. Solche Flächen wären ansonsten nicht wirklich möglich, da fast keine offenen Flusslandschaften im Kanton Zürich bestünden. Natürlich stehen diese naturnahen Flächen, aber auch immer in Konkurrenz zu den Fruchtfolgeflächen."

- Truls Toggenbruger, Präsident des Fachverbandes für Kies- und Betonwerke Kanton Zürich

"Viele Pionierarten profitieren von der Kiesindustrie, wie beispielsweise die Kreuzkröten, welche natürlich in dynamischen Flussauen vorkommen würden. Diese natürlichen Lebensräume wurden immer seltener. Nach den Flusskorrekturen Anfang des 20. Jh. sind 99% dieser Lebensräume für Pionierarten verloren gegangen. Pionierarten finden jedoch in Kiesgruben durch die offenen Fläche anthropogene Sekundärlebensräume. So sind schon während dem Abbauprozess Betriebsflächer wichtig für Pionierarten. Daher bestehen während den Arbeiten in der Grube Auflagen, um Wanderbiotope und Böschungen zu schaffen. Der Kiesabbau kann zudem einen Mehrwert für die Biodiversität bilden, da in der Endgestaltung auf zuvor stark kultiviertem Ackerland naturnahe Flächen entstehen. Das Ziel ist hier mit dem Gestaltungsplan einen Mehrwert für die Ökologie zu schaffen."

- Fabio Fässler, Kantonales Amt für Landschaft und Natur, Kanton Zürich

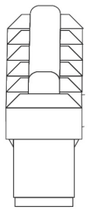
"Die Kiesgruben sind auch vermehrt ein politisches Thema, da diese mit Lastwagenverkehr einhergehen. Daher wurde 2021 die «Verordnung über den Bahntransport von Aushub und Gesteinskörnung» erlassen. Seitdem müssen Bauherren bei Grossbaustellen per Bahn transportieren. Es handelt sich hierbei aber nicht um eine ökologische Massnahme; mit der Verordnung soll der Norden des Kantons, wo die grossen Kiesvorkommen liegen, von Schwerverkehr entlastet werden."

- Dominik Oetiker, Amt für Abfall, Wasser, Energie und Luft, Kanton Zürich

CONCRETE PLANT (KIBAG AG)

"Der Standort in Zürich Wollishofen bietet den grossen Vorteil, dass der Transport des Betons in die Stadt sehr lokal und effizient passiert. Auch können lokale Firmen, direkt den Beton ab Werk beziehen. Nahe Transporte für die Baustellen in Zürich sind aufgrund der Verteilung der Kibag-Werke rund um die Stadt gewährleistet. "

- Adrian Müller, Regionalleiter bei der Kibag Management AG



"Da es mehr verschiedene Mischungen und unterschiedliche Produkte geben wird, müssen di Betonwerke flexibler arbeiten können. Hierfür bräuchte es gerade bei älteren Betonwerken mehr Infrastruktur, die meist mit hohen Investitionen verbunden sind. Andererseits wäre auch eine Spezialisierung von einzelnen Werken möglich, wobei dies zu deutlich längeren und komplizierteren Transportwegen führen könnte. Auch bei Zementwerken werden die neuen Entwicklungen zu Investitionskosten führen, beispielsweise beim Thema der CO2-Abscheidung bei der jedes Unternehmen gut abwägen muss, was die beste und nachhaltigste Lösung ist."

- Volker Wetzig, FSKB Fachverband der Schweizerischen Kies- und Betonindustrie

"Kibag Gib ab - Weiterhin Nein zu teuren Wohnungen am See. Nein. Weshalb wir auch wie letztes Jahr am 4. September den Raum mitgestalten wollen und sie erneut darauf hinweisen, was die Stadt Zürich und das Quartier Wollishofen wirklich brauchen... Platz. Platz um Freiraum bestehende Infrastrukturen umzunutzen; für unkommerzielle Zwecke, Menschen aus allen Schichten, Räume für Treffen und Aktionsraum. Ein Erholungsraum erweitern, welcher di Lebensqualität aller fördert!"

- Flyer "KEBOCK"

CONSTRUCTION SITE (KIBAG AG)

"Alle Leute wissen, dass wir Beton weiterhin brauchen werden, auch wenn es Vorbehalte diesbezüglich auf allen Ebenen gibt. Wichtig ist hierbei transparent aufzuzeigen, wie nachhaltiges Bauen mit Beton möglich ist, sowohl auf der industriellen als auch auf der Planungsebene. Mögliche Hebel wären eine Planung im Sinn der Kreislaufwirtschaft zu fördern und hierbei auf Materialeinsparung, Systemtrennung und Fertigbauteile zu achten. Auch hybride Konstruktionen und Bauteilaktivierung sind hier sehr sinnvoll. Generell ist es jedoch wichtig, die Lebensdauer von Bauwerken zu erhöhen."

- Patrick Suppiger, Geschäftsführer Betonsuisse

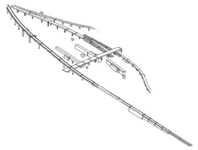
"In general, concrete is over dimensioned for many applications in Central Europe. Builders, architects, and planners tend to use more concrete, and often of better quality, than is needed. Thi is a consequence of the fact that labour often costs more than the material used. Concrete is comparatively cheap and is therefore often wasted. To reduce this waste, CO2 should be given a fair price."

- Pietro Lura, Concrete and Asphalt Laboratory at Empa and professor at ETH Zurich, Institute of Building Materials

"Die Ausschreibungen im Beschaffungswesen müssten überarbeitet werden, wobei «Materialneutral» ausgeschrieben werden. Es sollte nicht darum gehen eine Konkurrenz zwischen verschiedenen Materialien zu fördern, wie beispielsweise die andauernden Vergleiche zwischen Ho und Beton. Sondern es sollte im Fokus stehen wie bei der Grössenordnung von 5 Mio. Tonnen Zementverbrauch im Jahr in der Schweiz, die negativen Effekte sinnvoll und je nach Einsatzbereich vermindert werden können. Oft sind auch Normierungen bei Bauunternehmen eine Frage beim Einsatz von neuen Materialien. Beispielsweise, ob ein Bauteil statisch den Ansprüchen genügt. Hie sind private Investitionen auch nötig, um Innovationen voranzutreiben."

- David Plüss, Cemsuisse, Leiter Kommunikation & Public Affairs

BUILT HABITAT CITY OF ZURICH



"Beton ist heute nicht wegzudenken. Wäre der Zement und damit der Beton nicht erfunden worden, würde unsere Gesellschaft heute ganz anders aussehen. Ohne den Baustoff Beton wären Infrastrukturen, Staumauern, Wasserleitungen oder die Fundation von Häusern gar nicht möglich gewesen."

- Armin Grieder, Stadt Zürich, Amt für Hochbauten

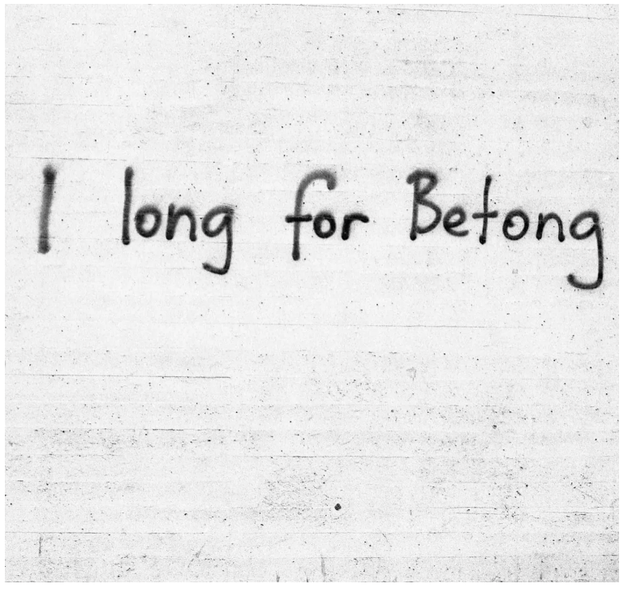
I long for Betong

"Beton ist mehr als Beton. Beton ist eine bösartige Geschwulst mit raschem, destruierendem, inflativem Wachstum. Beton bildet Metastasen. Beton dring ein in den Kopf, verstopft die Ohren, wächst aus Augen,versperrt Münder, umschliesst Hände. Beton in den Gesichtern eilig vorübergehender..."

- O.V. Walter in "Wollt ihr den totalen Beton?"

"Der Beton bildet den Baustoff für das Gerippe der gesamten Stadt. Es gibt zwar Sichtbetonbauten, doch ist der Beton meist das statische Skelett eines Gebäudes. Heute herrscht ein klarer Trend weg von der Ästhetik, hin zu einem funktionalen, kreislaufbasierten Schwerpunkt in der Jurierung der besten Bauten. Wenn man sich die CO2 Thematik ansieht, muss einem klar werden, dass der Beton immer noch ein Material der Zukunft ist aufgrund seiner Langlebigkeit und Stabilität"

-Truls Toggenbruger, Präsident des Fachverbandes für Kies- und Betonwerke Kanton Zürich



RECYCLING PLANT (KIBAG AG)

"Da wir zurzeit genügend Rückbauten in der Stadt Zürich haben, ist die Verwendung von Recyclingbeton sehr sinnvoll. Bauvorhaben der öffentlichen Hand und grösseren Bauherren fordern meist 40% Recyclinggranulat für ihre Neubauten. Aber schon herkömmlicher Beton wird bis zu 25% Recyclinggranulat verwendet. Damit werden Primärressourcen gespart und de Stoffkreislauf geschlossen. Ausserdem ist je nach Qualität und Beschaffenheit des Aushubmaterials auch eine Aufbereitung, der darin enthaltenen Gesteinskörnungen möglich, u Primärressourcen zu sparen."

- Adrian Müller, Regionalleiter bei der Kibag Managment AG

"Die Bauindustrie produziert mengenmässig den meisten Abfall in der Schweiz. Wir müssen also fähig sein, den Beton bzw. den Mischabbruch wieder in den Kreislauf einzubinden und wiederzuverwenden... Die Stossrichtung ist definitiv die, dass die Kies- und Betonindustrie zum aktiven Player einer Kreislaufwirtschaft wird. Bei der Absorption des Rückbaus wird heute im Kanton Zürich schon nahezu 100% des Betonabbruches wiederverwendet. Der Baustoffkreislauf wird unterstützt durch Labels und politische Vorgaben. Im weiteren gilt, dass nur wenn es Abnehmer für die Produkte der Kreislaufindustrie gibt und diese auch durch die Ingenieure, Architekten, Planer, Baumeister verbaut wird, wird es möglich, dass der Kreislaufgedanke eine Zukunft hat."

- Truls Toggenbruger, Präsident des Fachverbandes für Kies- und Betonwerke Kanton Zürich

"Ob die Nachfrage an Recyclingmaterial steigt, hängt erstens davon ab, wieviel Recyclingmaterial in den normalen Beton gelangen darf, wenn er nicht explizit als Recyclingbeton deklariert wird. Dies hängt jedoch von der Normengebung der sia ab.. Zweiten spielen auch die Deponiepreise eine wichtige Rolle. Wenn diese hoch sind, begünstigt dies das Recycling von Materialien. Auf Deponien sollten nur noch Materialien gelangen, welche man nicht gut verwerten kann."

- Dominik Oetiker, Amt für Abfall, Wasser, Energie und Luft, Kanton Zürich

A Manifesto for New Concrete Correspondences
– 10 Strategies for the Kibag Areal in Zurich-Wollishofen

I. Let's keep production within the city of Zurich!

Production should be as close as possible to the city of Zurich, to keep jobs and reduce transportation. This principle is all the more important for concrete as a building material. The Kibag Areal offers a great potential to remain a productive site in the city of Zurich. The site, where concrete has been produced for almost 100 years, is ideal due to its good location being near to the city centre and guaranteeing possible transport connections through the lake and the railway. Local material transport and fast connections to the neighbouring construction sites will be efficient and resource-saving. Production for an industry that urgently needs to take a step towards sustainability needs space in the city to present and to discuss in order to drive possible solutions forward.

II. Let's treat Zurich as a resource through activating the lake!

The Kibag site in Zurich Wollishofen will become a new recycling centre for the reuse of demolition and excavation material. To this end, the obsolete crane, which was originally used for loading gravel, will be reactivated so that the lake can once again be used for transportation of goods. This should not only bring the centuries-old tradition of material transport on the lake back to Zurich, but also will activate different locations along the lake. The densely populated area around the lake will become an urban mine for the future production of concrete. Loading stations can be built or reused at Kibag's existing harbours. In addition, this network can also be made denser by adding further loading stations at the landing stages of the Zurich shipping company. In this way, a largely recreational lakescape can be transformed back into a productive one. "Ledischiffe" sail alongside sailing and rowing boats. Tonnes of materials are cruising over the calm lake water, ready to return to the cycle or materials.

III. Let's strengthen existing infrastructures with new innovations!

The existing infrastructure of the Kibag site for concrete remains in place with all its buildings, some of which date back to the late 19th century. However, the over time functionally grown processing infrastructure needs to be extended to deal with the new material flows that will enter the site. In addition to the reactivated crane on the lake for transporting materials, a new connection to the rail network is also to be created, with the materials being lifted by crane over the main road. This will create an interweaving between the existing and new infrastructure, which will give the site a new expression and liveliness.

IV. A new recycling hub for a circular economy!

New recycling plant and silos are built between the existing production line and the Rote Fabrik to process the new material flows. Firstly, the washing and sorting plant for contaminated materials, then the industrial hall for the crusher and finally the silo for those materials that are not processed into concrete but are transported directly by rail or lorry to construction sites or other plants.

V. The Kibag Areal as research and testing ground!

In order to be able to build sustainably with concrete in the long term, it is not only important to promote the circular economy, but also to be able to drastically reduce the high CO_2 emissions when building with concrete. To this end, a new research centre and testing ground is established on the Kibag site. The building materials laboratories and test workshops are located in the existing buildings of the former Kiefer window factory, with new testing units to be built on the roof of the building. On the one hand, they emphasise the importance of the new material in terms of urban planning and, on the other, the testing units will be visible from the busy street.

VI. Make concrete architecture sustainable again with productive case studies!

All new built structures for the centre for recycling and research are case studies, which are trying to test different design solutions and architectural expressions for a more sustainable use of concrete.

a. Washing Plant: The newly created washing plant consists of an unreinforced solid tamped concrete structure with the lowest possible cement content and a high proportion of recycled excavated and demolition material. The very solid walls are designed to withstand the vibrations, while the tensile load is borne by an internal steel skeleton.
b. Recycling hall: The recycling hall for the concrete crusher and CO_2 gassing requires the largest possible spans for the machines. A thin shell construction with optimised static form-finding and reusable formwork is therefore used. The aim here is to achieve the largest possible roofing with the smallest possible use of materials.
c. Silo: The new horizontal silo, which consists of barrel vaults, adopts the original pressurised construction method from Roman times, with each barrel vaults consisting of different recycled materials and clinker proportions to test different mixtures under weathering and load.
d. Primary structure for testing units: The basic structure for the extension on top of the building is to be constructed from bolted prefabricated concrete elements, which can later be dismantled and reused without having to demolish how elements.

VII. Make the production public!

The front part of the site facing the lake provides a new green space for the neighbouring quarter. The Wollishofen community centre meadow will be enlarged and the quarters' building itself will now stand as a pavilion in the newly created park. Visual references to the productive area open up with a new view of the silos and the mountains of material to be stored, which should give the public an insight into the materiality of their built city. The uncontaminated, reprocessed materials bordering the park will thus become part of a landscape park.

VIII. Create permeability on the productive site!

The existing public lakeside path is extended and supplemented to introduce new permeability to the area. On the one hand, a new connection to the lake is created and, on the other, the two culturally important neighbours for the district, the GZ-Wollishofen and the Rote Fabrik, are newly connected to the site. For that new paths and ramp connections are created. One ramp connects the Rote Fabrik to the site. Here, the path leads between the new recycling plant and the new silo, providing insights into the processing of materials. The ramp also crosses the material conveyor belts and lorry traffic. Another new silo will be surrounded by a public ramp leading to a raised walkway around the silos. This vertical park, which is also planted with greenery, will become a recreation area and lead to a viewing point and diving platform directly on the water next to the existing crane system. This creates views of the lake and the newly created park.

IX. A space for human and non-human actors!

The area should not only be accessible to people, but also create a habitat for plants and animals by the lake. The new case study buildings offer space for breeding grounds and new plants along the façade. The piles of material that border the park will become a habitat for pioneers thanks to their open space.

X. A space for negotiations!

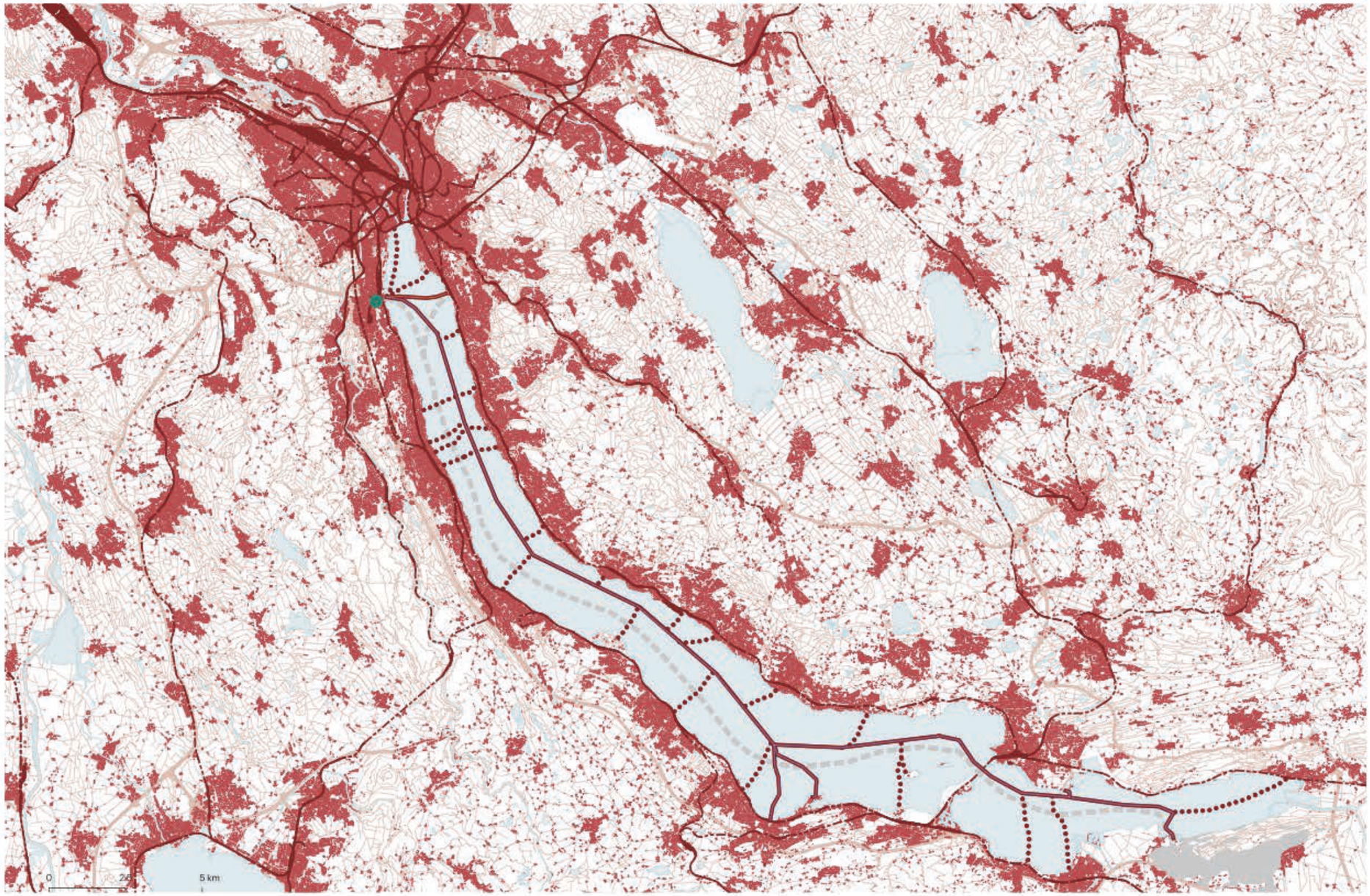
As a new public production and research centre, the Kibag site is intended to promote sustainable future construction with concrete. It should be a place where various stakeholders can come together to find and discuss future sustainable solutions. Stakeholders from research, production, authorities, planers, and the general public will be able to reflect on the building material and its future use.

Concrete Plant Zurich- Wollsihofen Kibag
Image: Haller, Juliet, BAZ, 2021.

Let's treat Zurich as a resource through activating the lake!

The Kibag site in Zurich Wollishofen will become a new recycling centre for the reuse of demolition and excavation material. To this end, the obsolete crane, which was originally used for loading gravel, will be reactivated so that the lake can once again be used for transportation of goods. This should not only bring the centuries-old tradition of material transport on the lake back to Zurich, but also will activate different locations along the lake. The densely populated area around the lake will become an urban mine for the future production of concrete. Loading stations can be built or reused at Kibag's existing harbours. In addition, this network can also be made denser by adding further loading stations at the landing stages of the Zurich shipping company. In this way, a largely recreational lakescape can be transformed back into a productive one. "Ledischiffe" sail alongside sailing and rowing boats. Tonnes of materials are cruising over the calm lake water, ready to return to the cycle or materials.

- Existing infrastructure and harbours at the lake of Zurich for the Kibag to reactivate again.
- Possible existing infrastructures of the passenger shipping company „Zürcher Schiffahrtsgesellschaft" to introduce further loading stations and thus densify the transport network
- Historical route of the „Ledischiffe" for gravel transport across lake Zurich
- Existing Kibag recycling plant in Regensdorf for the processing of demolition materials from Zurich North
- Site in Zurich Wollishofen as a new recycling and research hub for the concrete economy



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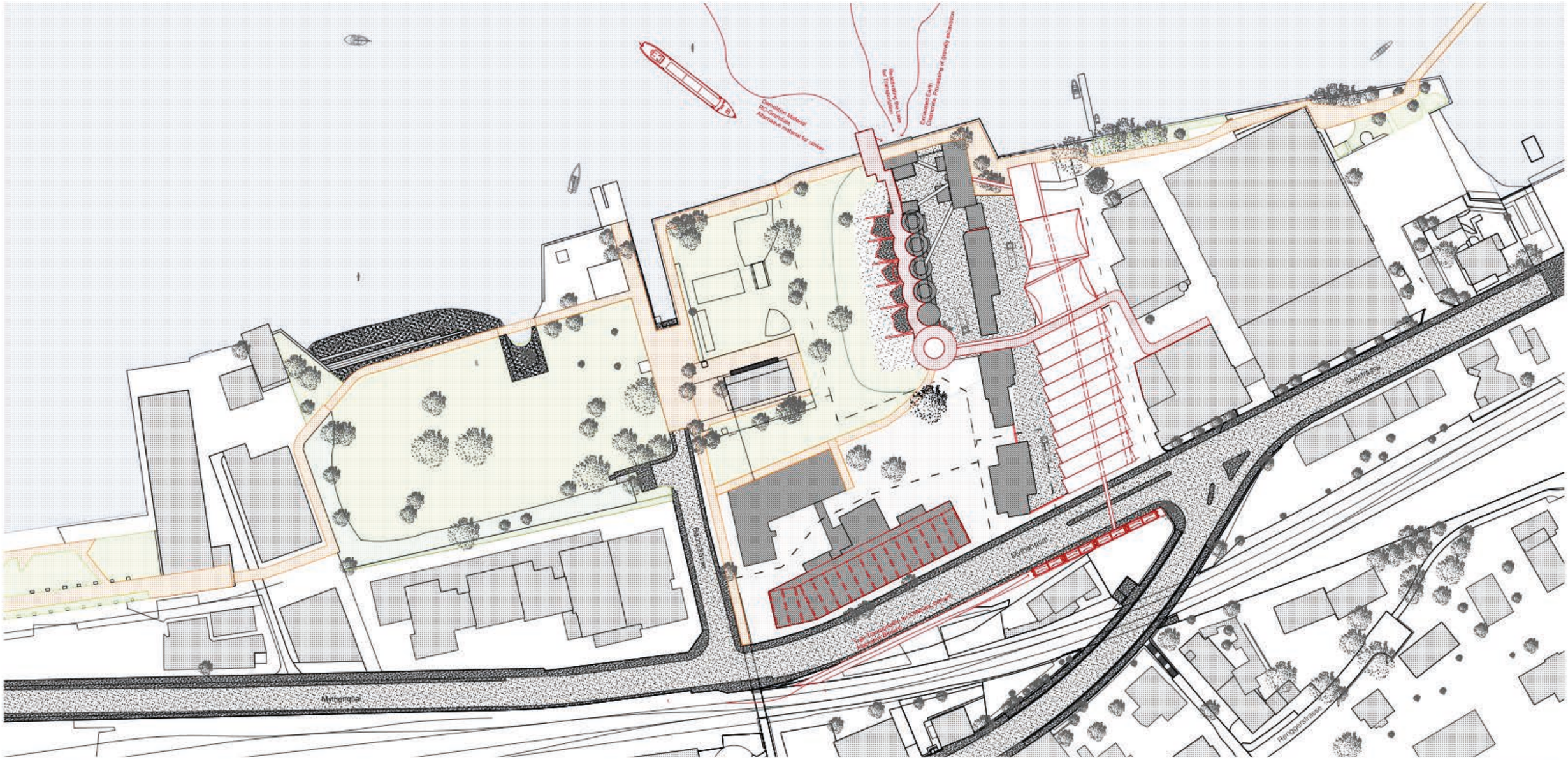
MEINRAD SZ 16
NEPTUN SZ 5.0



Situation 1:1000

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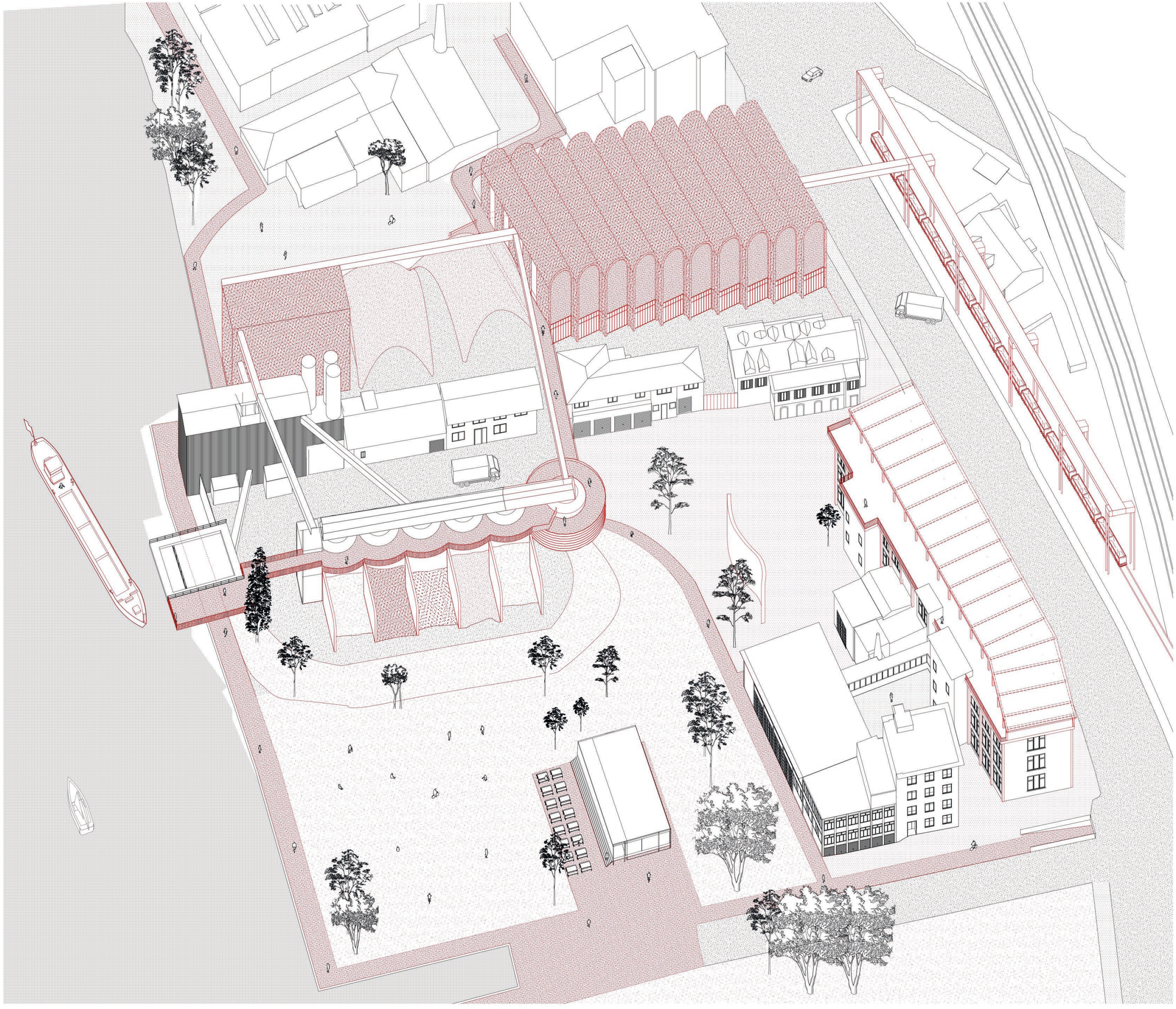

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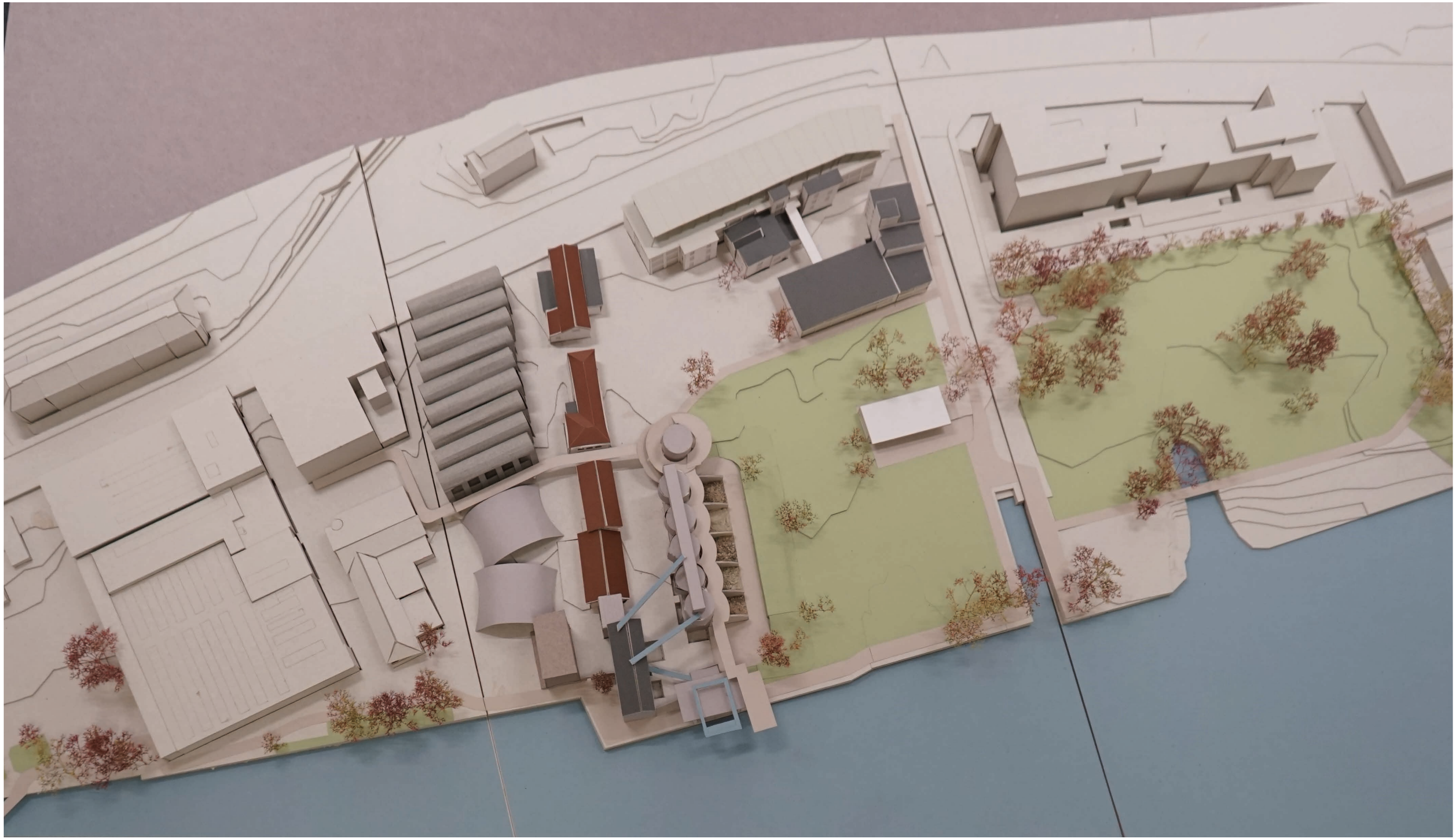
KIBAG

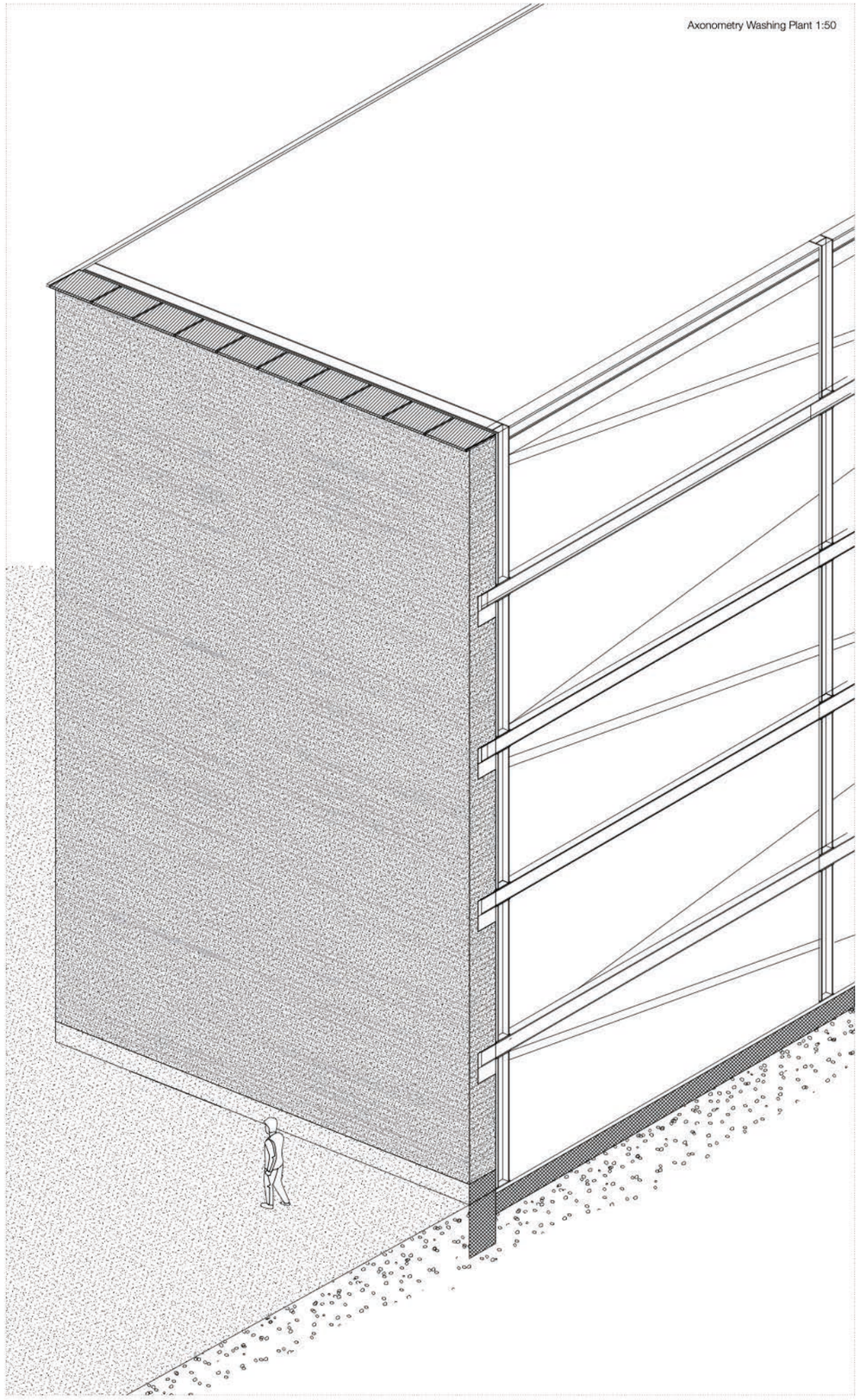

KIBAG


SR R:CREW



Model Picture Scale 1:333.

Axonometry Washing Plant 1:50



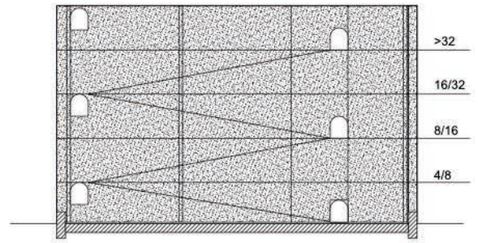
WASHING PLANT
STAMPED CONCRETE WITH AN INNER IRON SKELETTON

Production Process: In situ

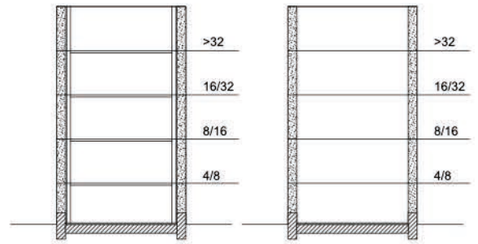
Formwork: Re-usable, board formwork

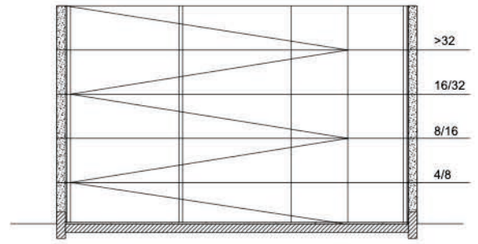
Design Advantages: The monolithic tamped concrete technique makes it possible to use less cement and alternative aggregates and binders. Excavated material, sludge from boreholes or other inorganic aggregates can be used.

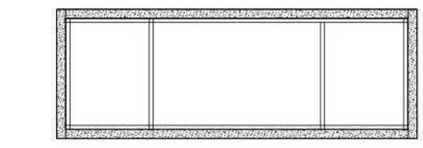
Actors: The strong monolithic expression of the concrete has a strong effect on the lakeshore front and makes the material tangible for all who enjoy the lakeshore.



Elevations & Sections of the washing plant with openings for the conveyor belts with different aggregates







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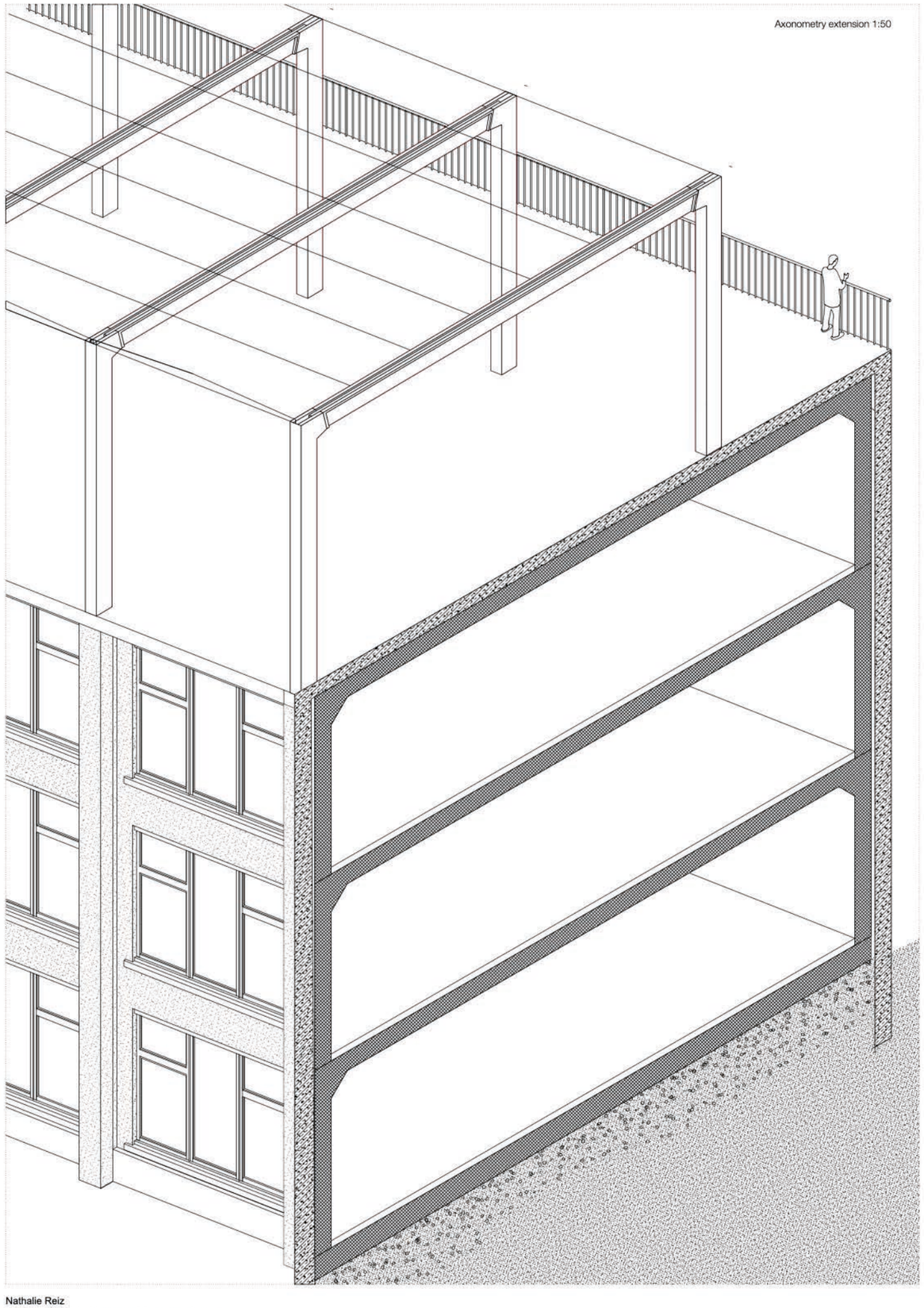


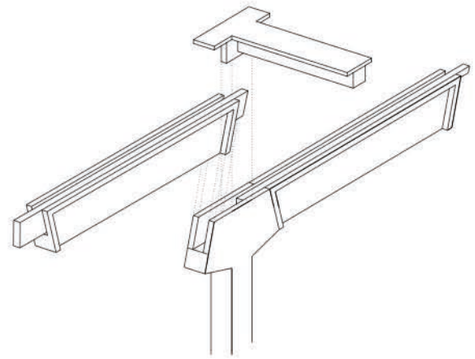
INTERCHANGABLE TESTING UNITS
FRAMED PREFABRICATED CONCRETE MODULES

Production Process: Prefabricated

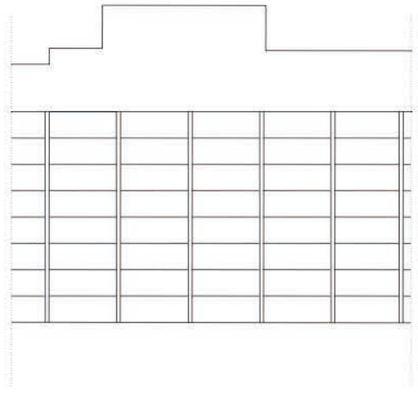
Formwork: Re-usable, suitable for large scale systems

Design Advantages: Reassemblable for future use and creating flexibility within the new testing units. Material-saving, as the concrete is poured in the factory under optimum conditions. Optimum use of materials.

Actors: Standardisation of the components must be carried out and documented from the outset for a longer period of time in order to promote the future use of the components not only on a design-specific basis.



Interlocking system of prefabricated concrete elements, moved and screwed together on site. Can be reused later by loosening the screws.



Regular grid based on the concrete frame of the existing building from the 1920s. Each new frame is in 3 parts, each with 7 ceiling elements to place on top.

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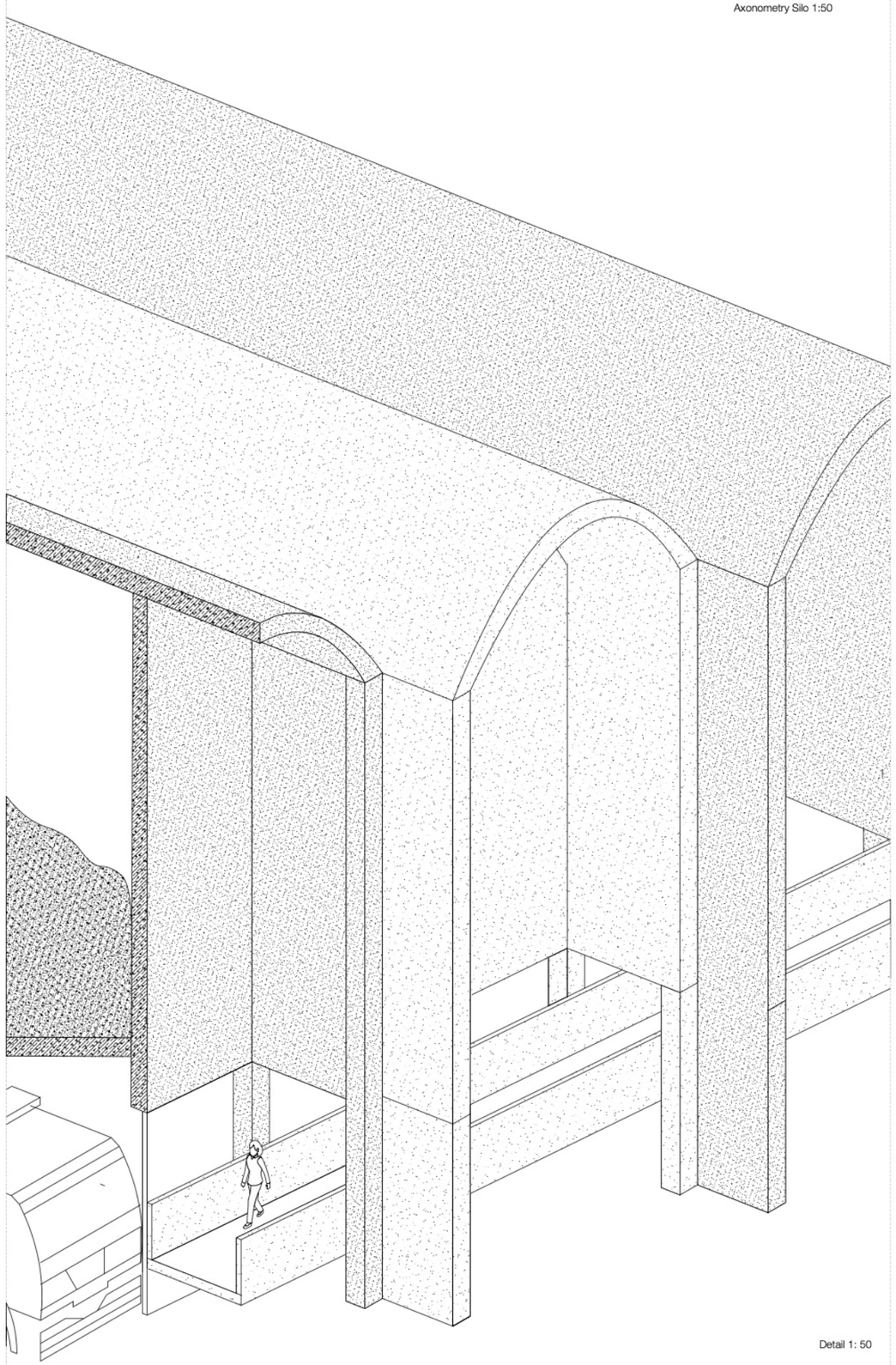
Axonometry Silo 1:50



Detail 1: 50

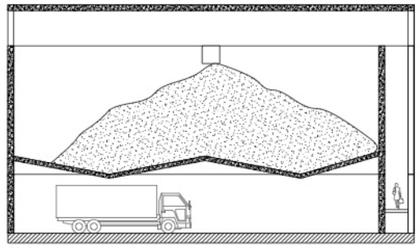
HORIZONTAL SILO
BARREL VAULT CONCRETE

Production Process: In situ

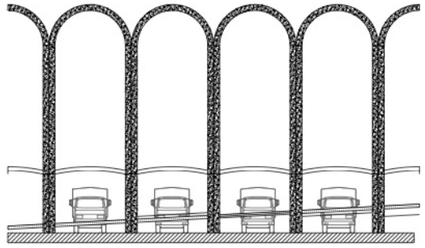
Formwork: Re-usable, for different vaults

Design Advantages: Each barrel is self-supporting in compression. This corresponds to the most original form of load transfer of the material concrete, which was already used in this way in Roman times. This means that each tonne can test a new concrete mix with different binders, cement contents and aggregates.

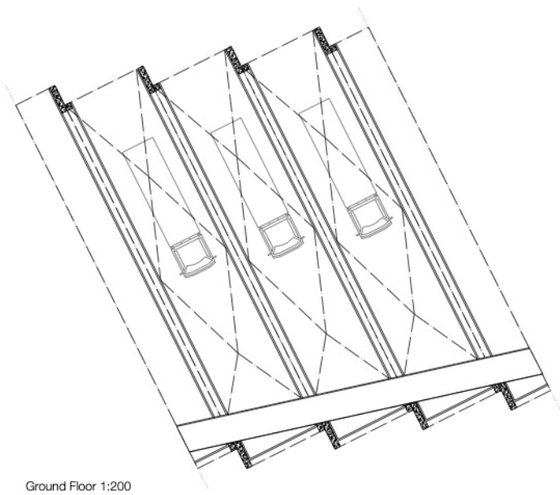
Actors: Various standardised cement contents can be tested here under load. The barrels retain the material they are made of, creating a strong presence of concrete as a material.



Section 1:200



Section 1:200



Ground Floor 1:200

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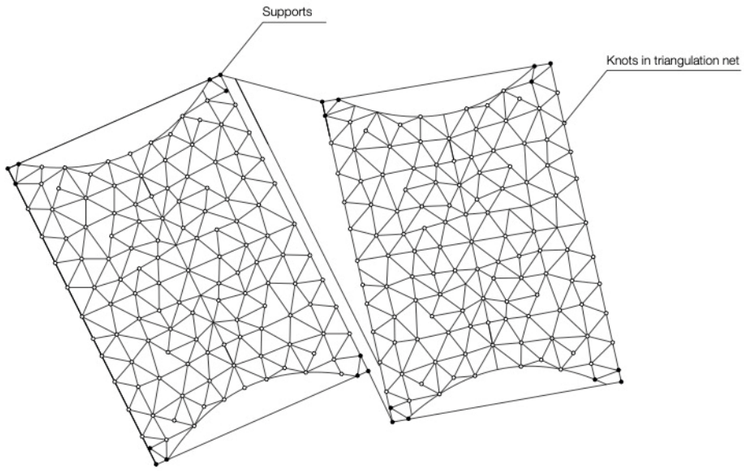
SHELL STRUCTURE FOR CONCRETE DEMOLITION CRUSHER

Production Process: In situ

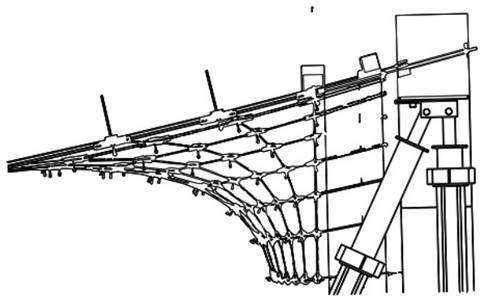
Formwork: Digital fabricated, not-re-usable "lost formwork"

Design Advantages: Very thin constructions made possible by digital moulding. Optimum tensile and compressive forces prevail, which leads to large material savings.

Actors: A new type of construction that must be scalable and possible for larger applications. Technical expertise is therefore also required on the construction sites. It also results in a new design language for concrete that speaks differently to the city.



Plan 1:200 Showing Computational Formfinding
with Rhino Vault



Possible Formwork:
Cable-net and fabric formworks for concrete shells

Axonometry Shell Structures
Scale 1:100

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