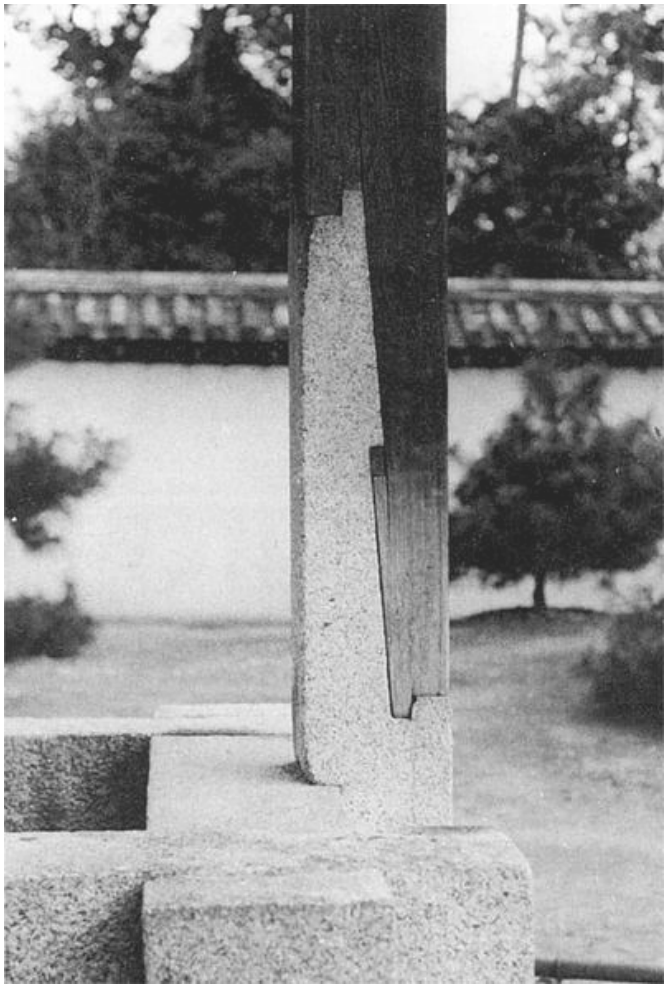


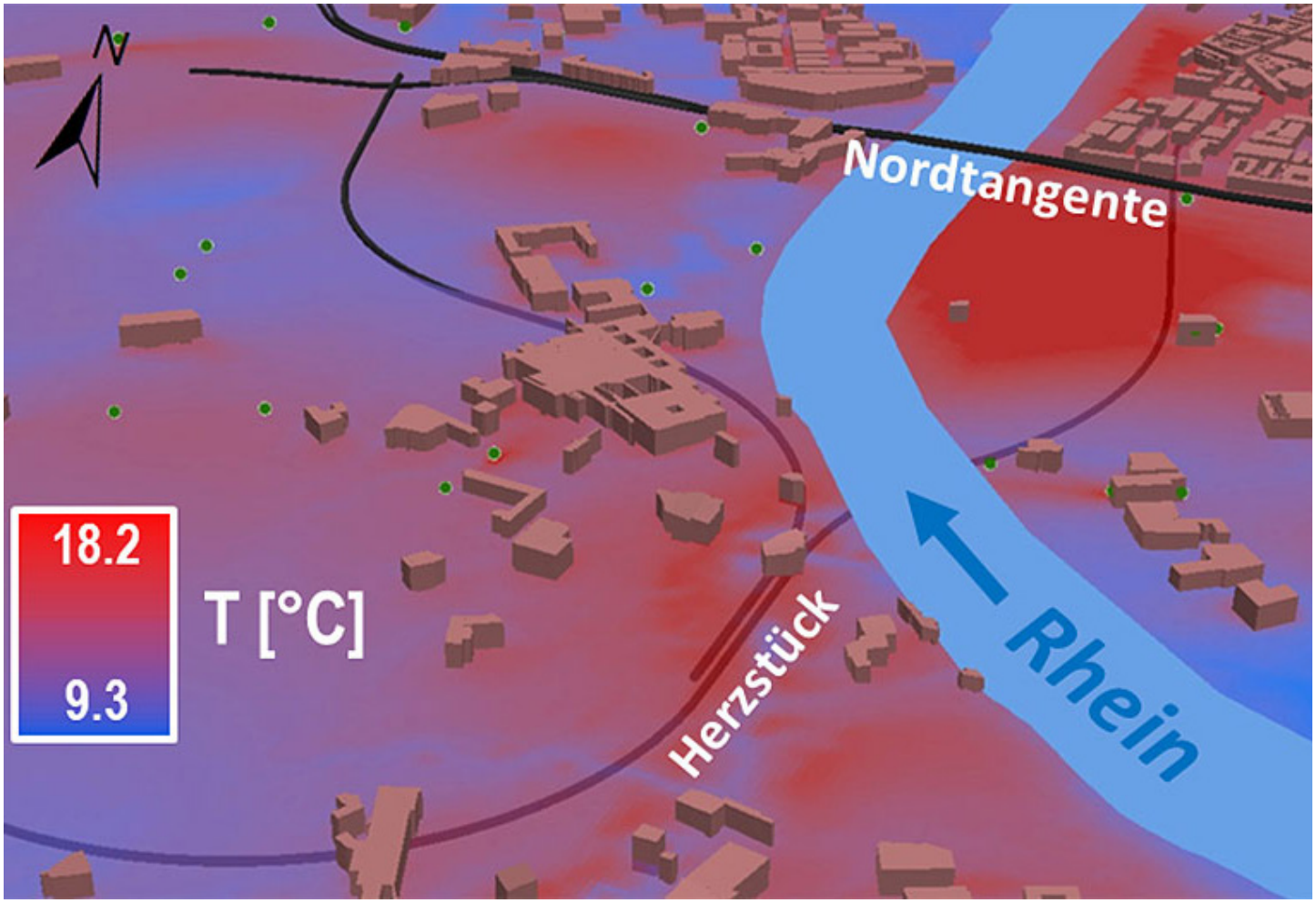
dual-use - Prozessbuch

Diplom Thema C - CIBA Areal Klybeck Basel

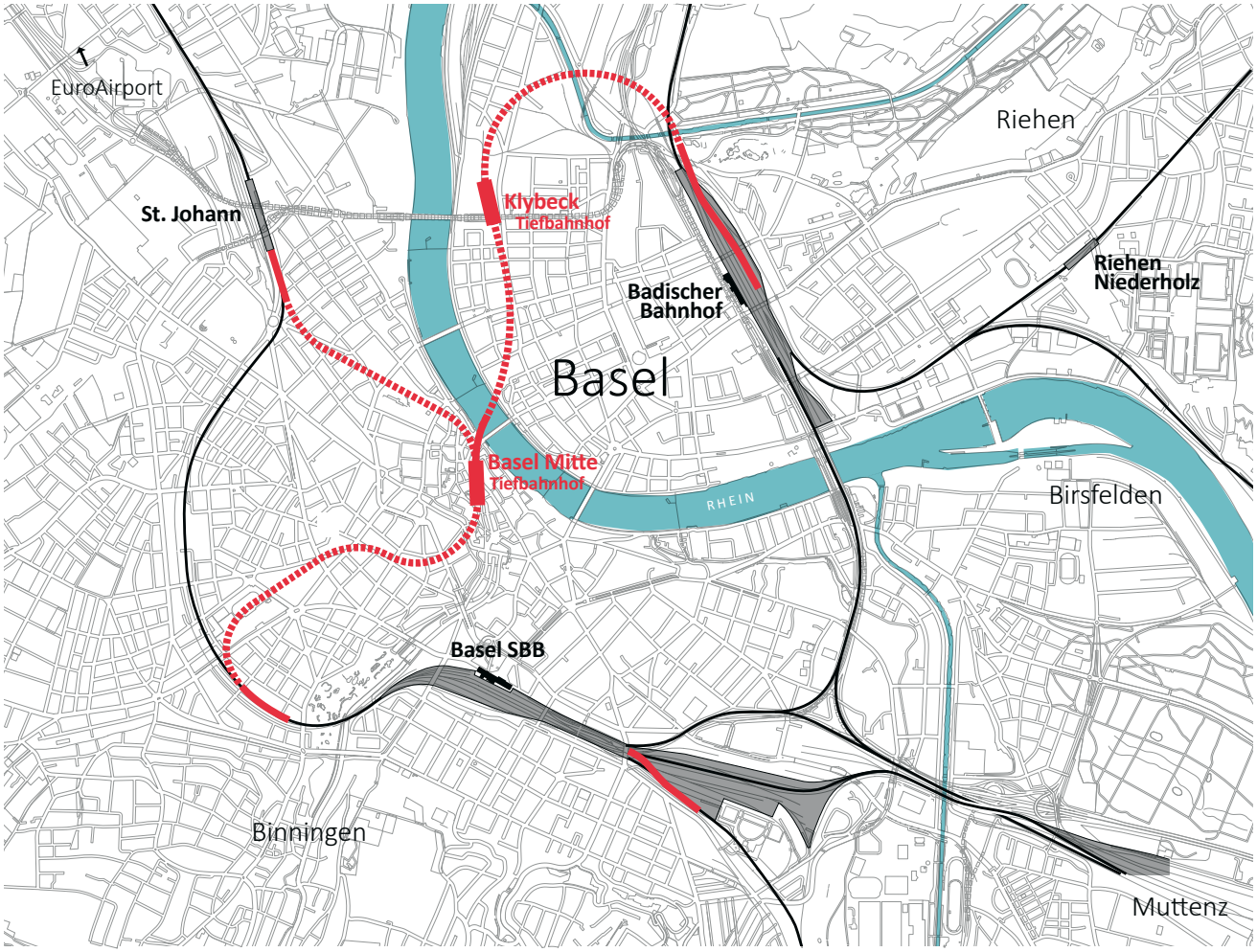
Lukas Brusch - Professur Mosayebi

Assistenz - Lukas Burkhart

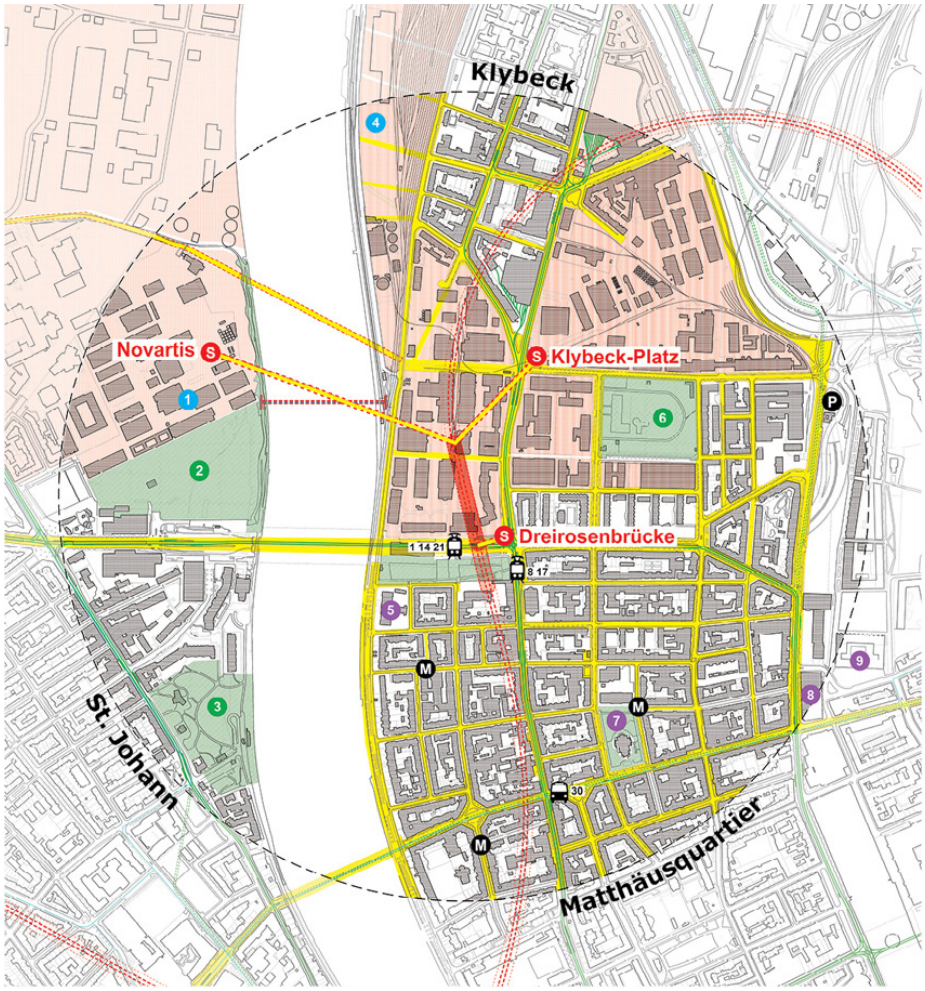
Begleitfächer
Gebäudetechnik
Bautechnologie & Konstruktion



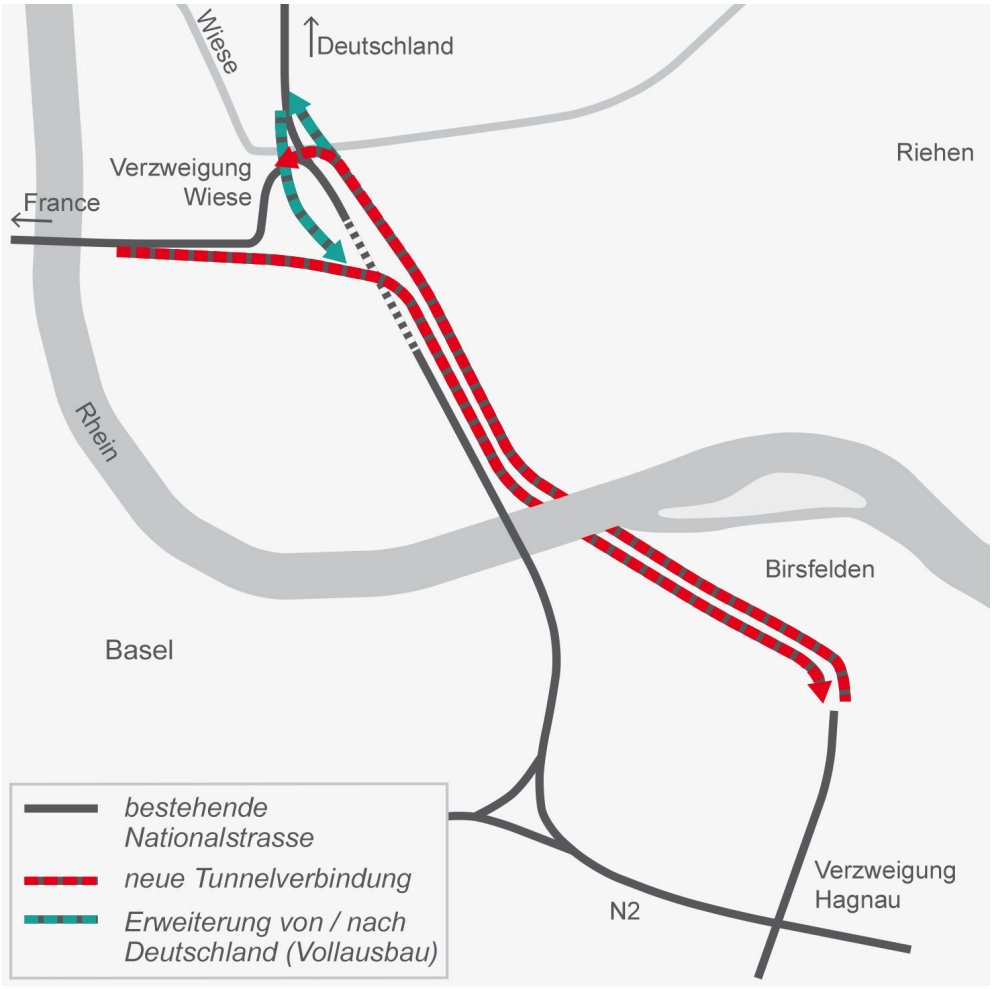
grundwassertemperatur
universität basel



geplante s-bahn linie herzstück
herzog & de meuron, kantone basel-stadt & basel-land



geplante s-bahn station klybeck
herzog & de meuron, kantone basel-stadt & basel-land



geplante autobahn
vbs, kantone basel-stadt & basel-land

geothermische nutzung tunnelwand
epf lausanne

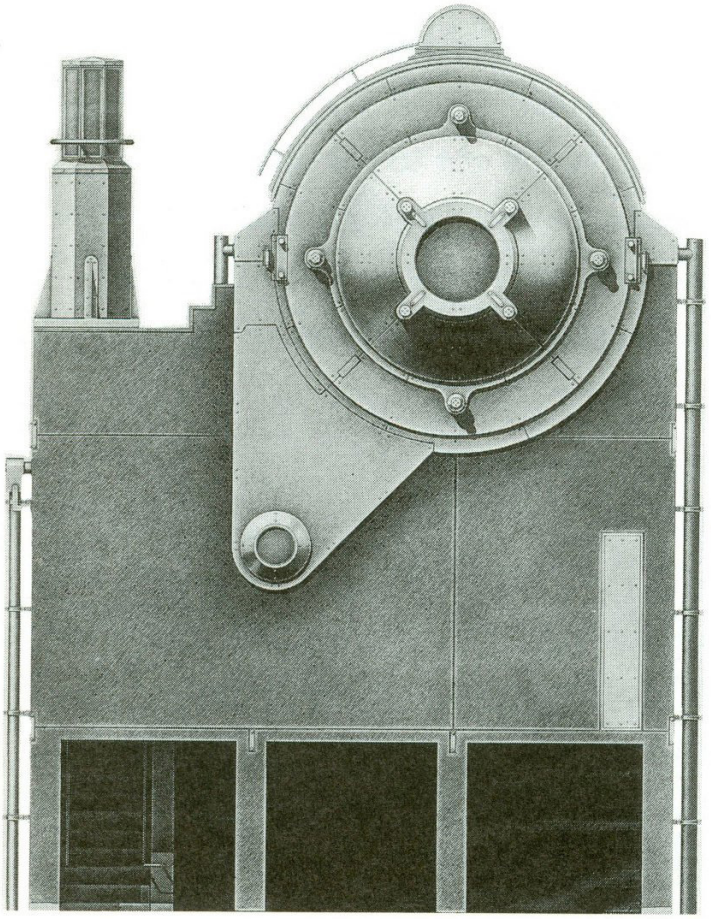
78‘508 m2

=

4 GWh

resultierende wärmeenergie aus tunneloberfläche
kleinbasel, universität basel

umlauftank
ludwig leo, berlin



ark nishina dental clinic
shin takamatsu, kyoto

onyx
jean nouvel, nantes

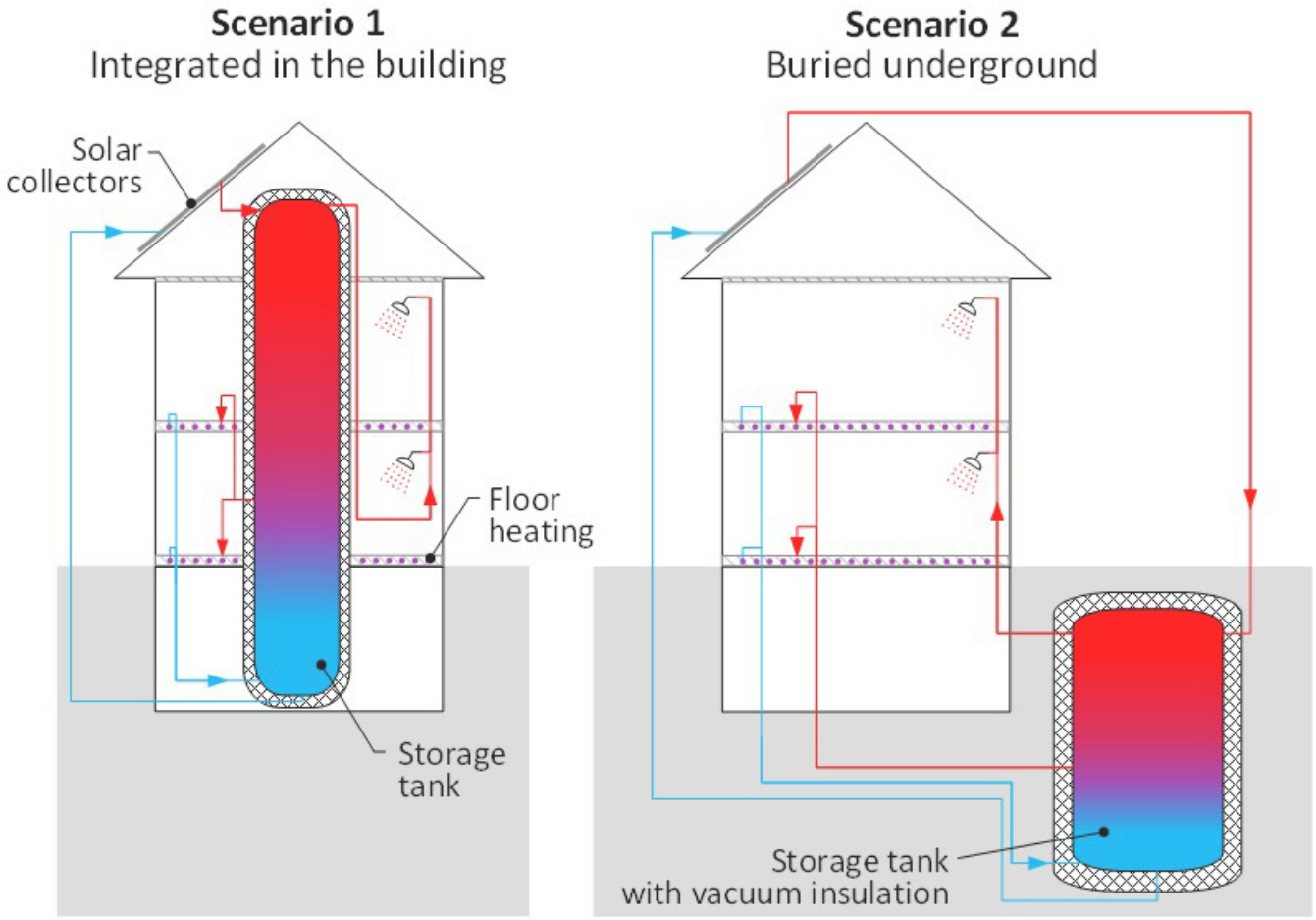
gerichtssäle bordeaux
richard rogers, bordeaux

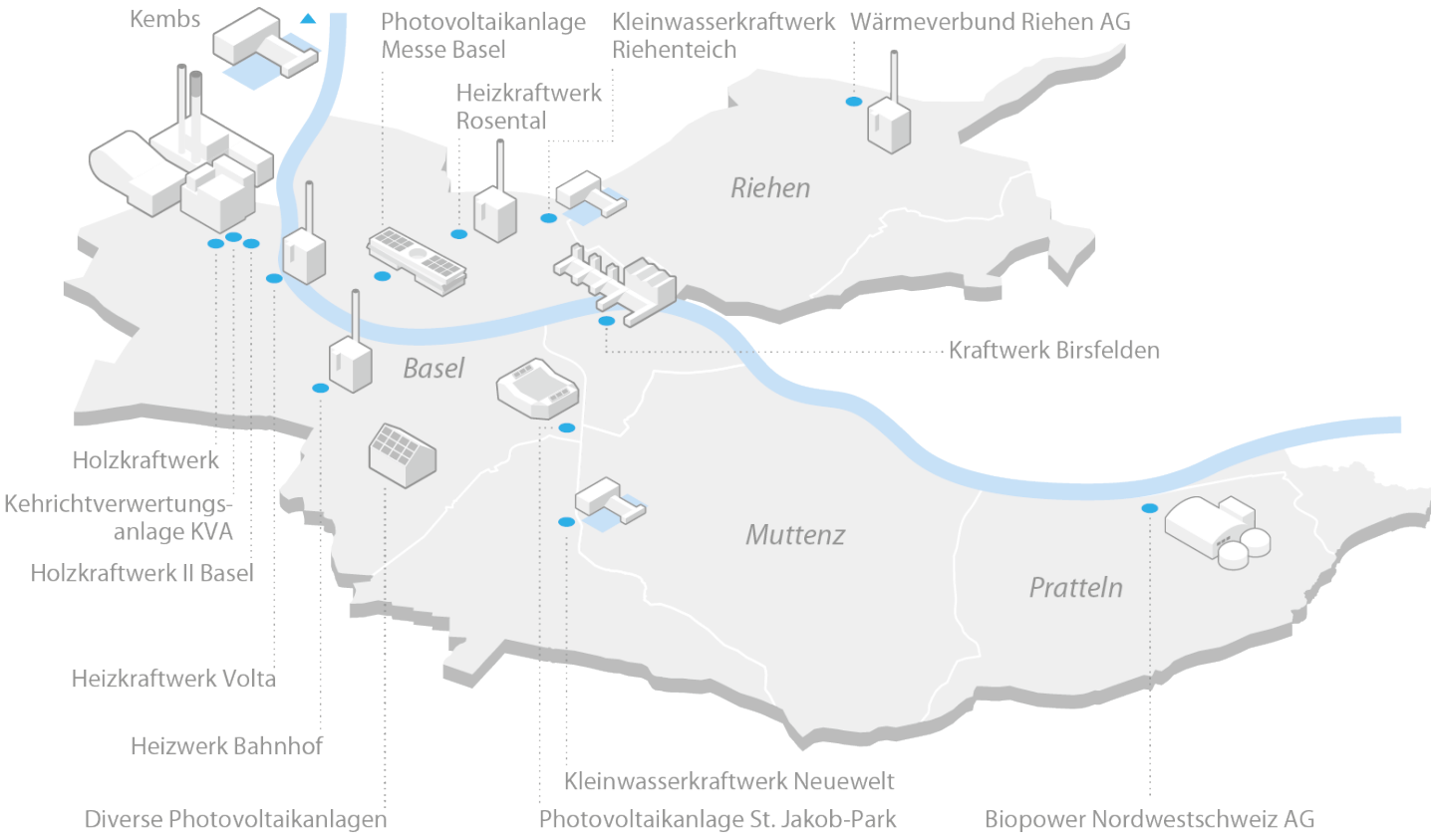
cultural & sports centre
bruther, paris

3. und 4. geschoss mit zwischengeschoss
K-26

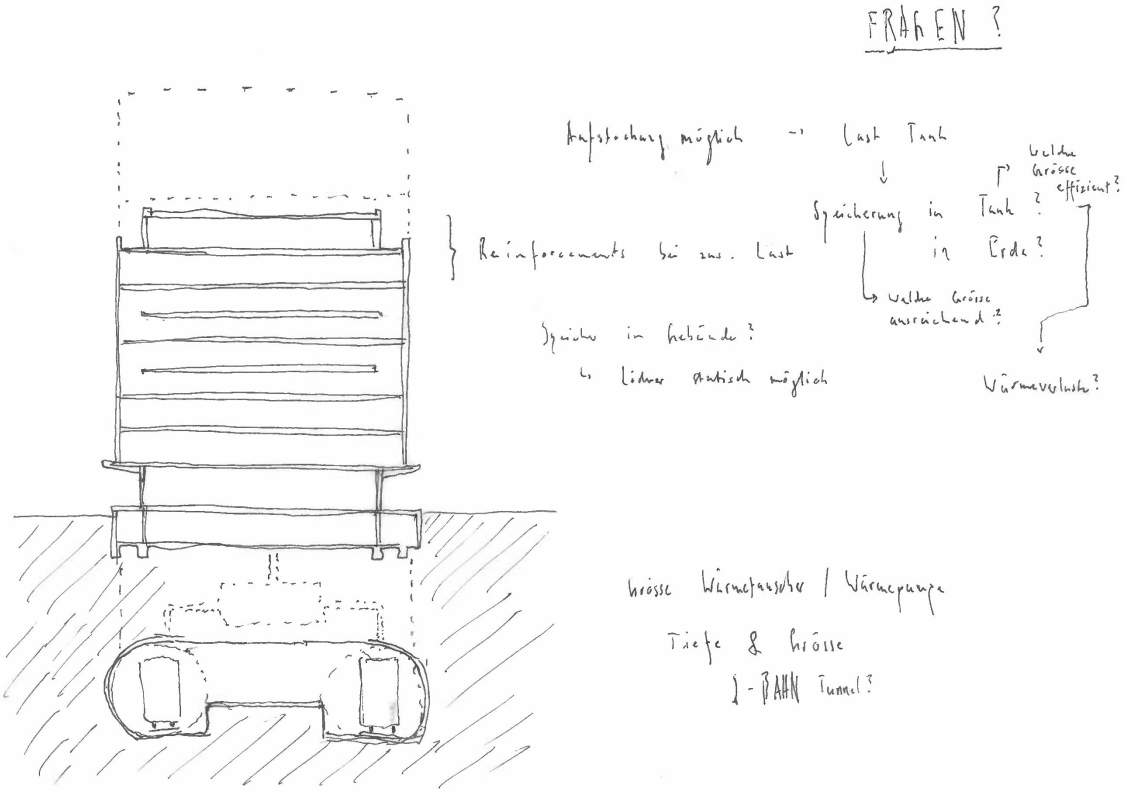
fassade
K-26

5. und 6. geschoss
K-26

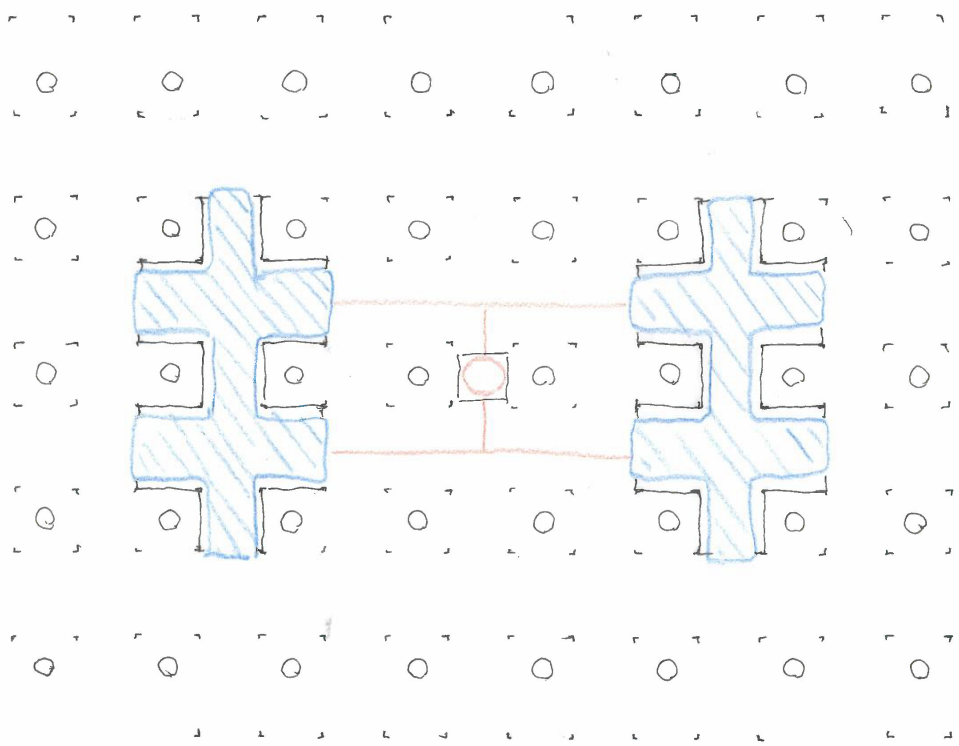

Scenario 1
Integrated in the building
Solar collectors
Floor heating
Storage tank
Scenario 2
Buried underground
Storage tank with vacuum insulation



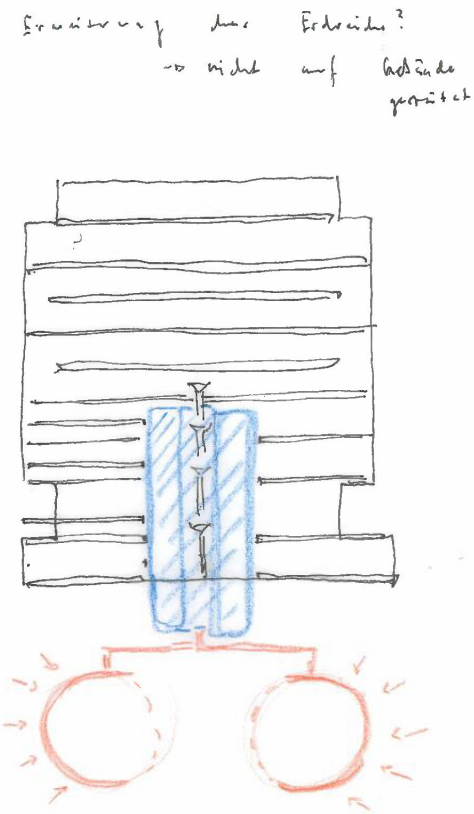
fernwärmenetz
stadt basel

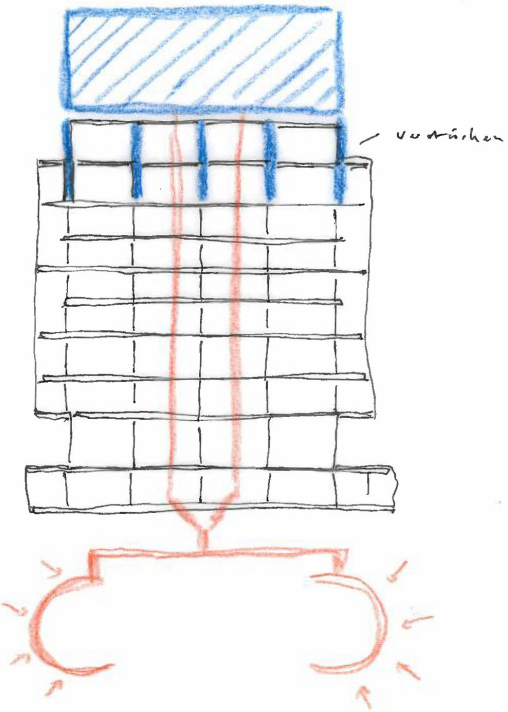


energiespeicher über s-bahn
konzeptskizze

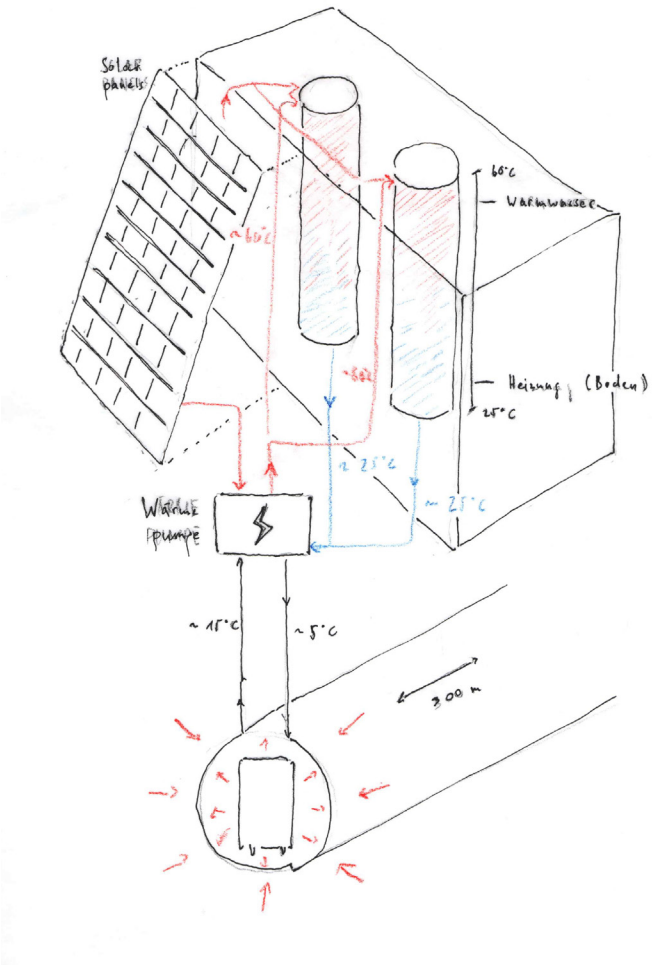


energiespeicher im gebäude
konzeptskizze



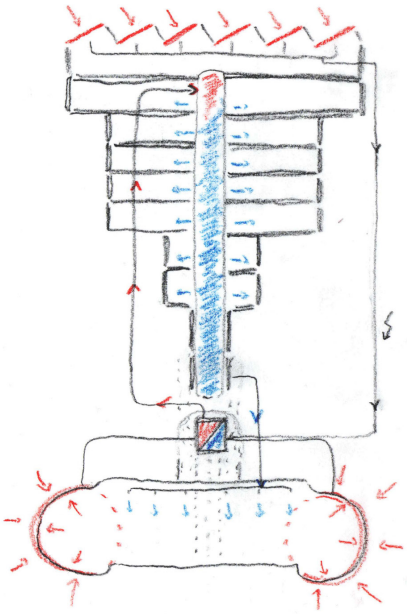


energiespeicher varianten
konzeptskizze

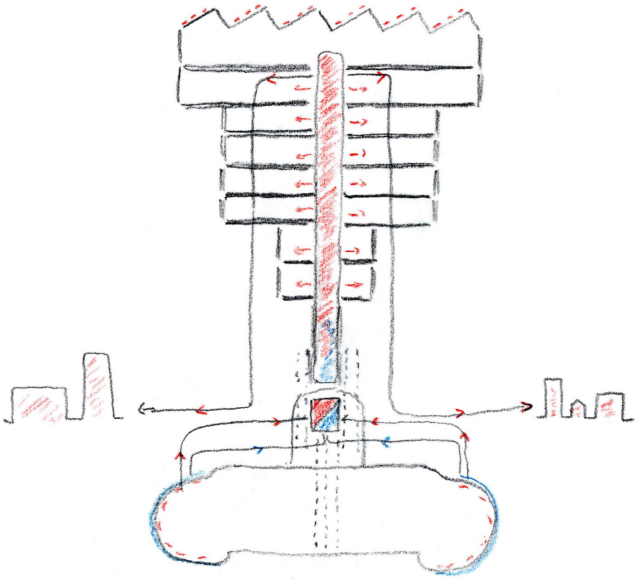


energiespeicher & solaranlage
konzeptskizze

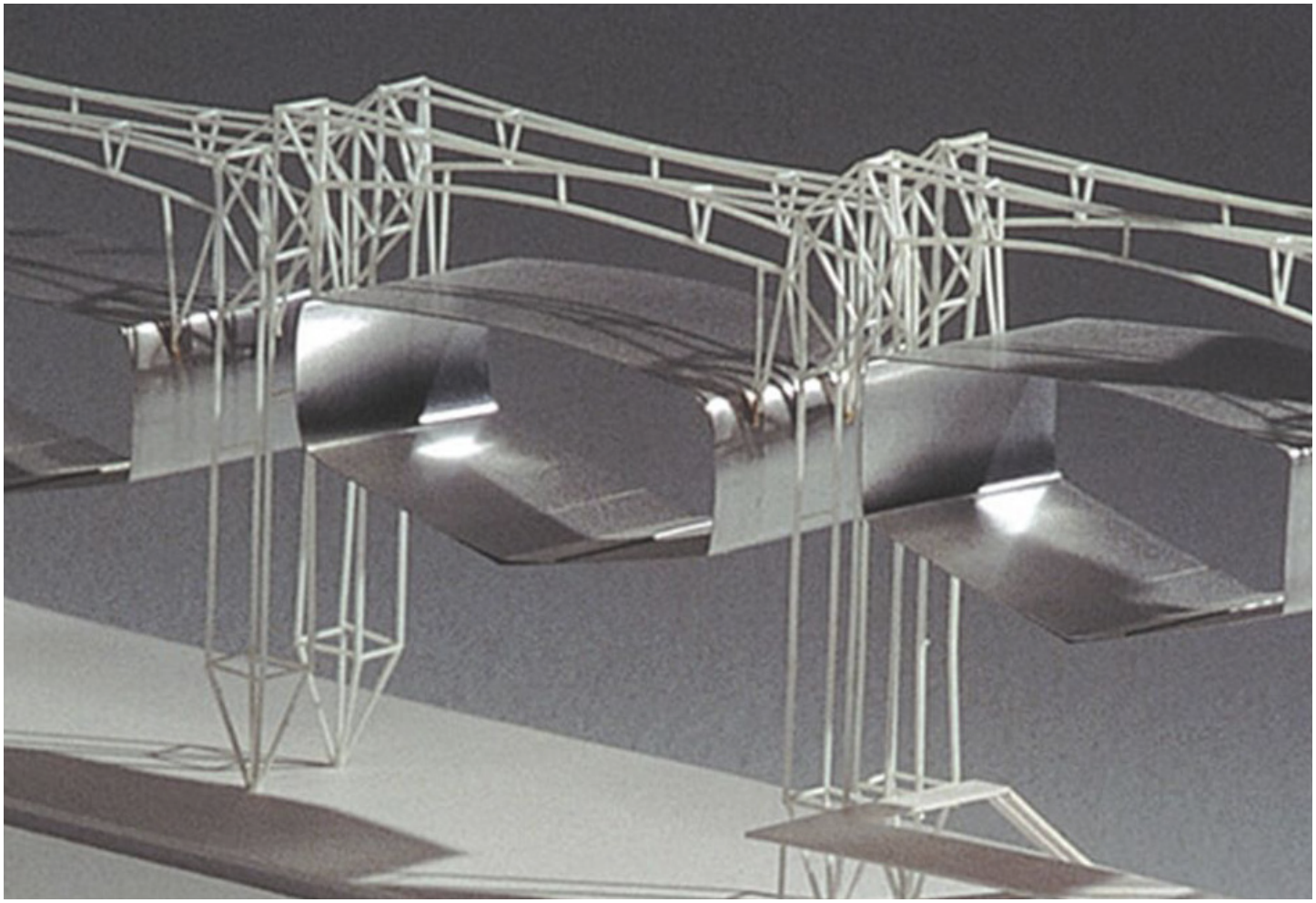
SOMMER



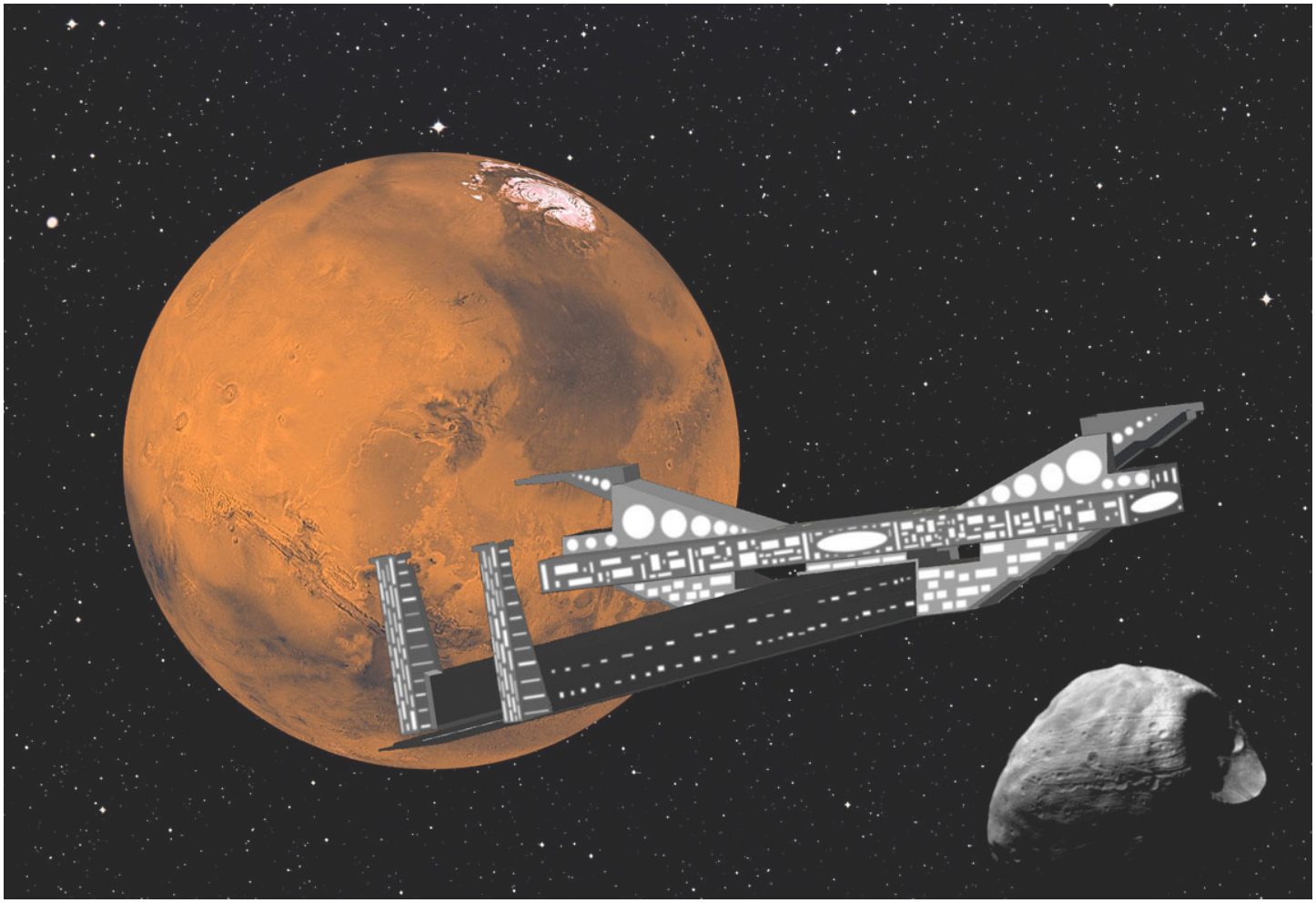
WINTER



energiekreislauf
konzeptskizze

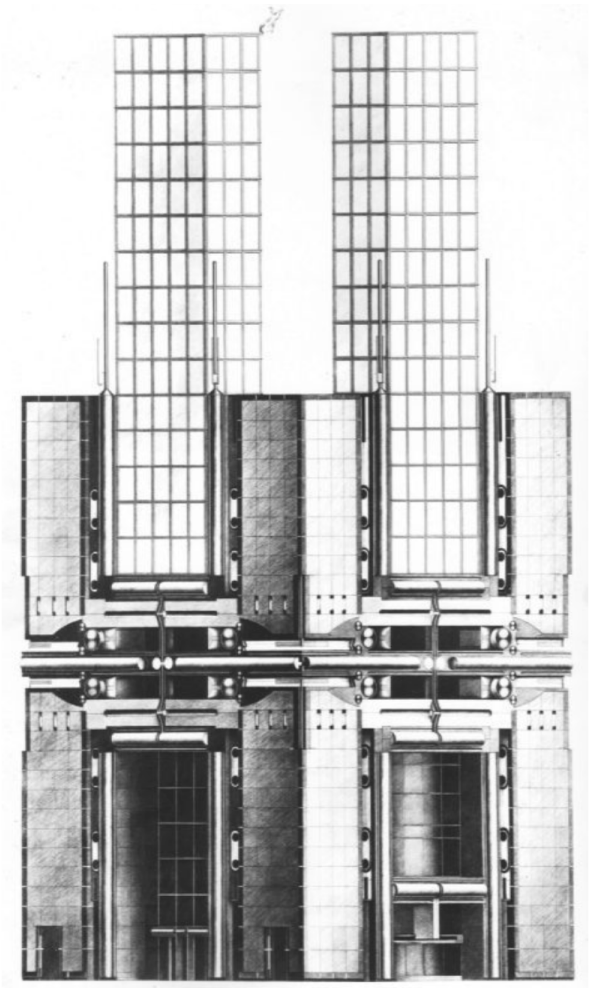


tokyo forum
richard rogers, tokyo



himmel oben, himmel unten
thomas stricker, düsseldorf

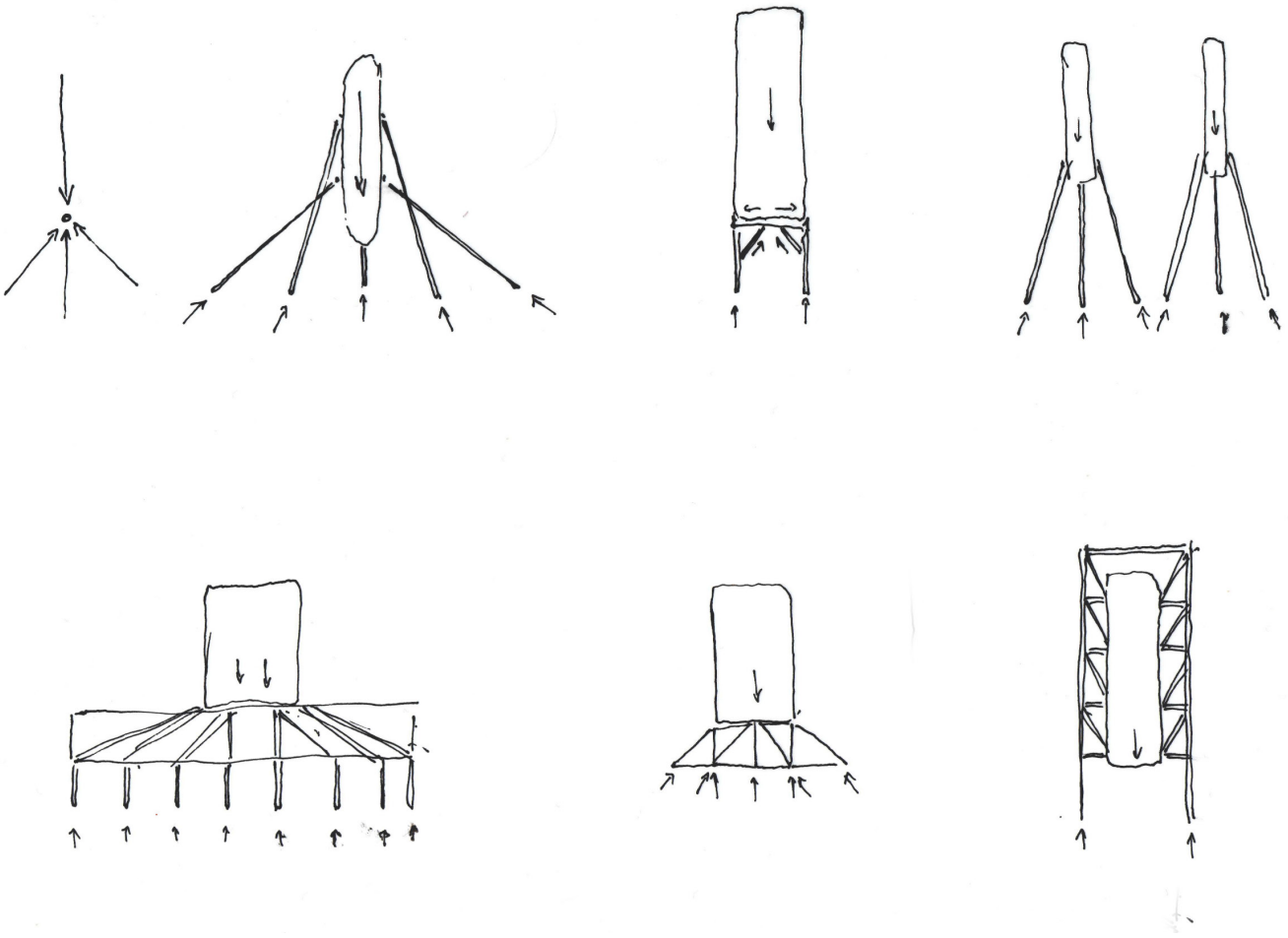
elefanten
salvador dalî



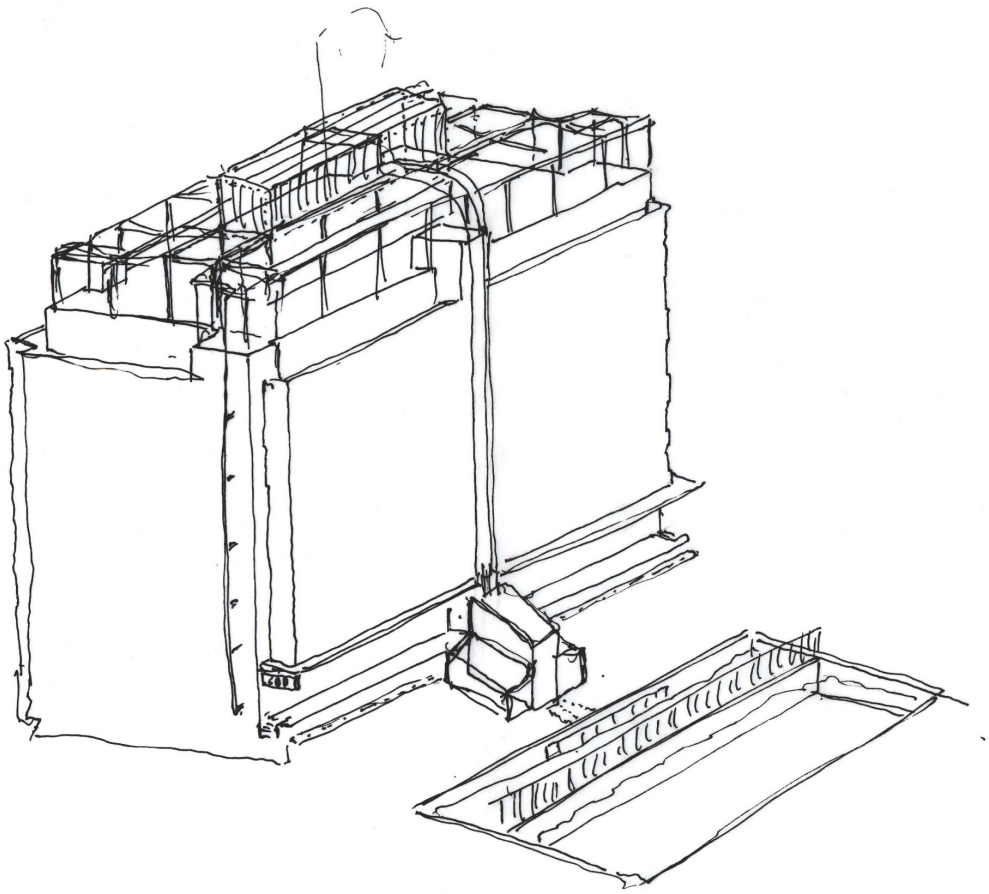
kirin plaza
shin takamatsu, osaka

media house
bruther & baukunst, brüssel

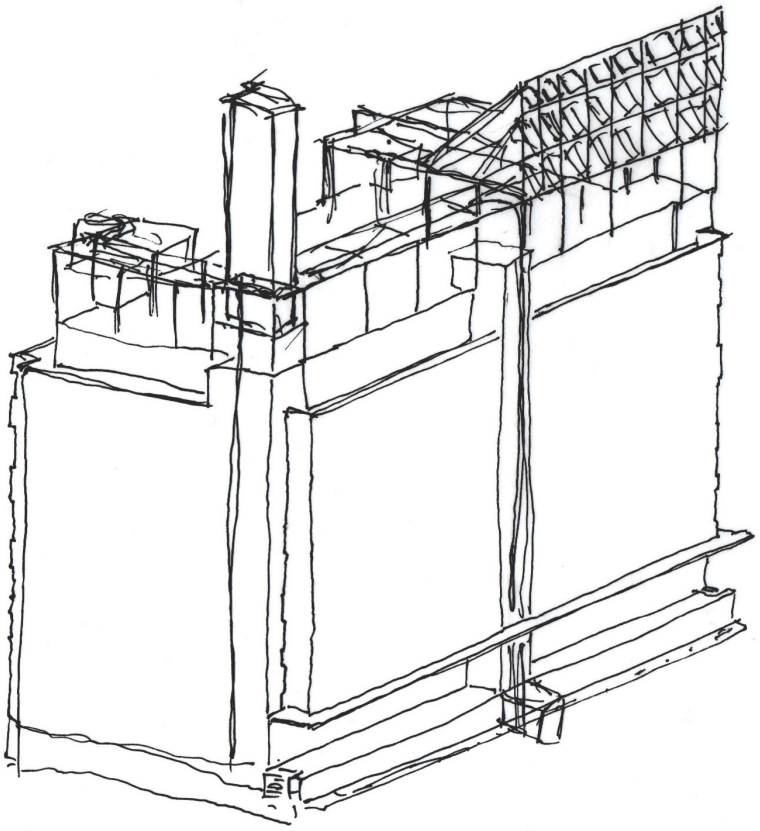
wasserturm
v-plus, brüssel



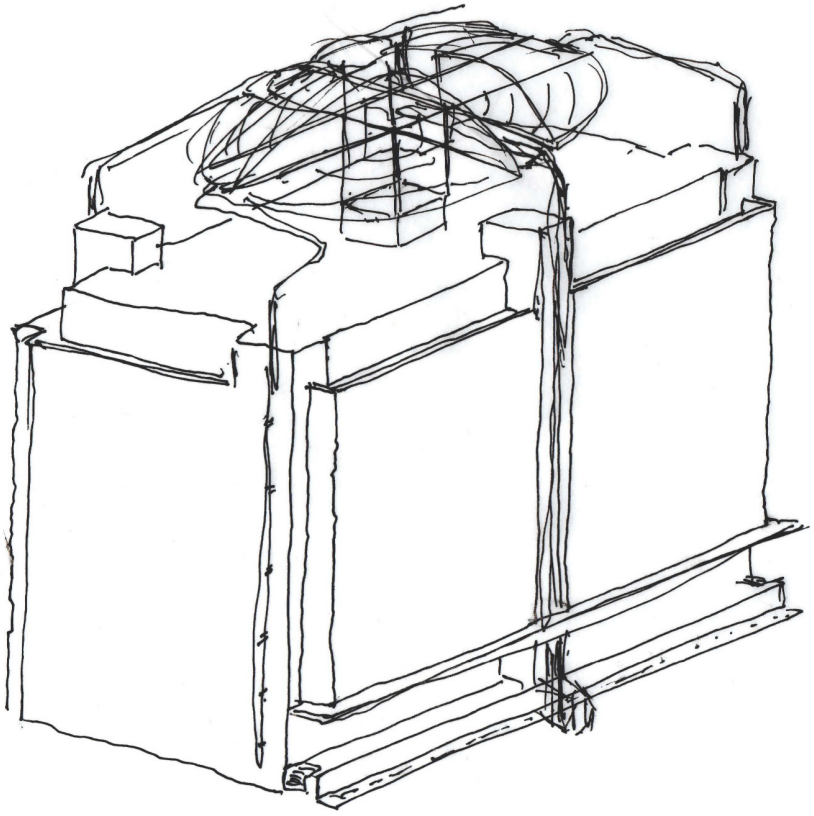
abfangen der kräfte
skizze



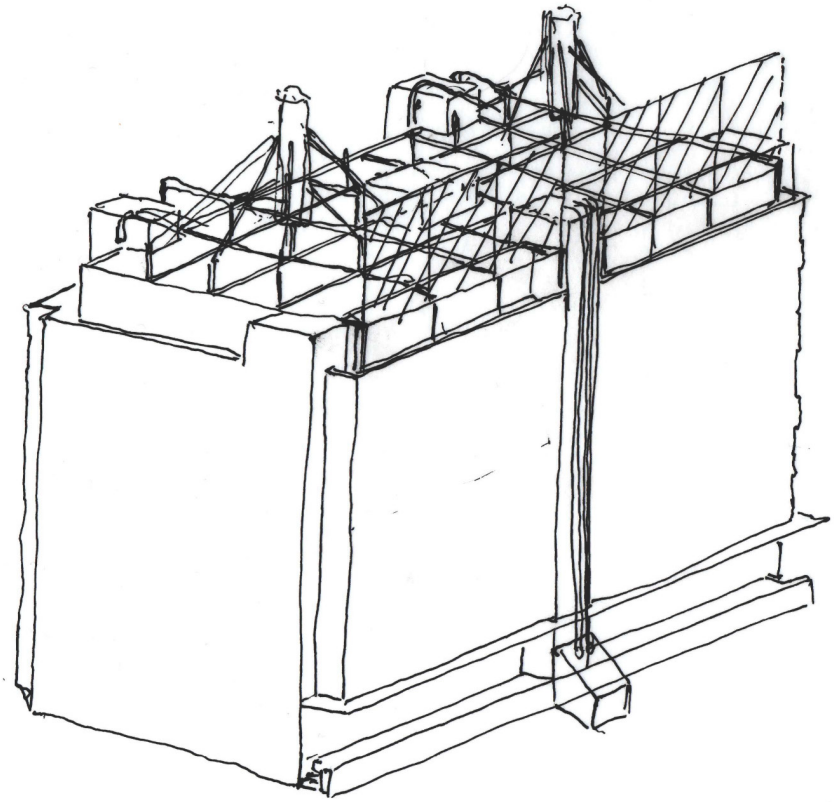
variante I
skizze



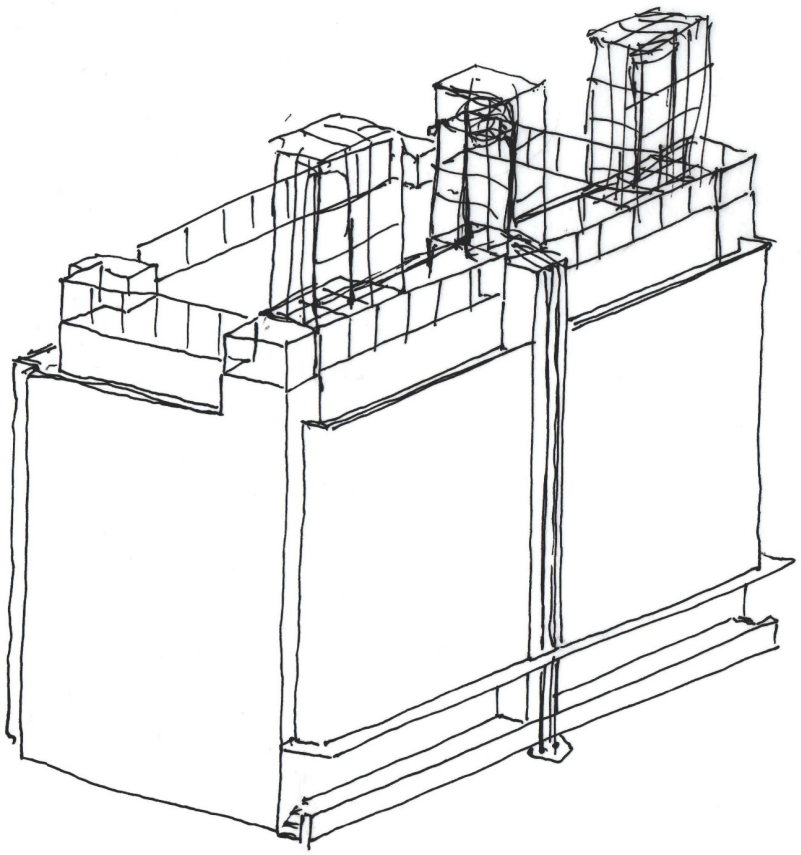
variante II
skizze



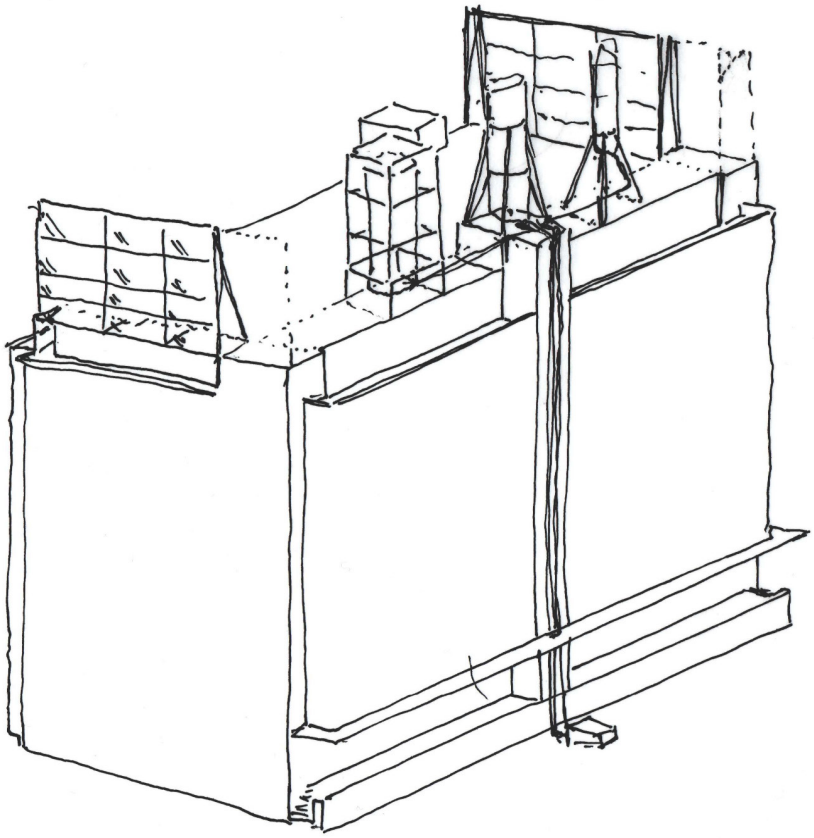
variante III
skizze



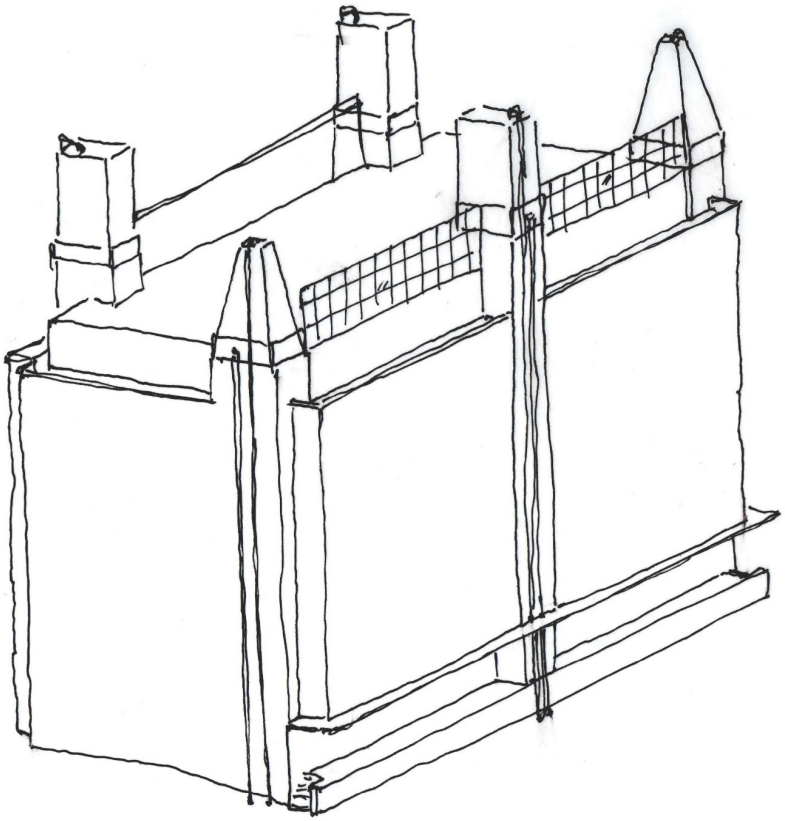
variante IV
skizze



variante V
skizze



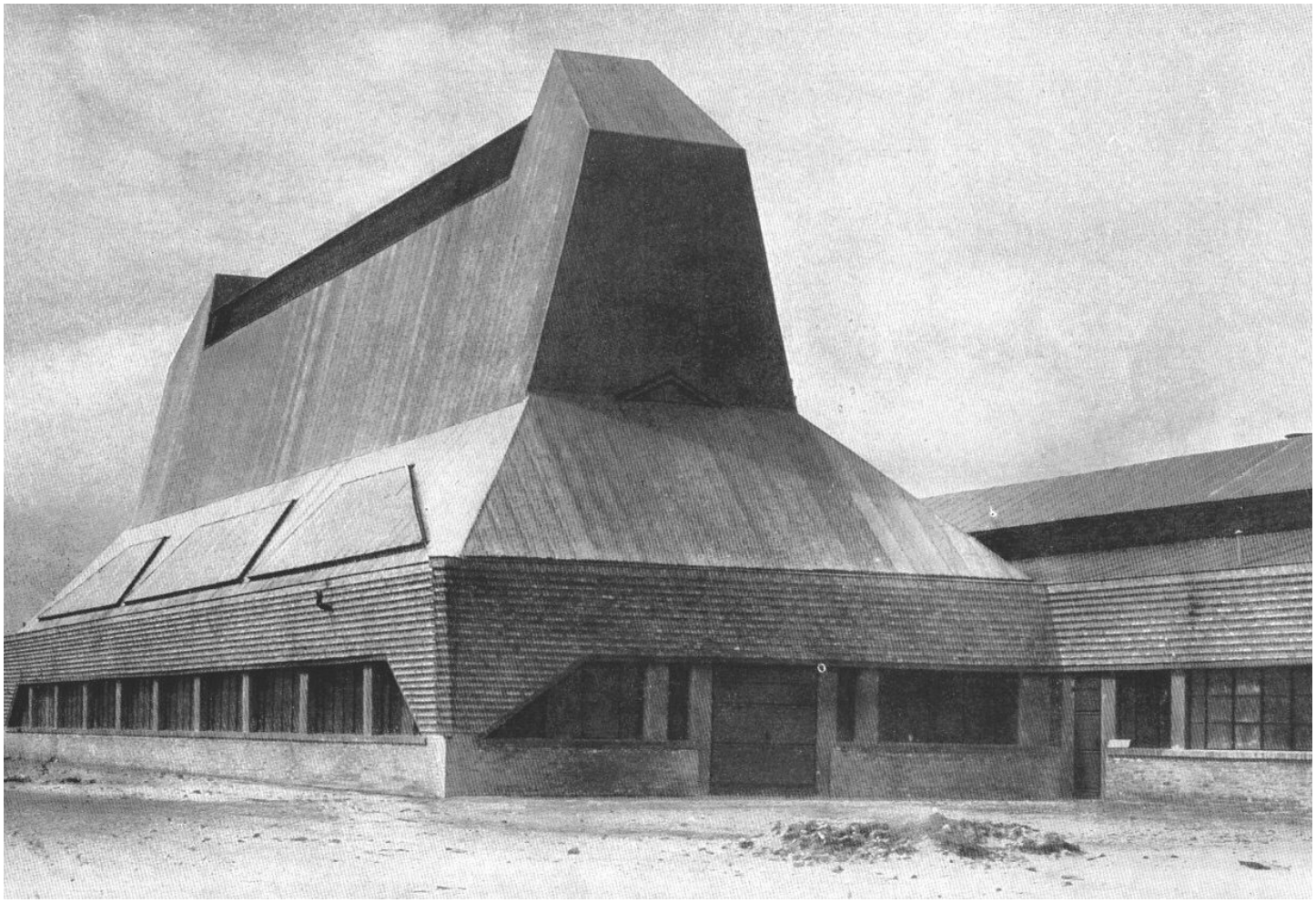
variante VI
skizze



variante VII
skizze

cultural & sports centre
bruther, paris

house in chiloé
smiljan radic, chile



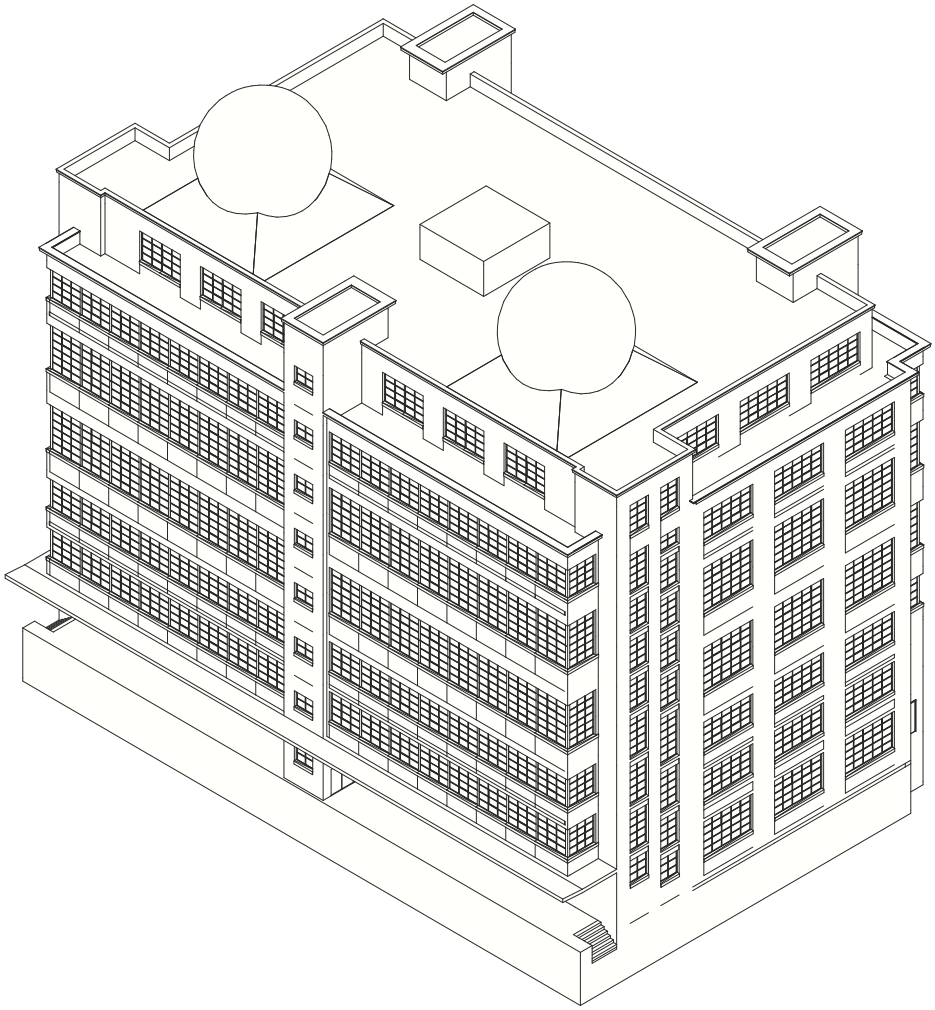
hutfabrik
erich mendelsohn, luckenwalde

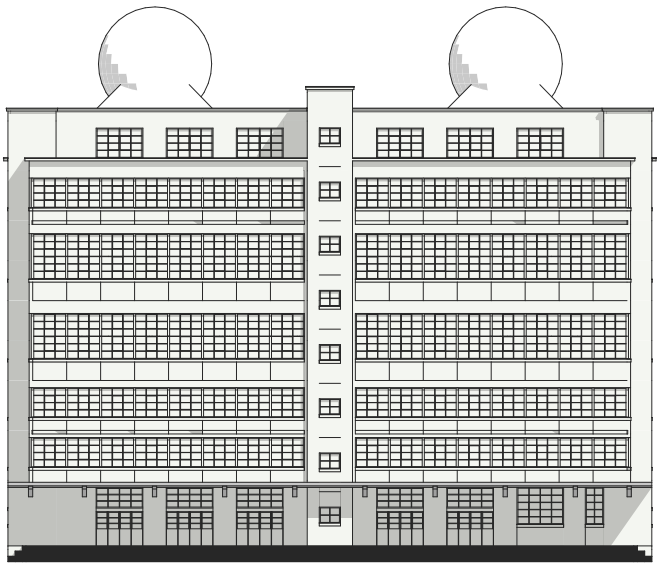
naturmuseum
meier hug, st.gallen

pharao dental clinic
shin takamatsu, kyoto

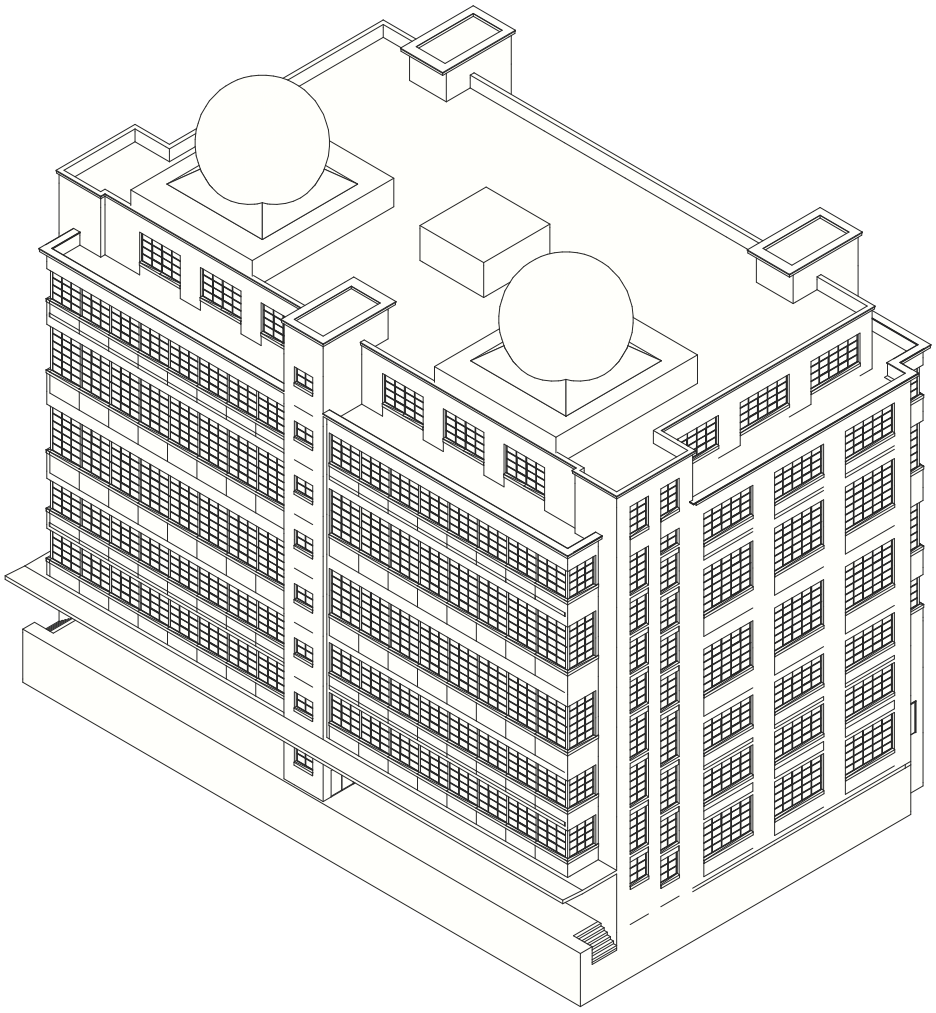
stehlampe
kyle dallman

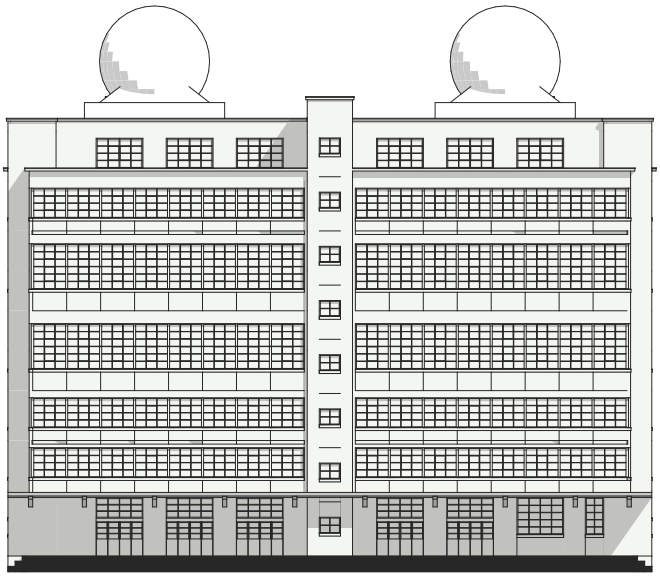
sozialräume für werkhalle
furrer jud, thun



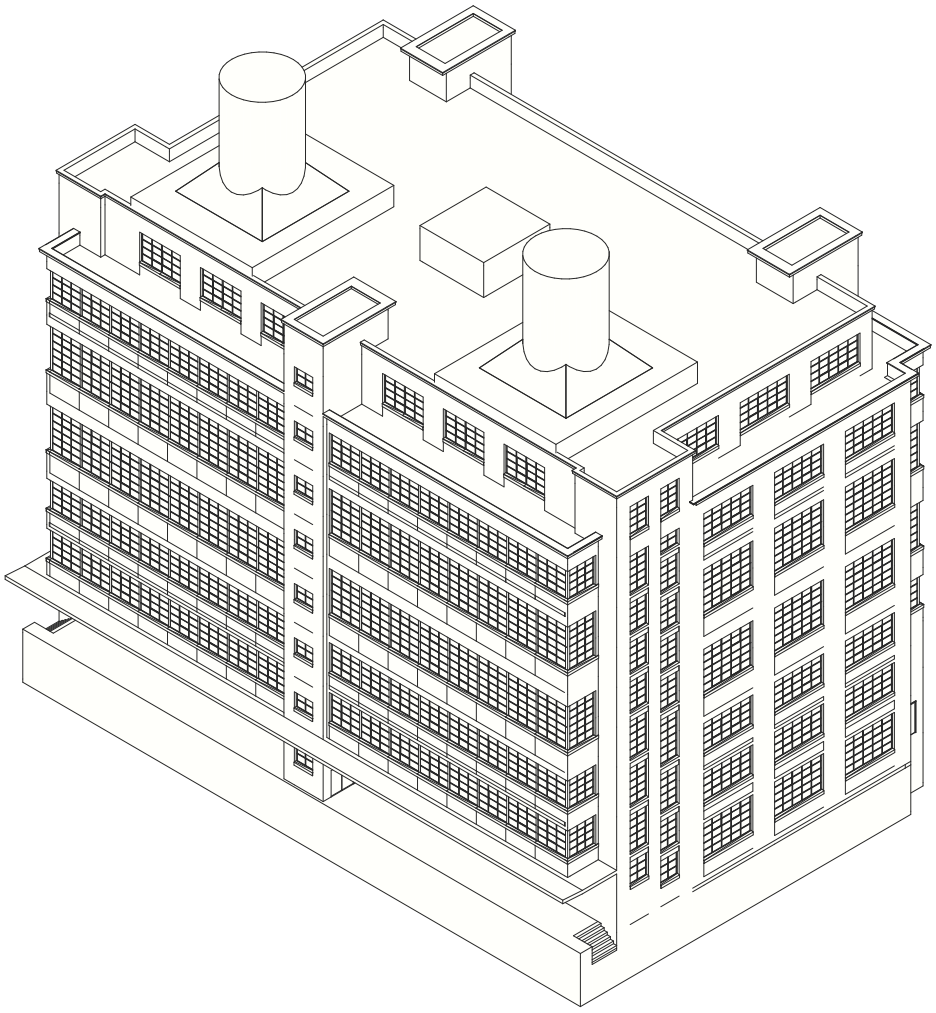


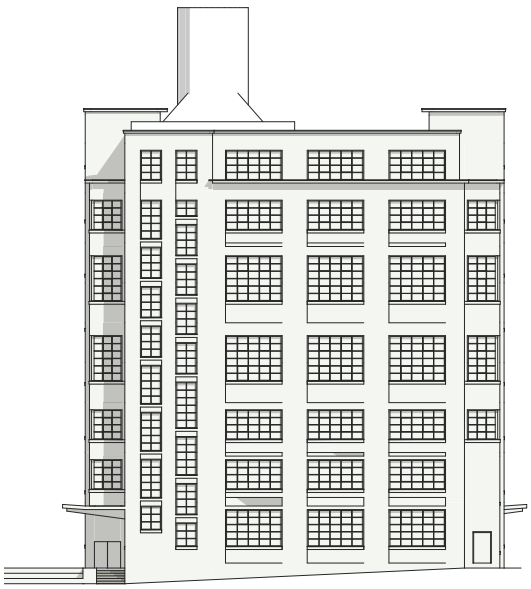
variante I
aufstockung

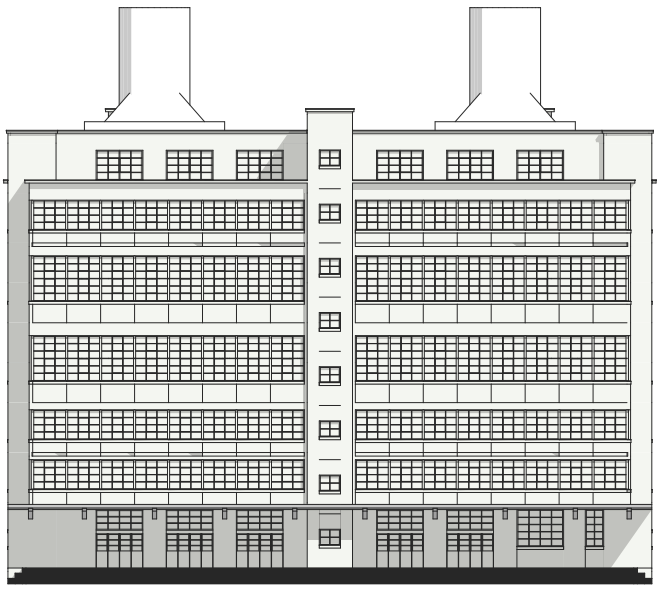




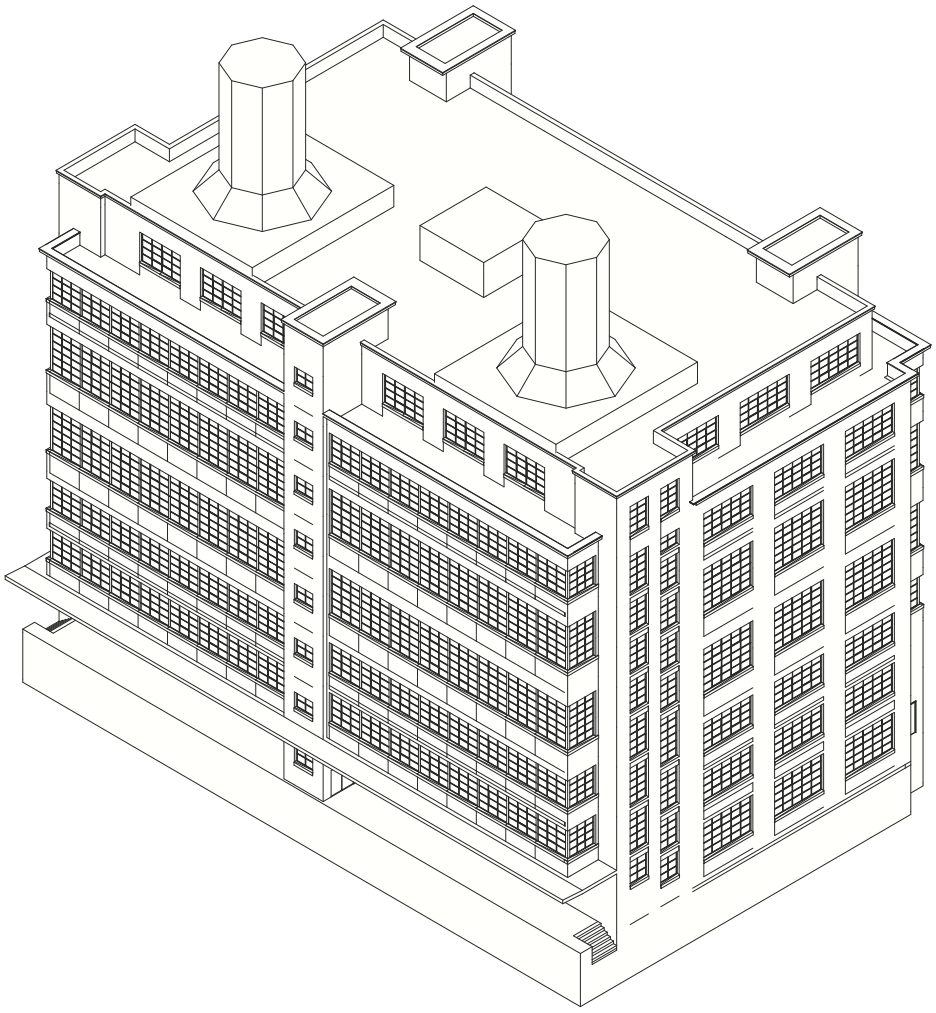
variante II
aufstockung

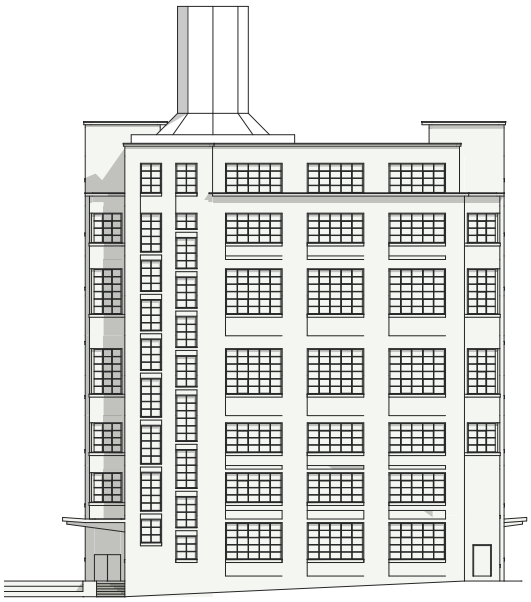


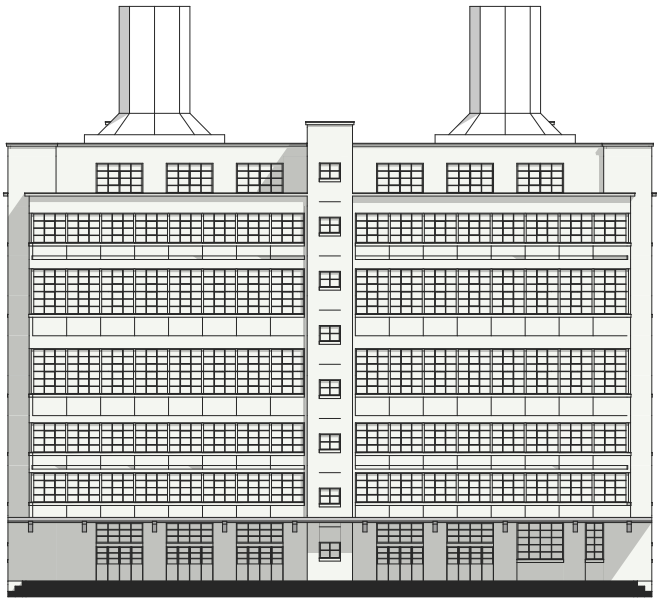




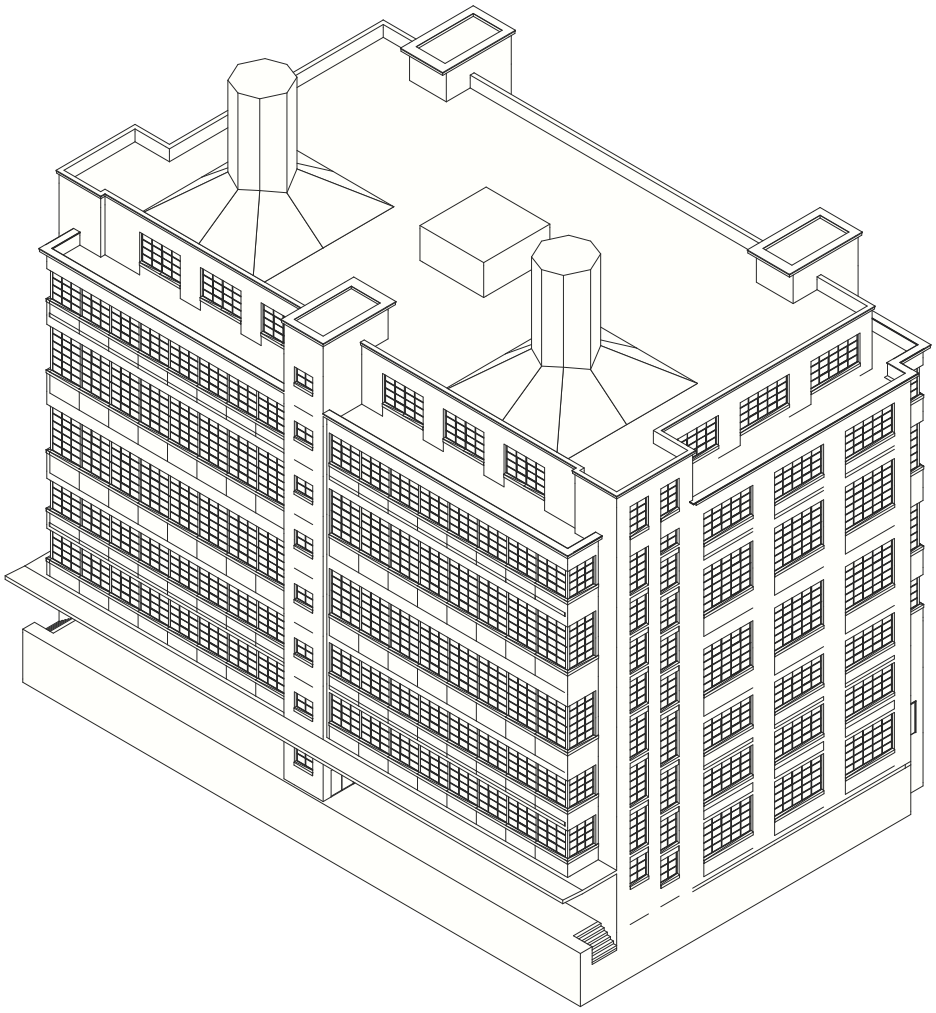
variante III
aufstockung

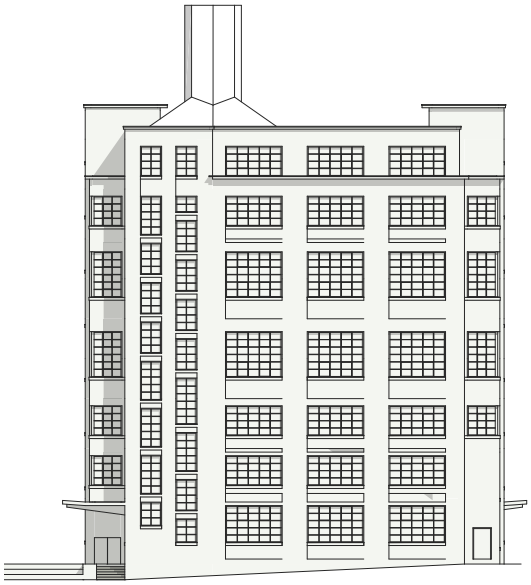


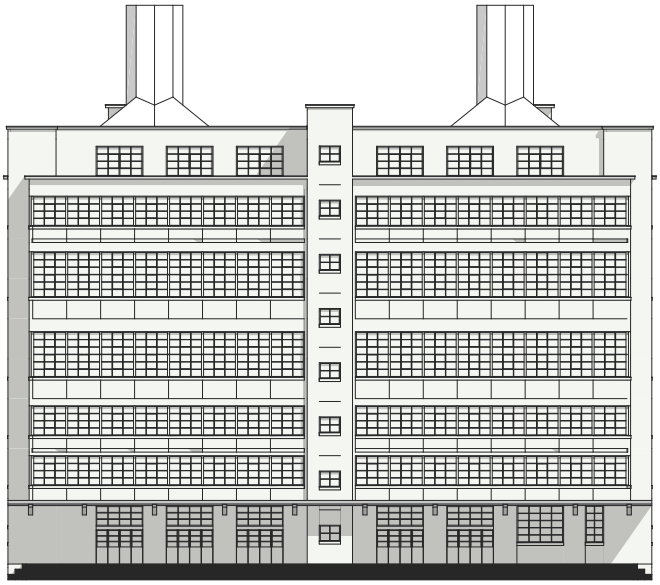




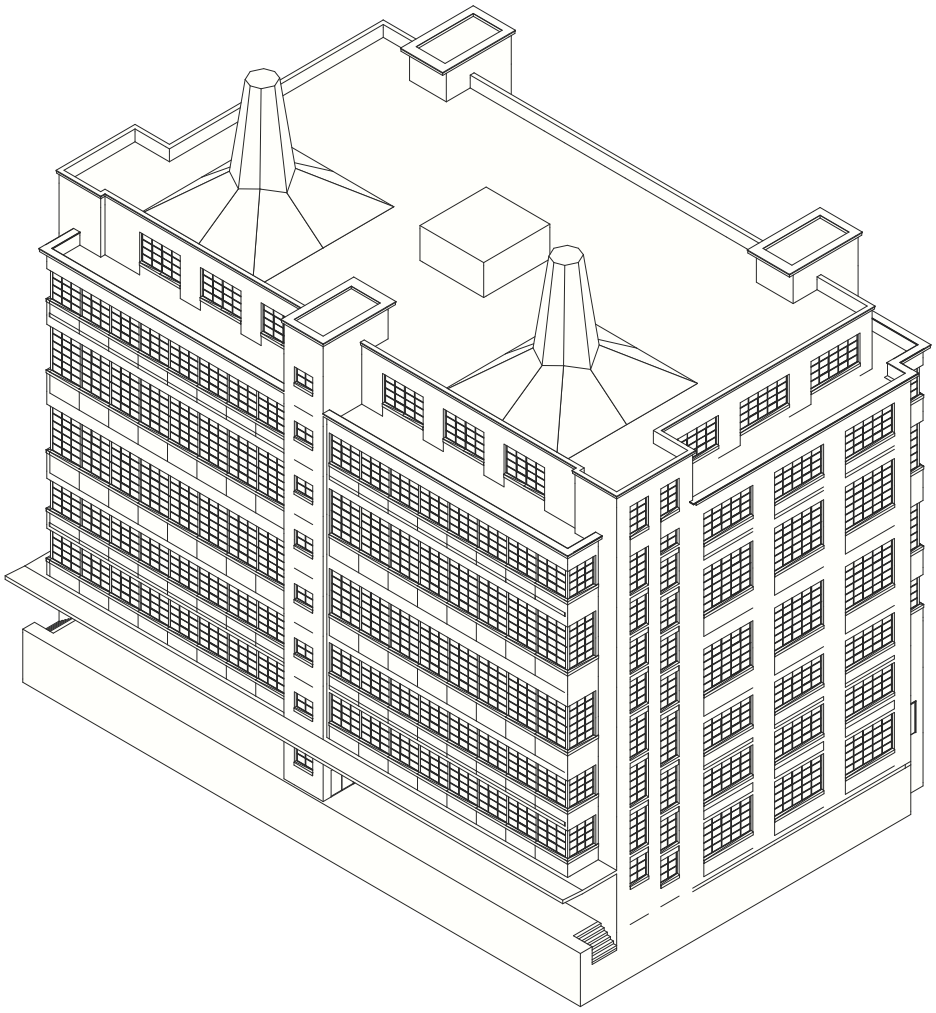
variante IV
aufstockung

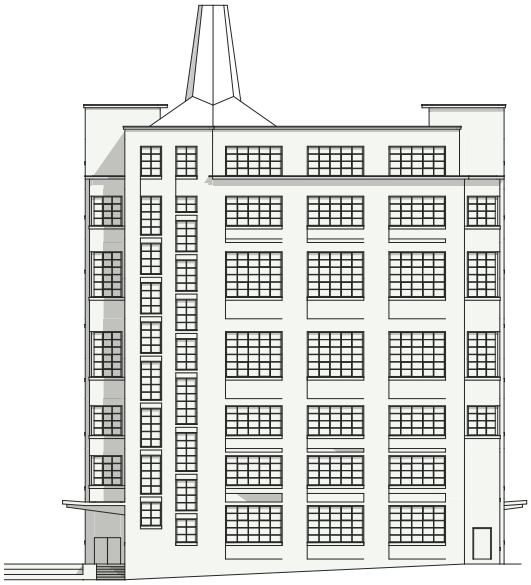


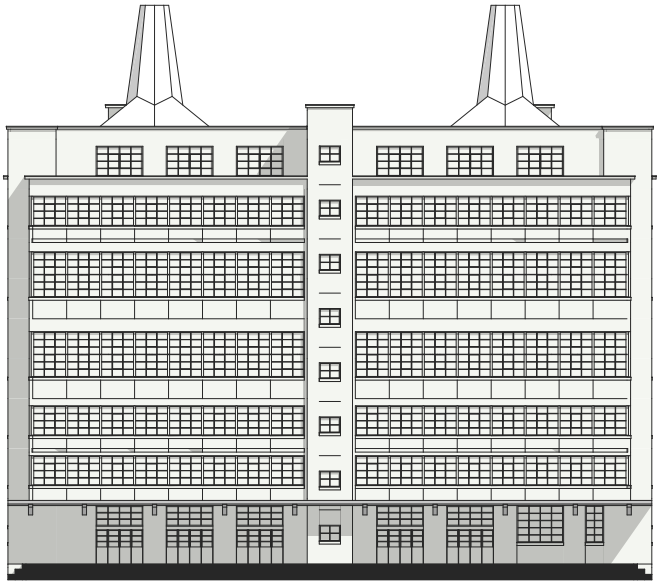




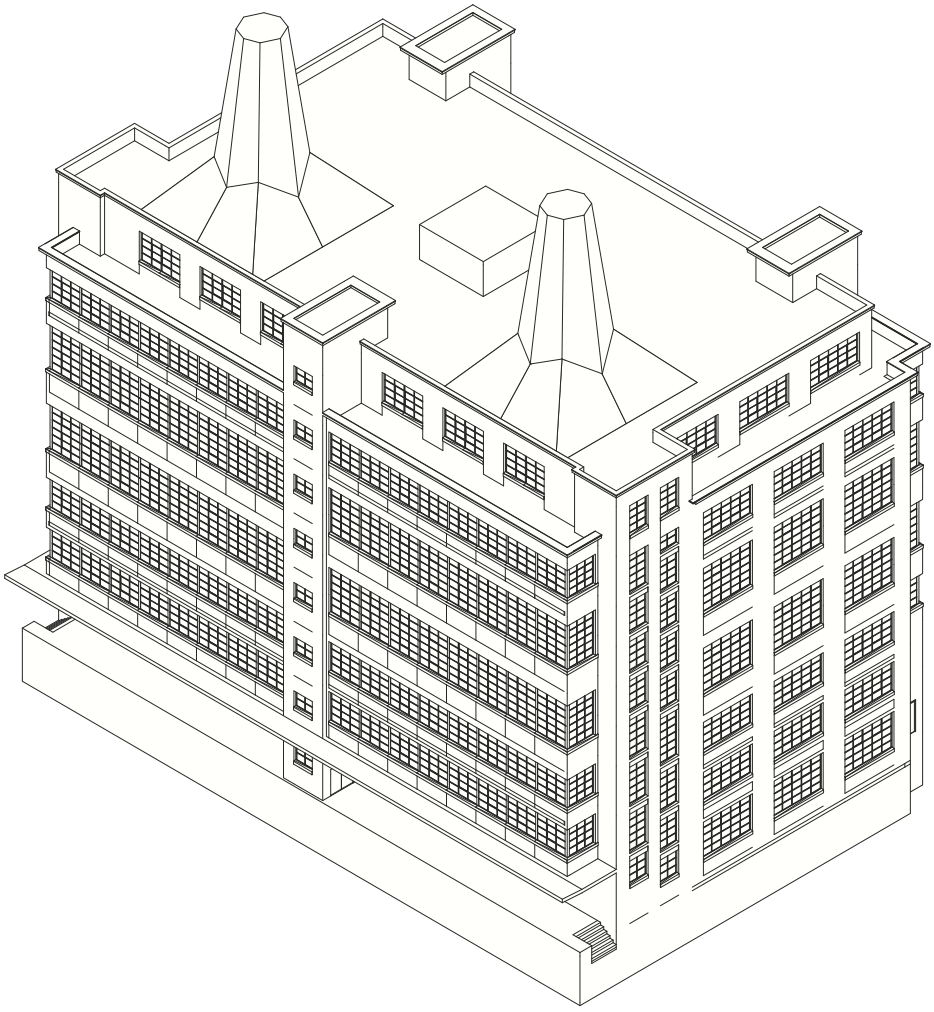
variante V
aufstockung

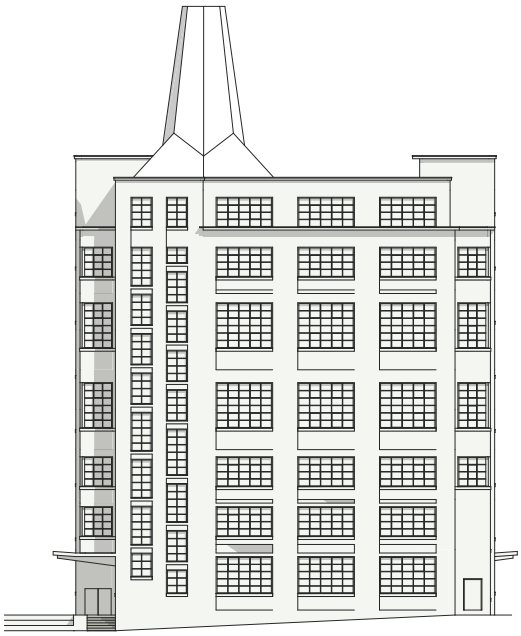


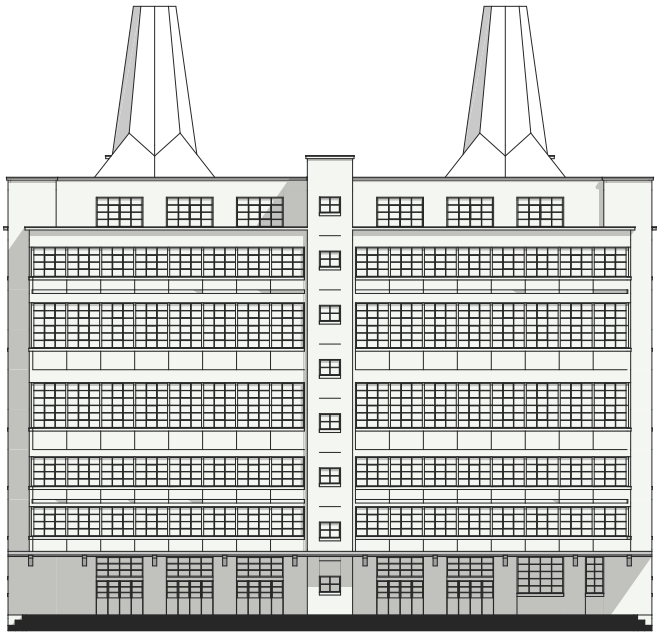




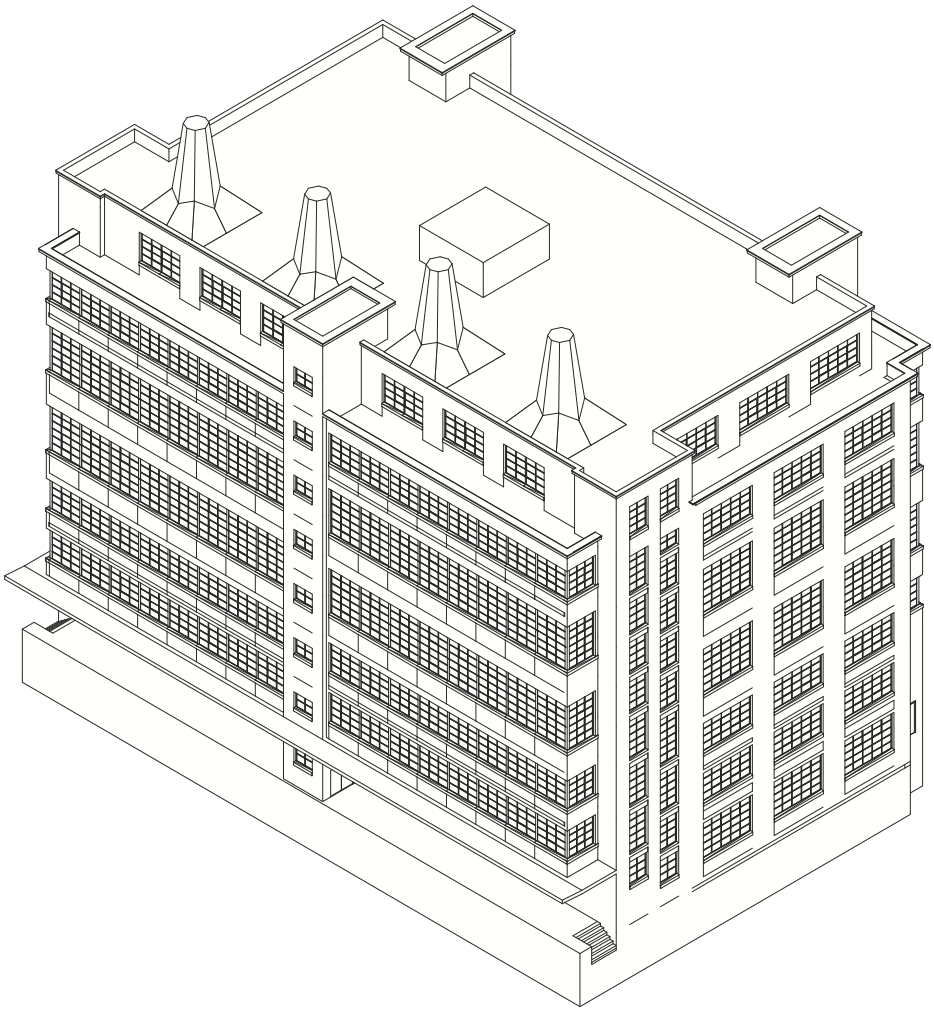
variante VI
aufstockung

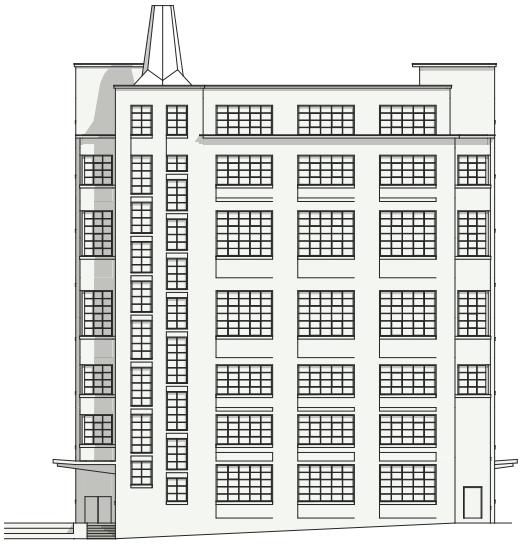


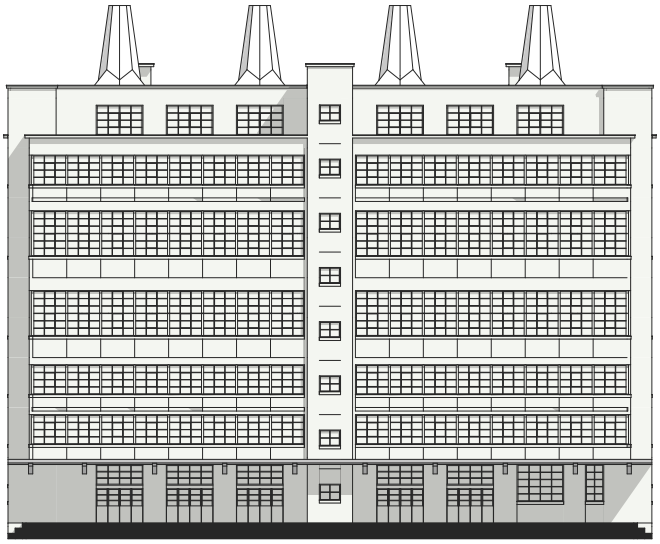




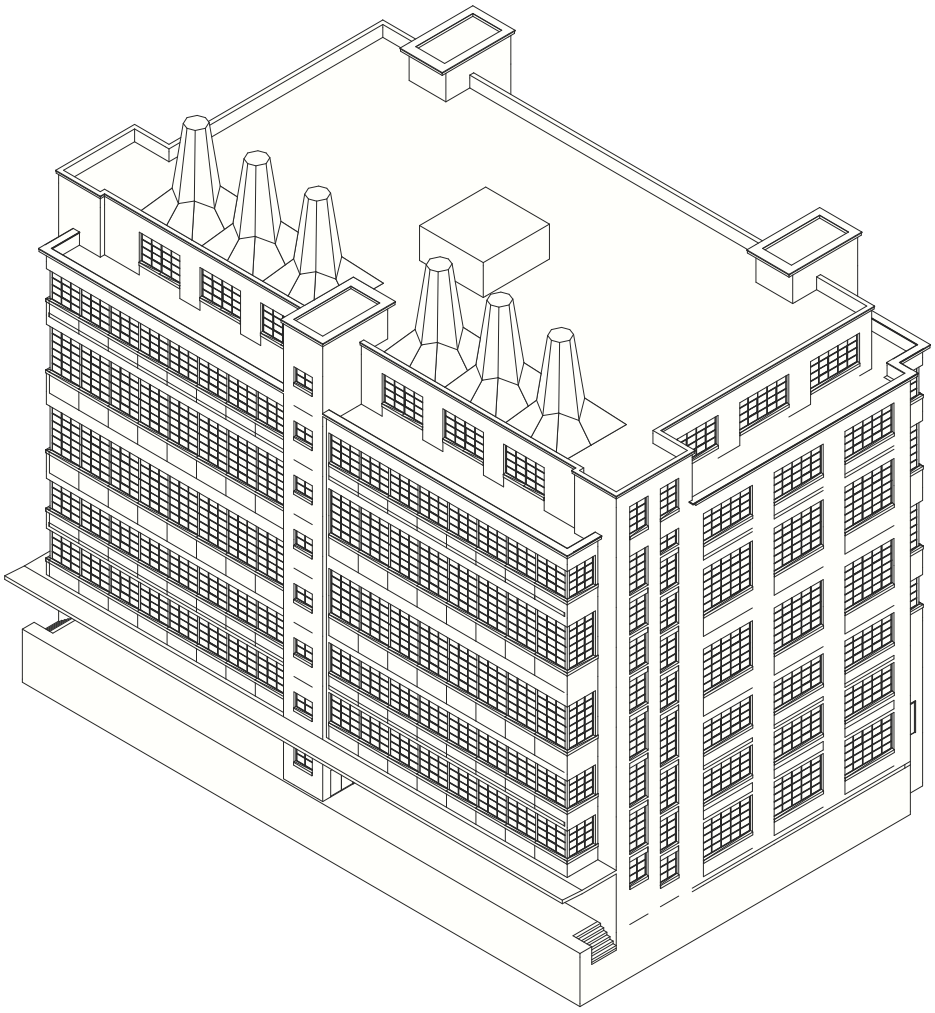
variante VII
aufstockung

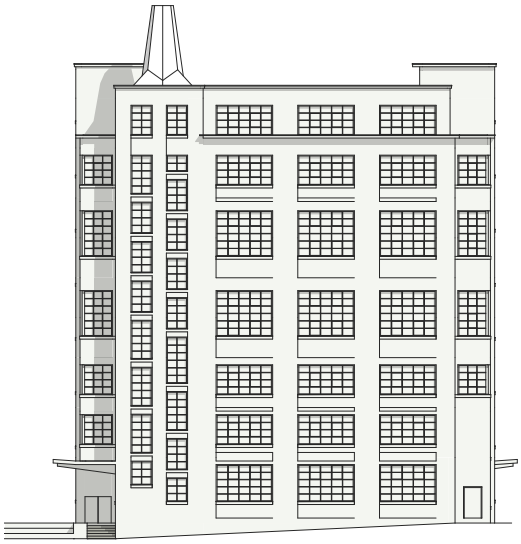


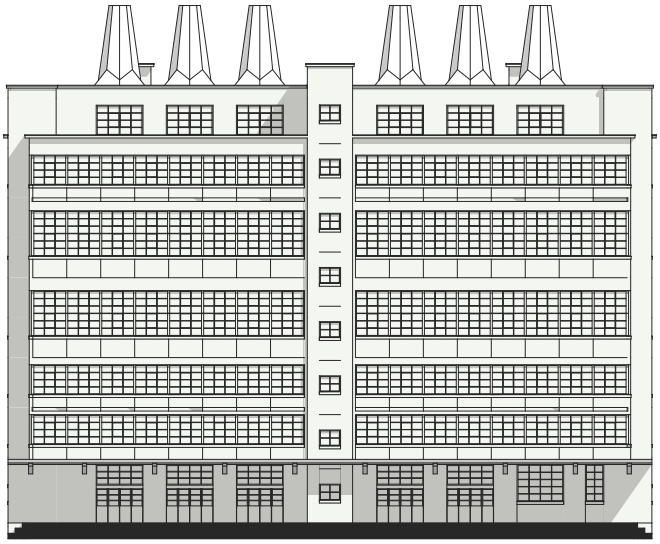




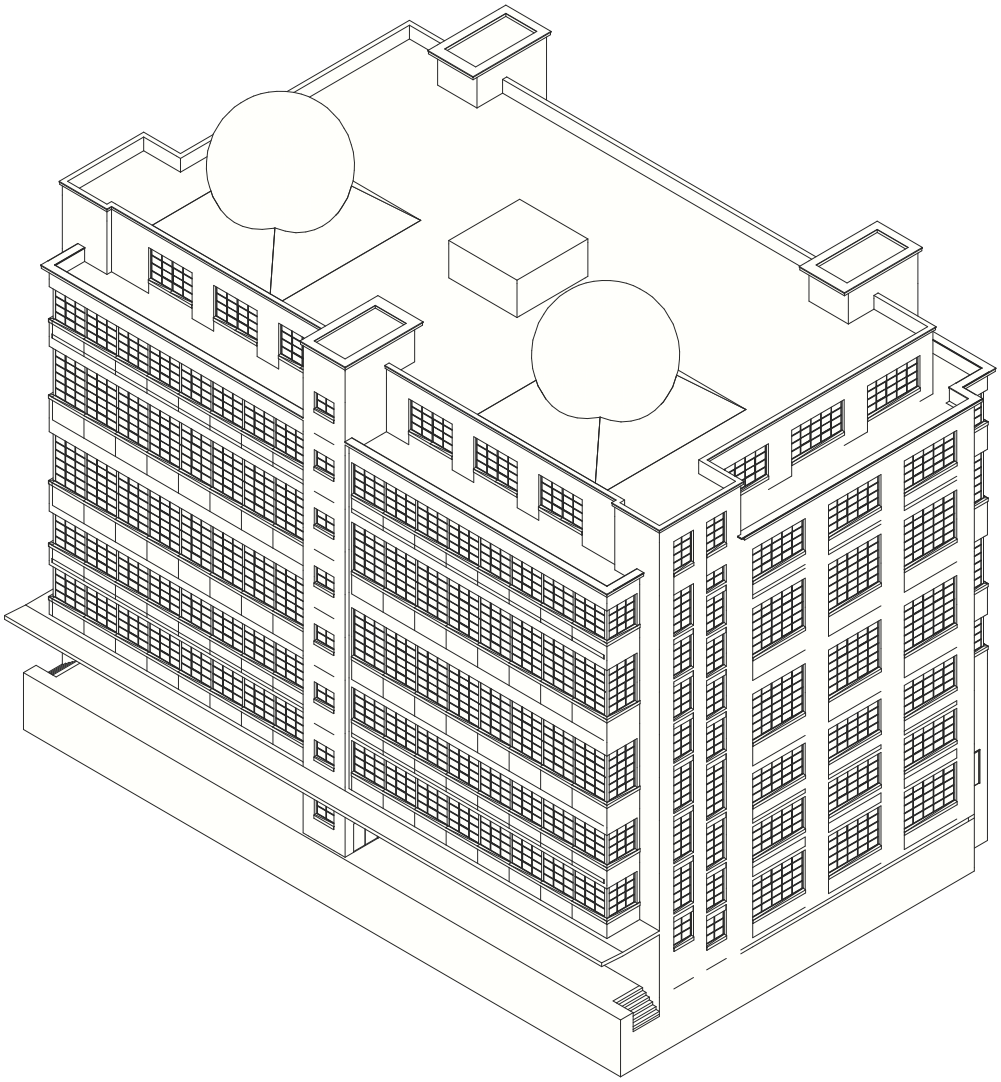
variante VIII
aufstockung

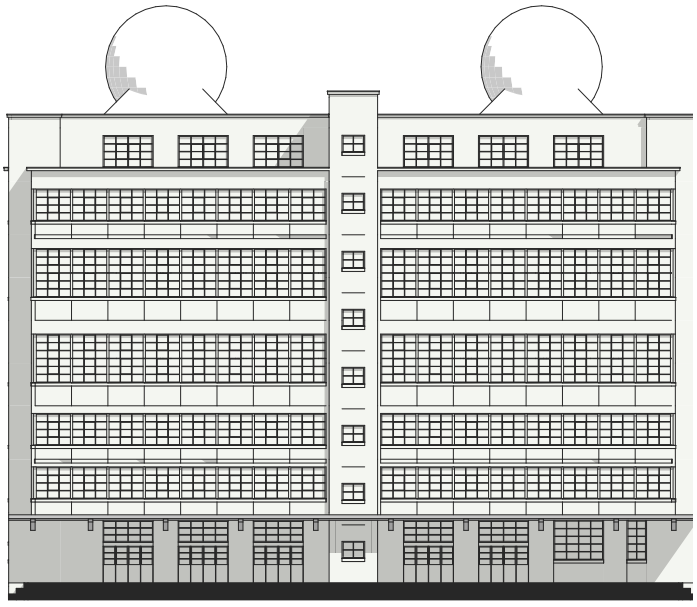




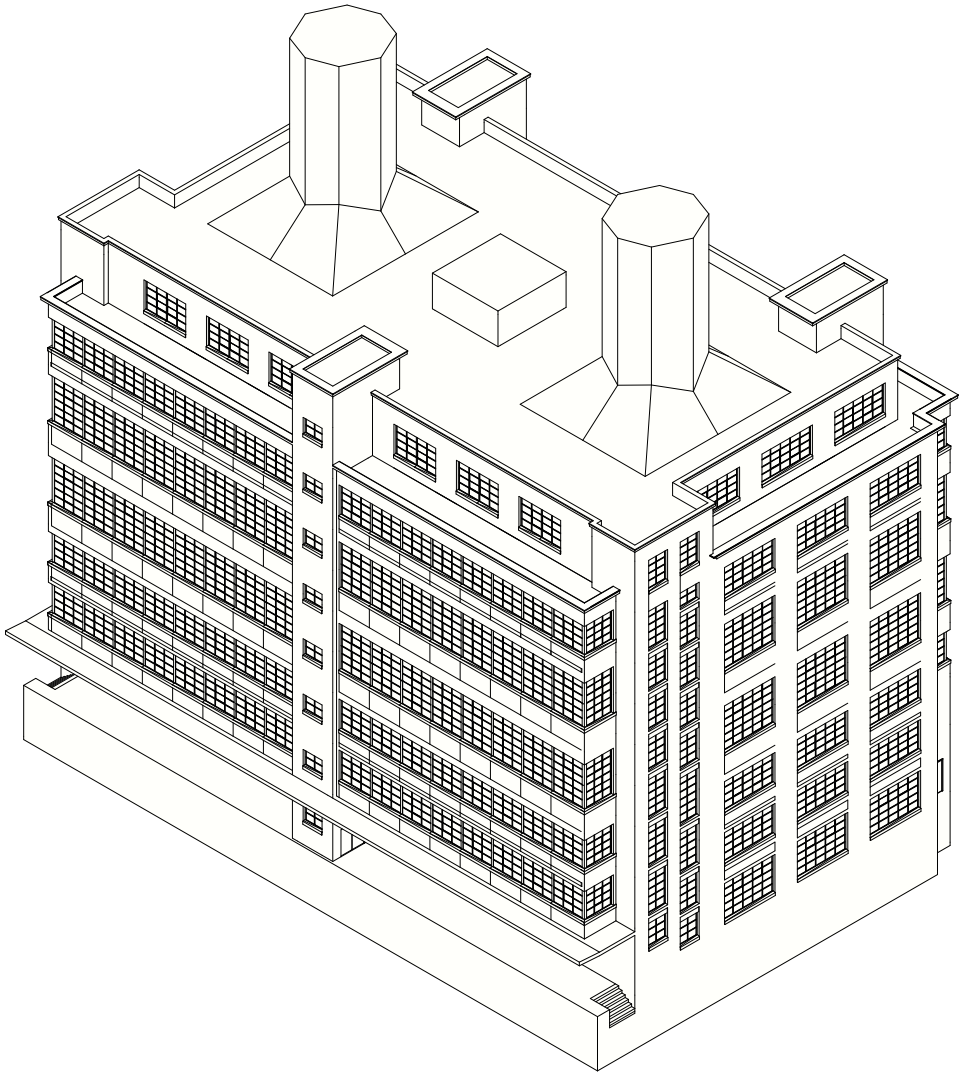


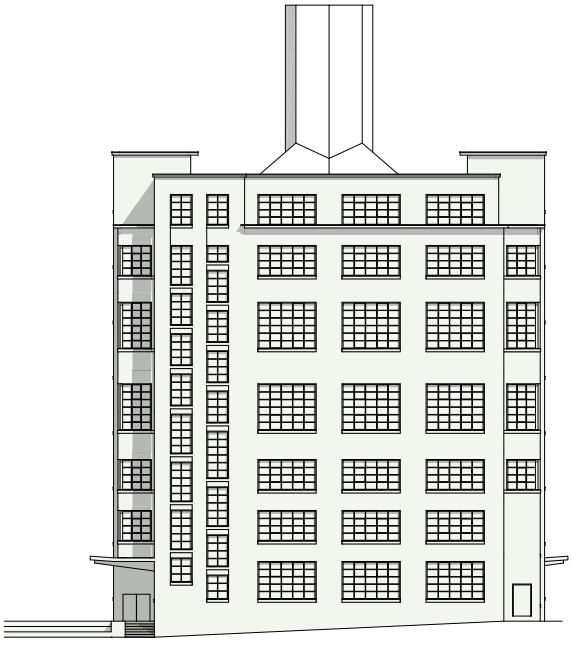
variante IX
aufstockung

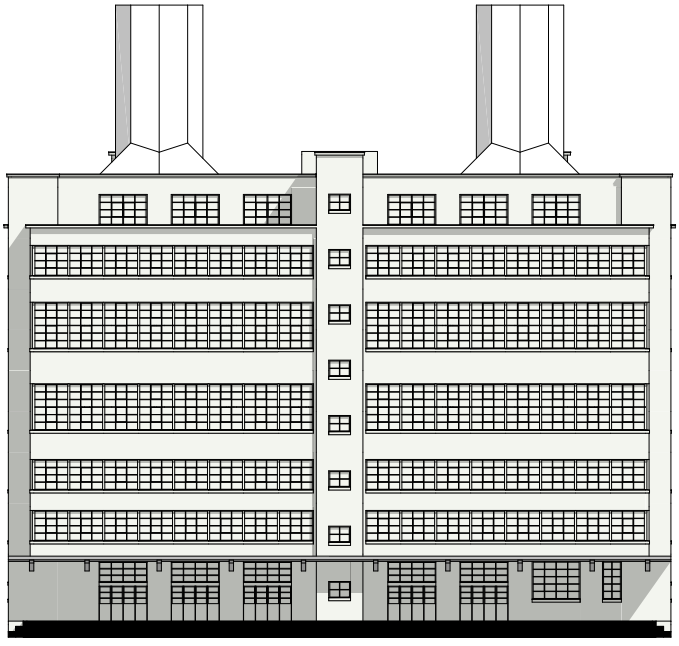




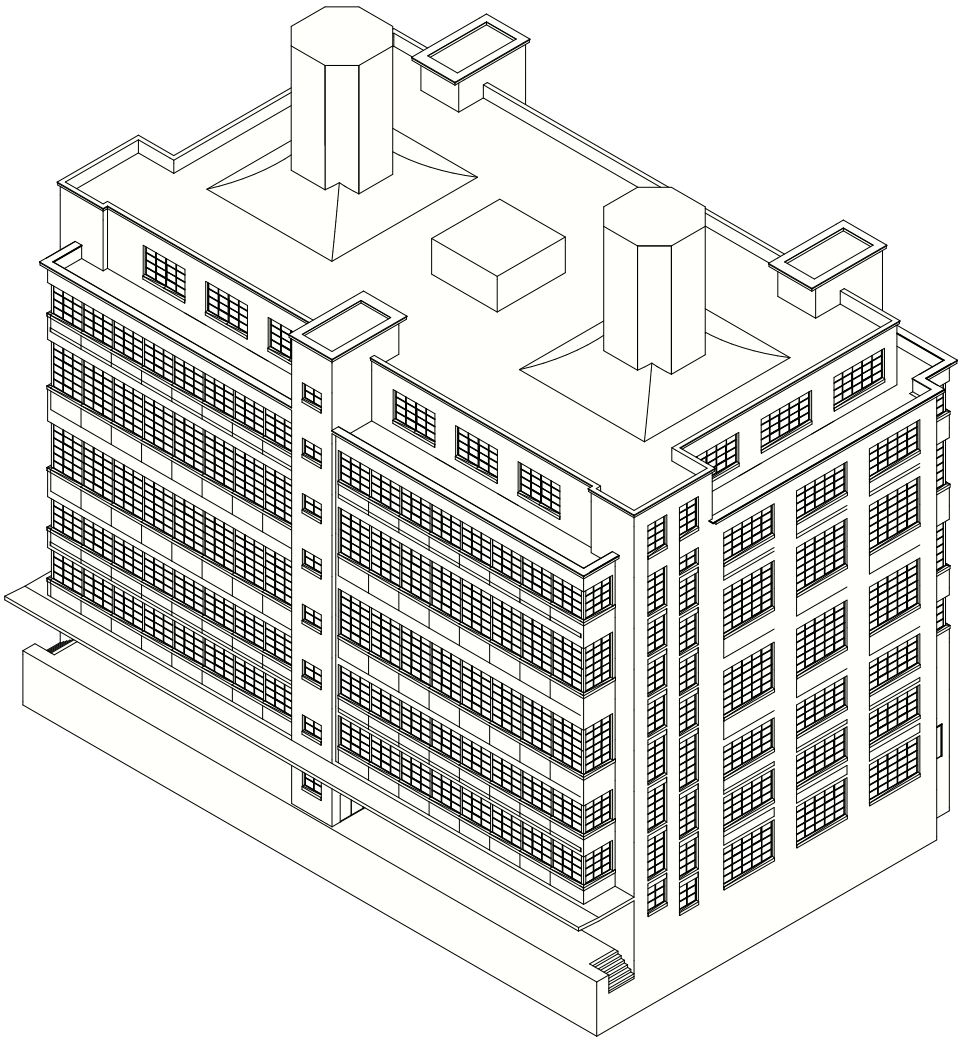
variante X
aufstockung

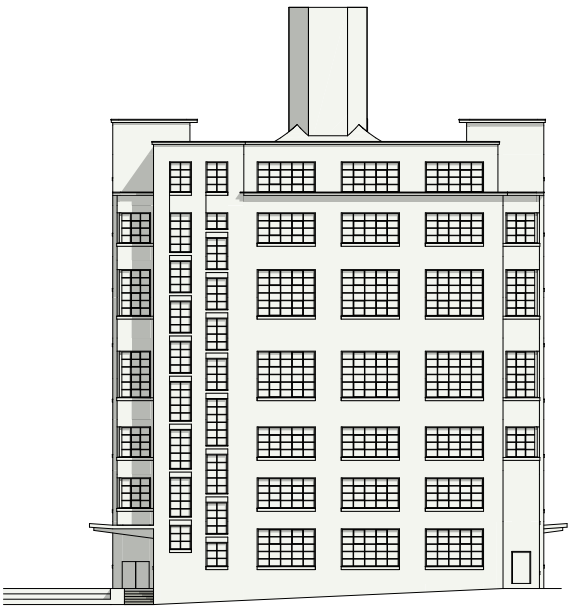


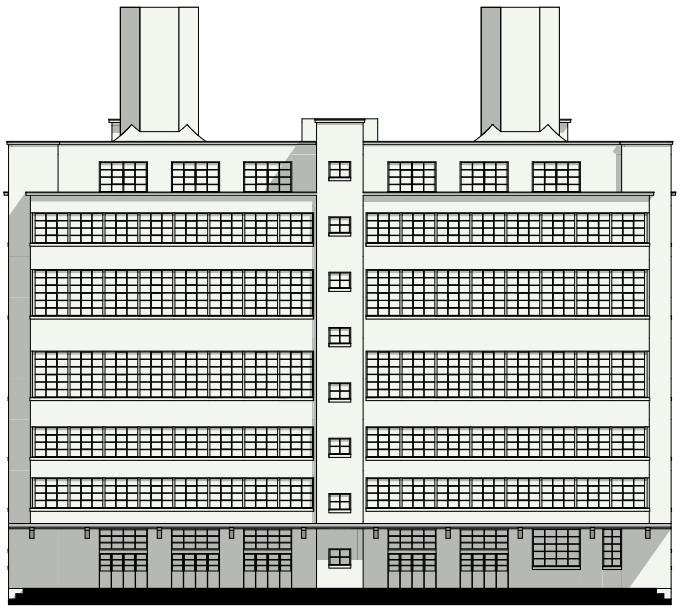




variante XI
aufstockung







variante XII
aufstockung

Jährlicher Energiebedarf von Standardnutzungen nach SIA 2024

Annahme Instandsetzung des Gebäudes, folglich Referenzwerte aus Kategorie „Bestand“

Betrachtung ohne Bedarf Geräte, Raumkühlung & Lüftung (Deckung Mieter durch reguläres Netz)

Grossraumbüro	82.1	kWh/m2 jährlich
Schalterhalle	63.1	kWh/m2 jährlich
Bibliothek	101.0	kWh/m2 jährlich
Hörsaal	111.2	kWh/m2 jährlich
Fachgeschäft	145.5	kWh/m2 jährlich
Verkauf Möbel/Garten	109.8	kWh/m2 jährlich
Restaurant	286.0	kWh/m2 jährlich
Mehrzweckhalle	177.0	kWh/m2 jährlich
Ausstellungshalle	163.3	kWh/m2 jährlich
Produktion	141.2	kWh/m2 jährlich
Lagerhalle	104.9	kWh/m2 jährlich
Fitnessraum	186.2	kWh/m2 jährlich
Mittelwert	**139.3**	kWh/m2 jährlich
Nettogebäudefläche	7630.5	m2
Verkehrsfläche (Annahme 15%)	1’144.5	m2
Energieverbrauch	37.9	kWh/m2 jährlich
Nutzfläche	6’486.0	m2
Resultierender Energiebedarf total	950’000	kWh
Potenzial Tunnelthermie total	1’800’000	kWh

Geothermisches Potenzial Ep

Energiegewinn pro Quadratmeter Absorberfläche En = 10.9 W/m-2
Absorberfläche für 1 Meter Tunnellänge A = 3.142 m2
Absorberfläche für 600 Meter Tunnellänge A = 18’850 m2
Energiegewinn für 600 Meter Tunnellänge En = 205’459 W = 205.459 kW

Energiepotenzial (365 Tage) Ep = 1’799’820 kWh = 1.8 GWh
Energiepotenzial (15.09-15.04) Ep = 1’045’375 kWh = 1.045 GWh

Leistungsziffer Wärmepumpe Strahlungsheizkörper $COPw$

Effizienz der Wärmepumpe ηw = 0.6
Temperatur des warmen Reservoirs $T1$ = 333 K (60°C)
Temperatur des kalten Reservoirs $T2$ = 289 K (16°C)

$$COPW = \eta W \cdot (T1/(T1 - T2))$$

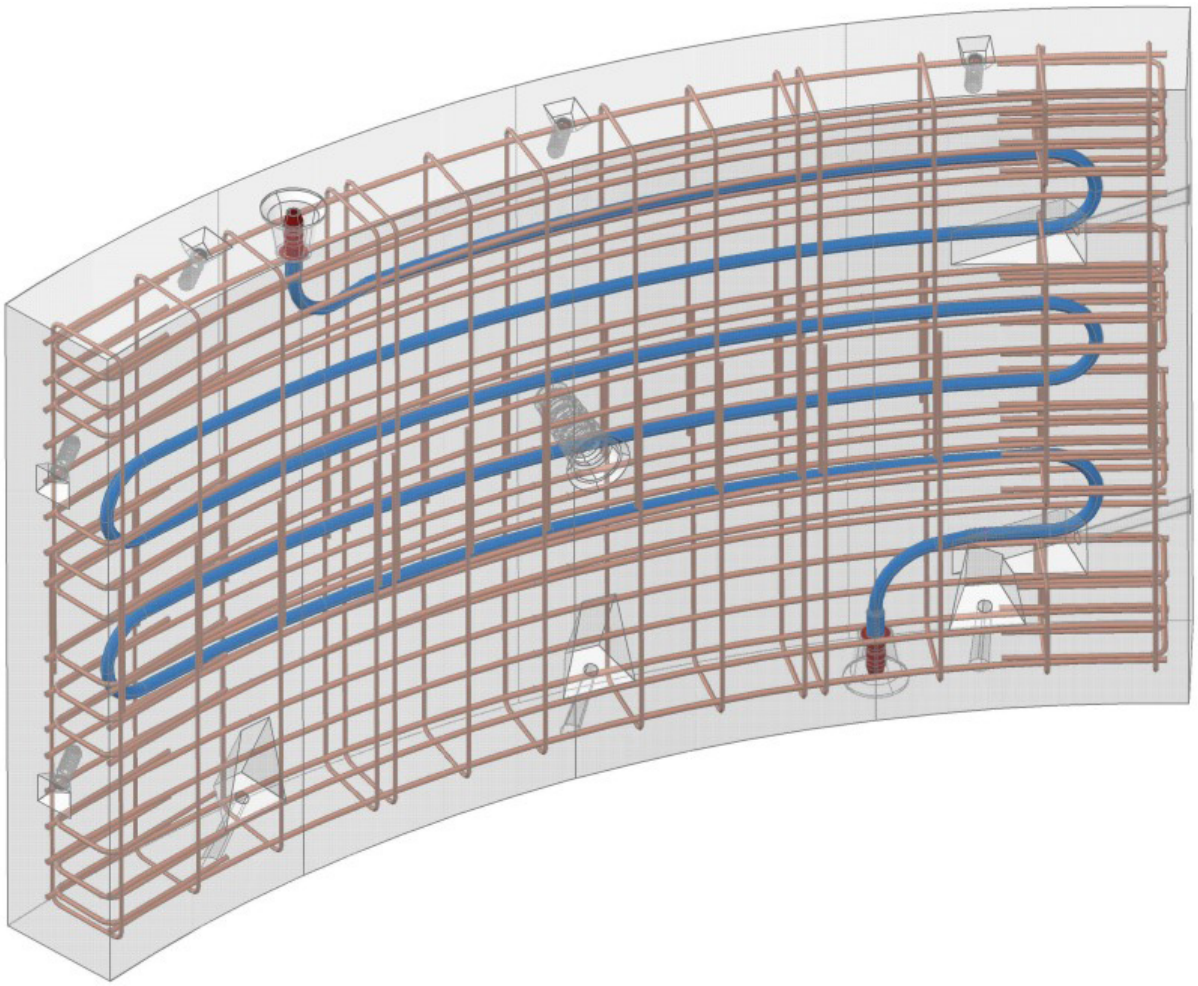
0.6 · (333K/(333 K - 289 K)) = 4.54

Leistungsziffer Wärmepumpe Boden- & Flächenheizung $COPw$

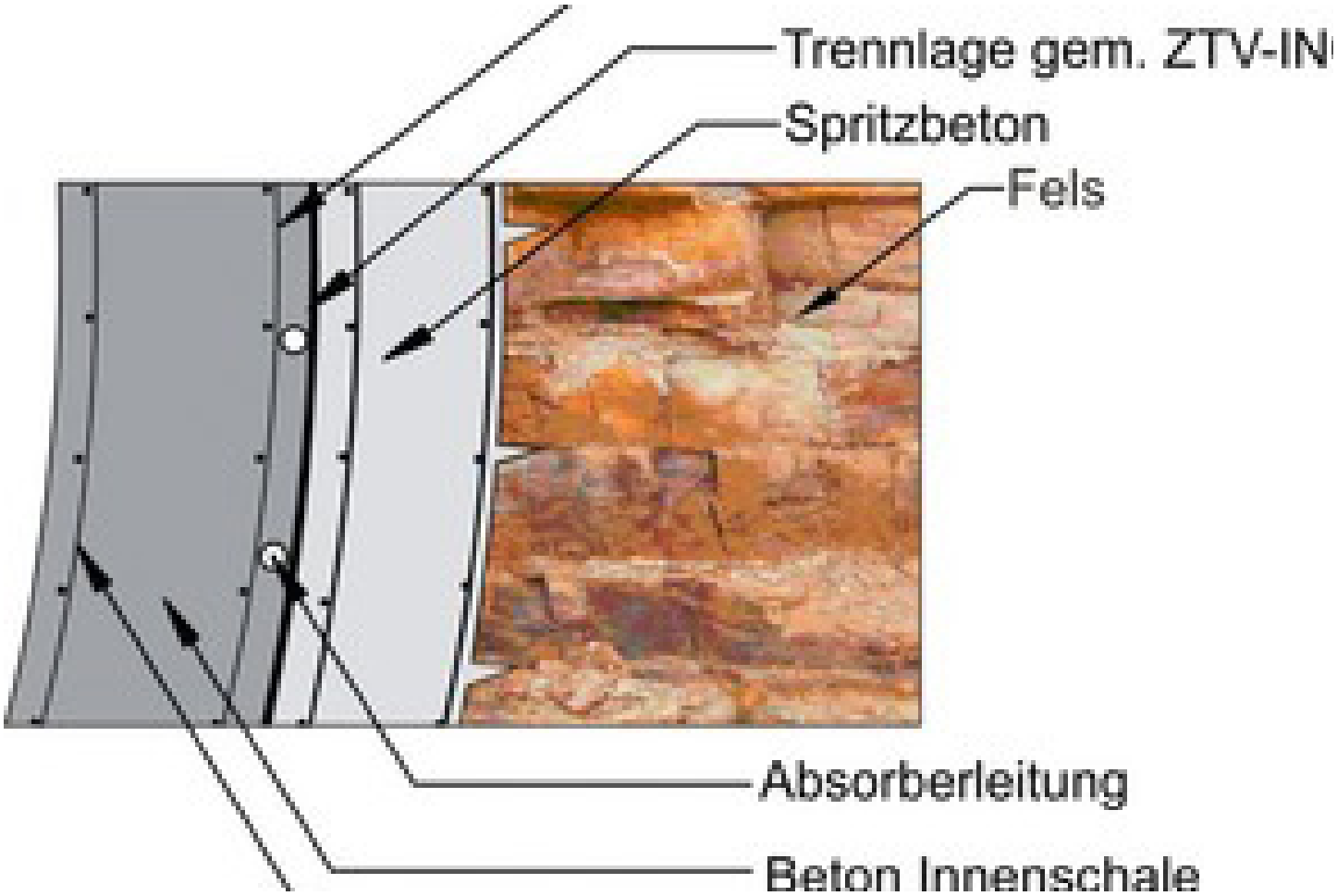
Effizienz der Wärmepumpe ηw = 0.6
Temperatur des warmen Reservoirs $T1$ = 313 K (40°C)
Temperatur des kalten Reservoirs $T2$ = 289 K (16°C)

$$COPW = \eta W \cdot (T1/(T1 - T2))$$

0.6 · (313K/(313 K - 289 K)) = 7.83



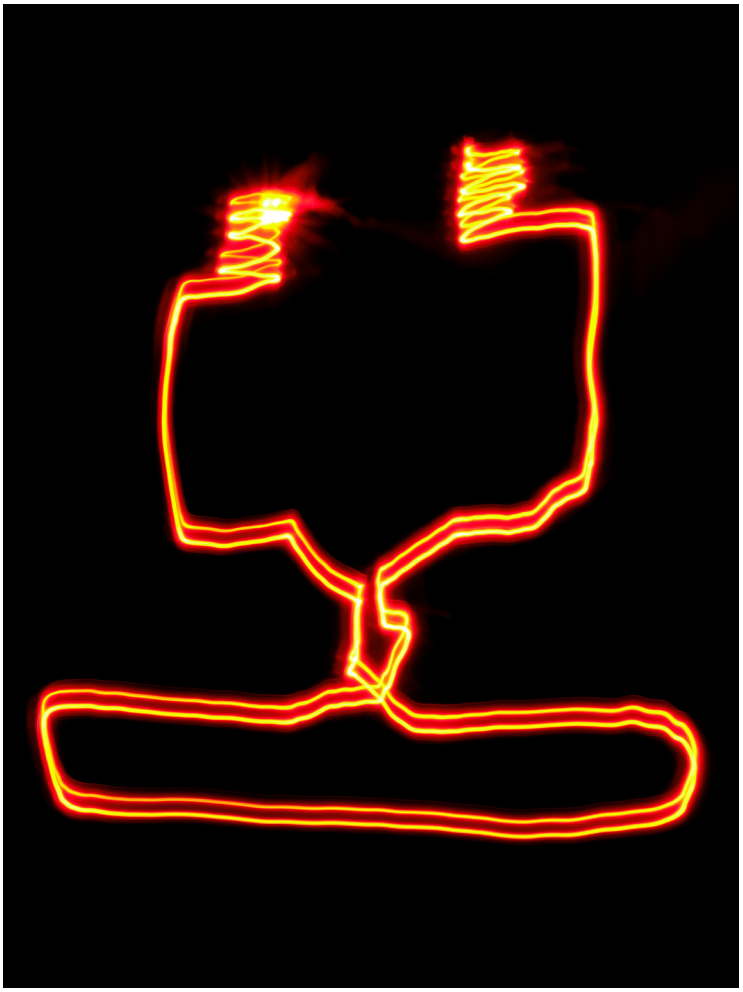
absorberelement
thermische aktivierung



absorberelement schnitt
thermische aktivierung

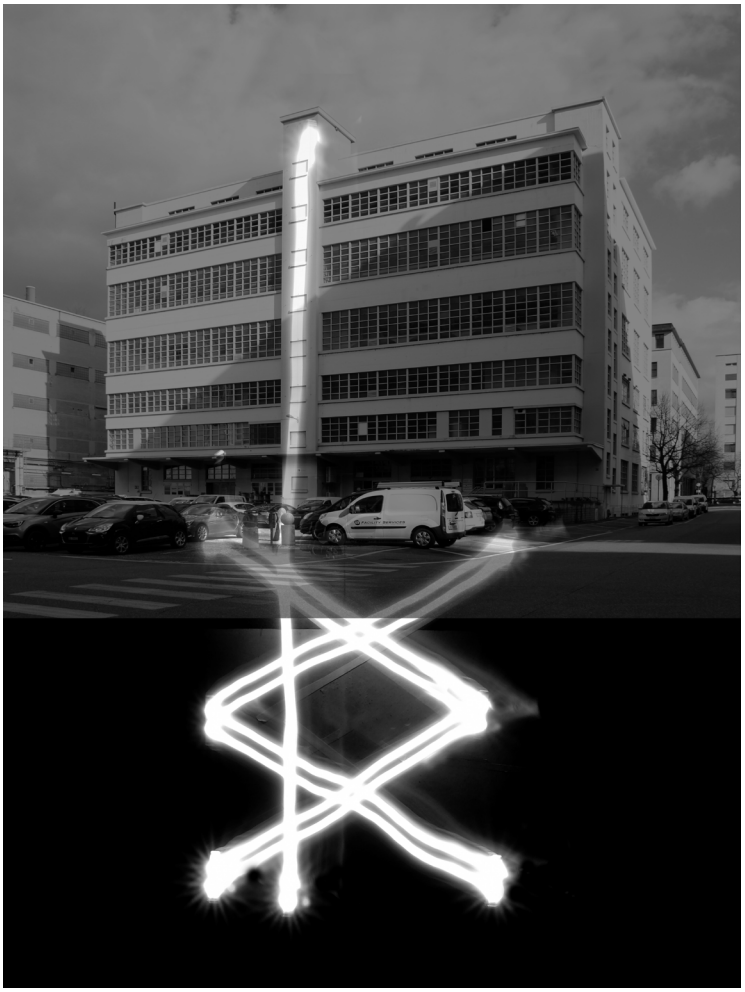
bildstudie
erschliessung

bildstudie
wärme

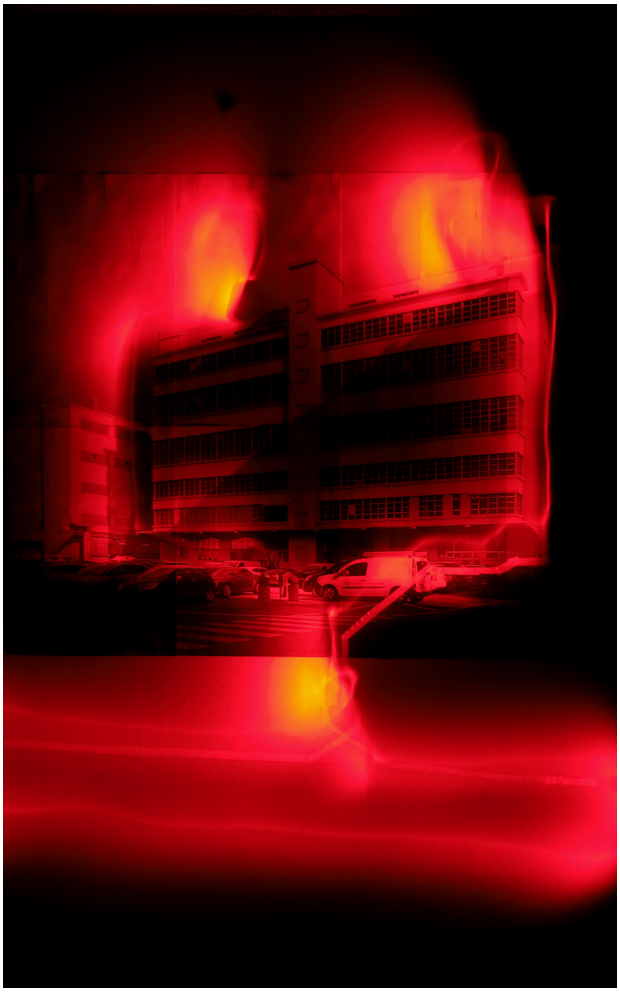


bildstudie
wärme II

bildstudie
wärme III

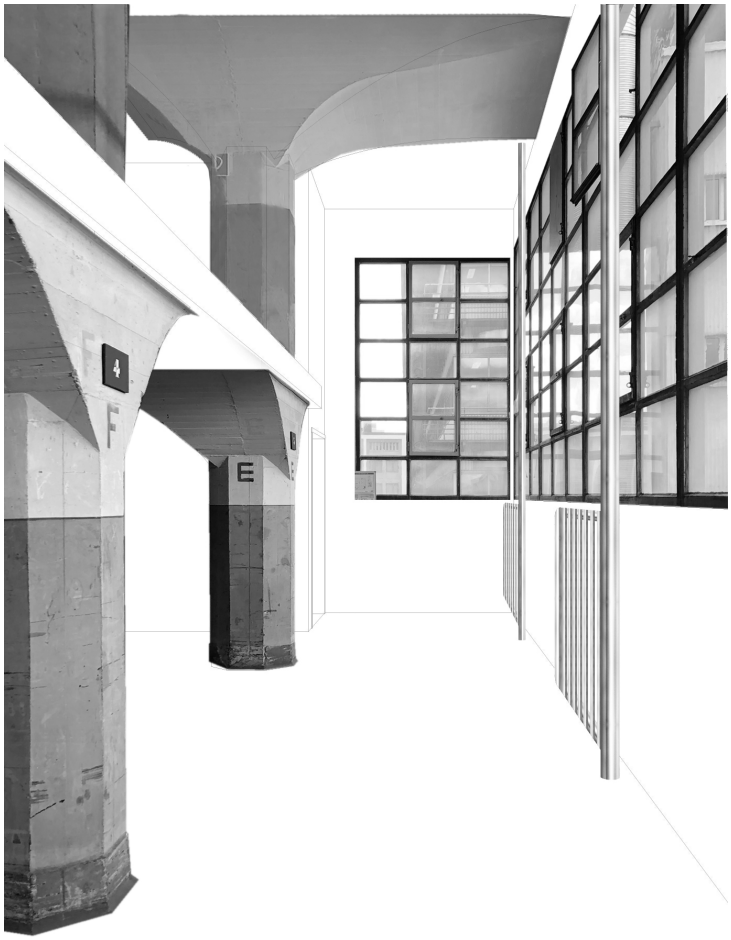


bildstudie
erschliessung II

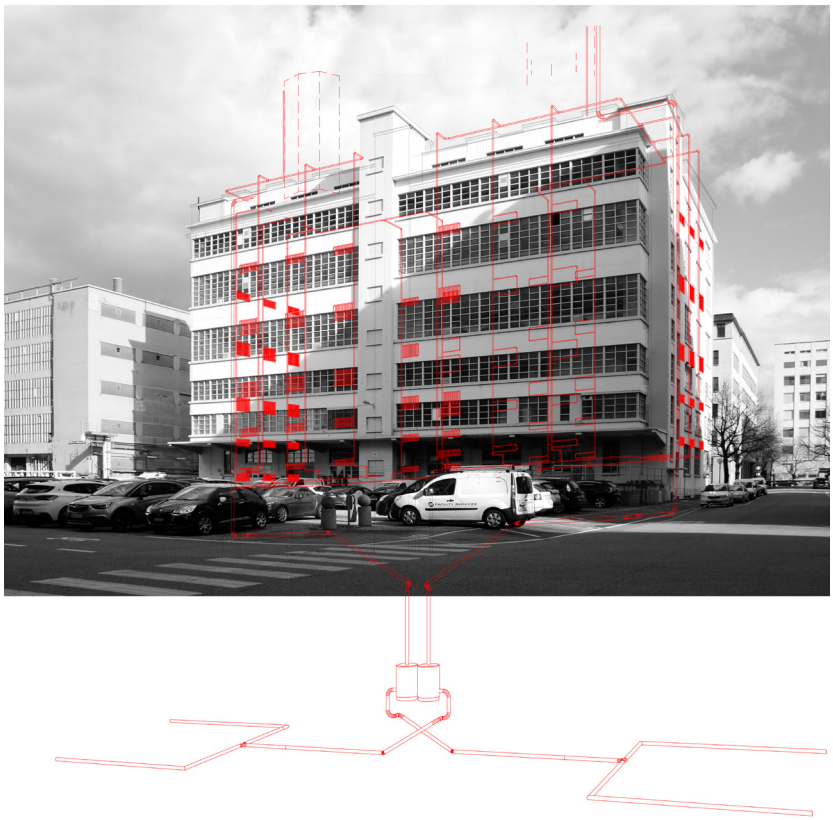


bildstudie
wärme

bildstudie
bahnhofshalle



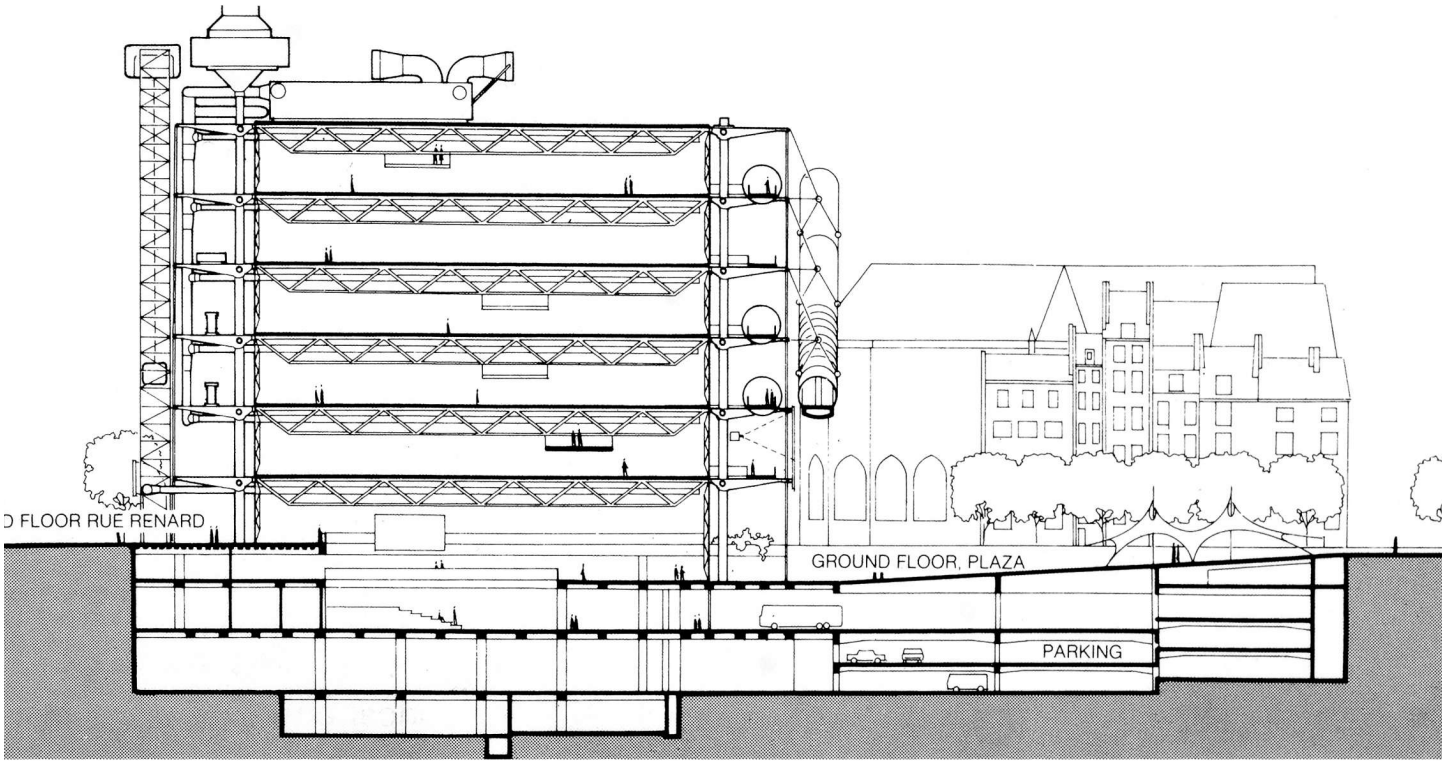
bildstudie
galerie



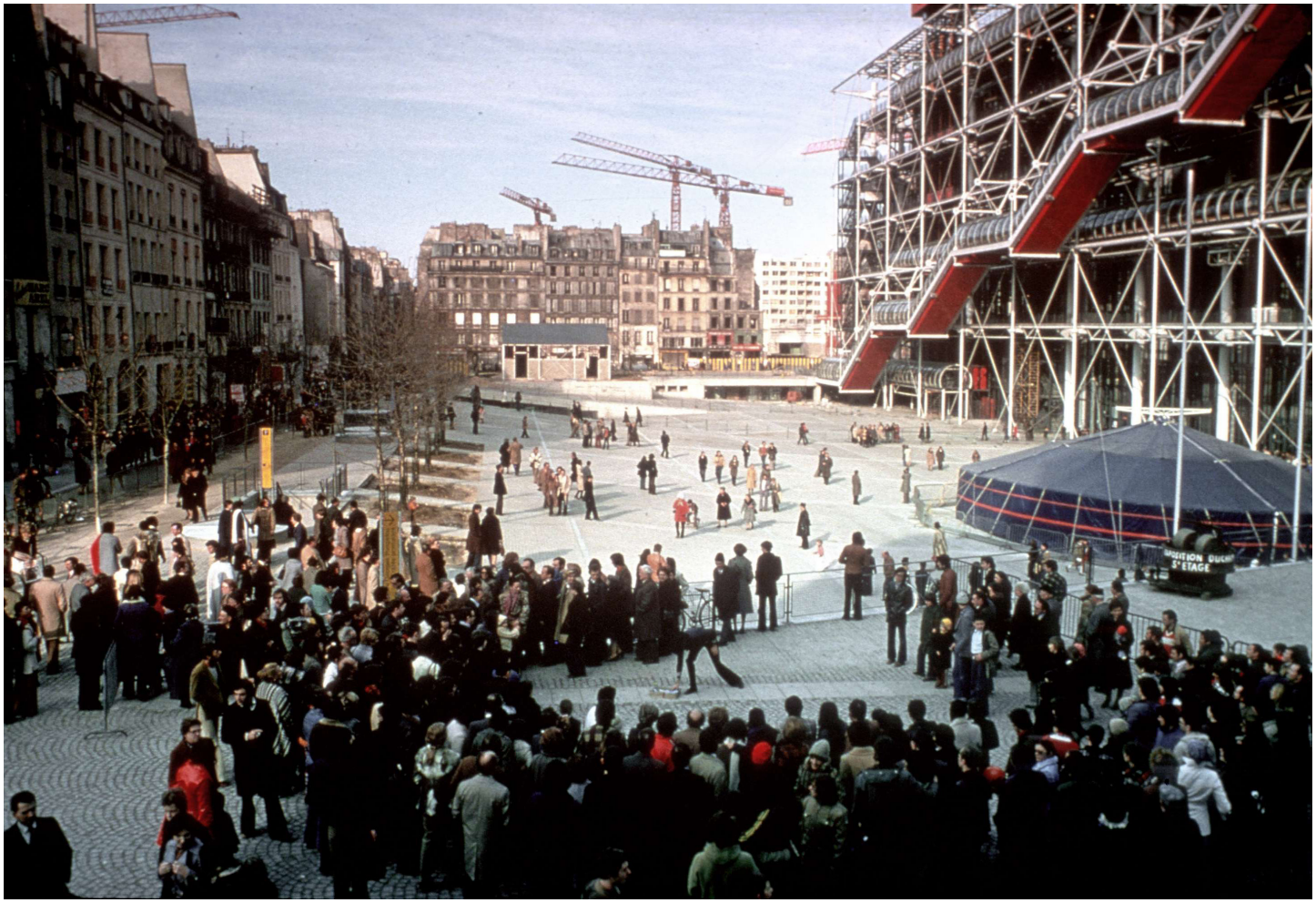
bildstudie
wärme IV

bildstudie
wärme V

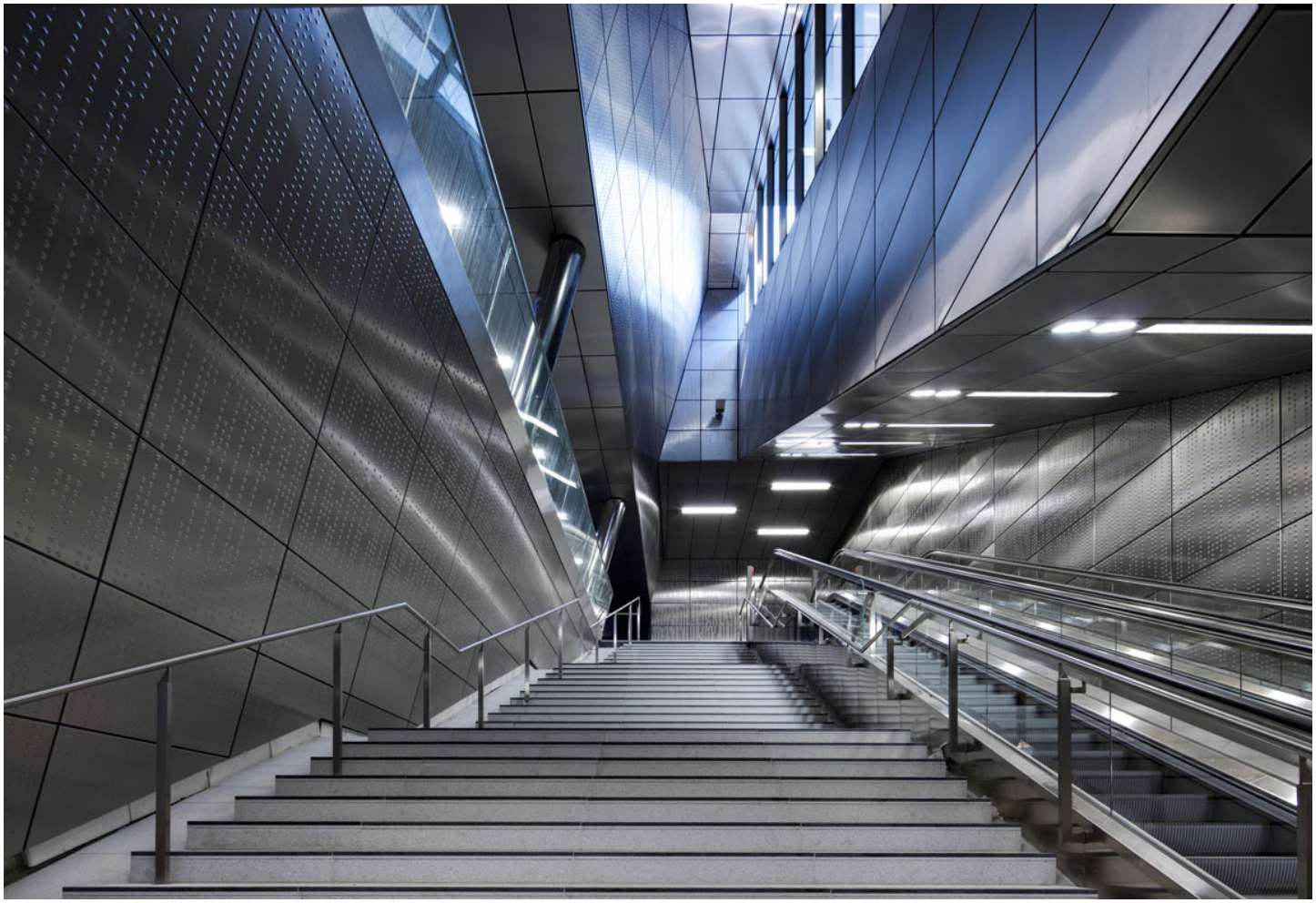
feigen gallery
hans hollein, new york



centre pompidou
renzo piano, paris



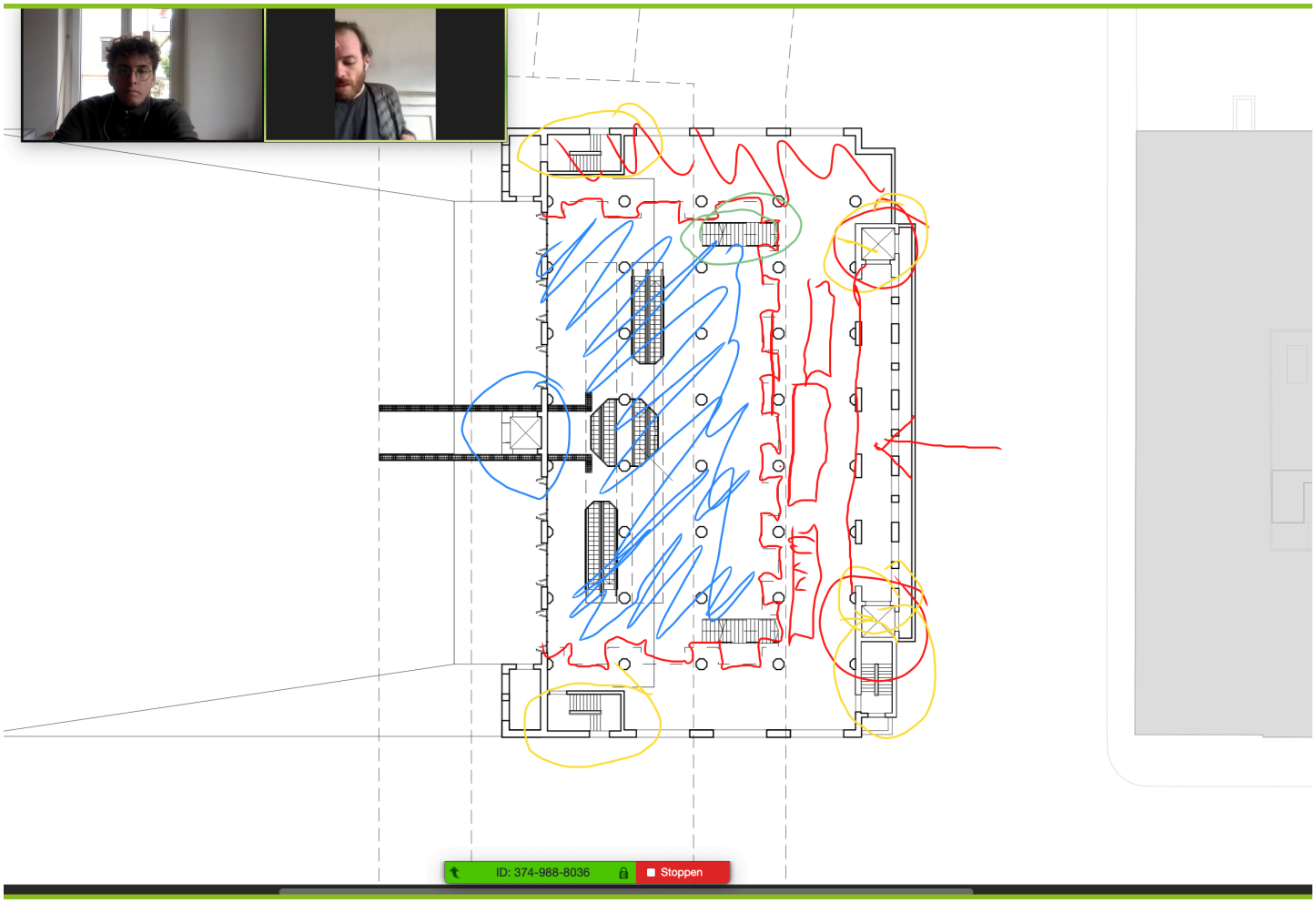
centre pompidou
renzo piano, paris



u-bahn station
netzwerkarchitekten, düsseldorf

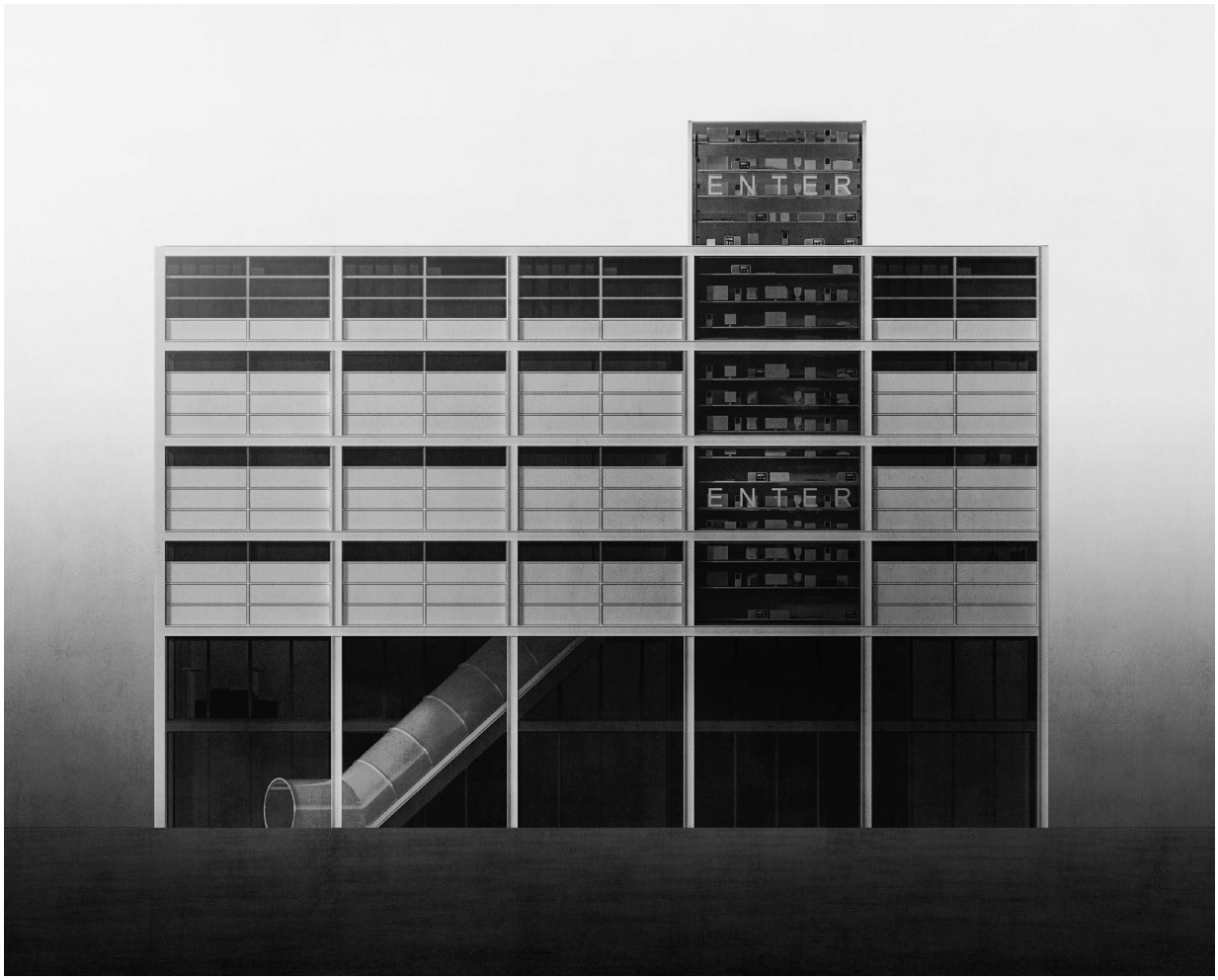
terrassenhaus
brandlhuber+, berlin

jardins neppert
lacaton vassal, mulhouse



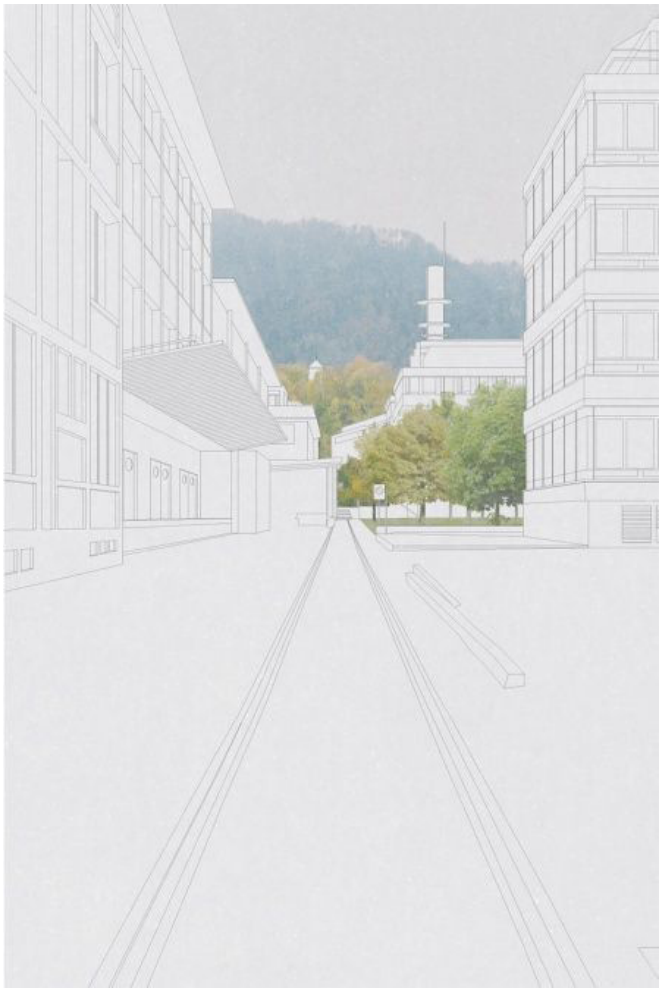
zoom skizze
erdgeschoss grundriss

neubau fachhochschule
moa , bern

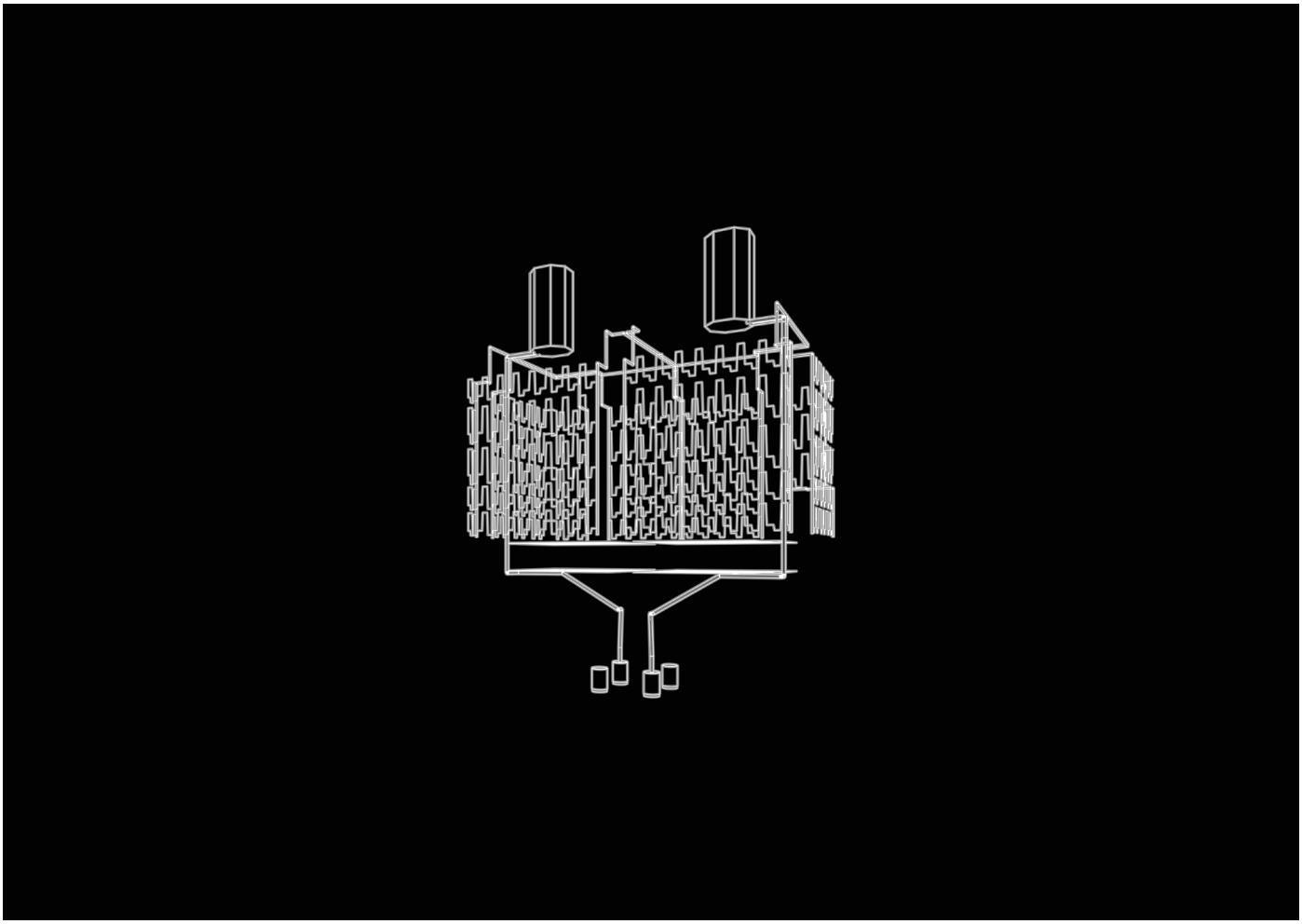


museum enter
waldrap, solothurn

marina tiefenbrunnen
waldrap, zürich

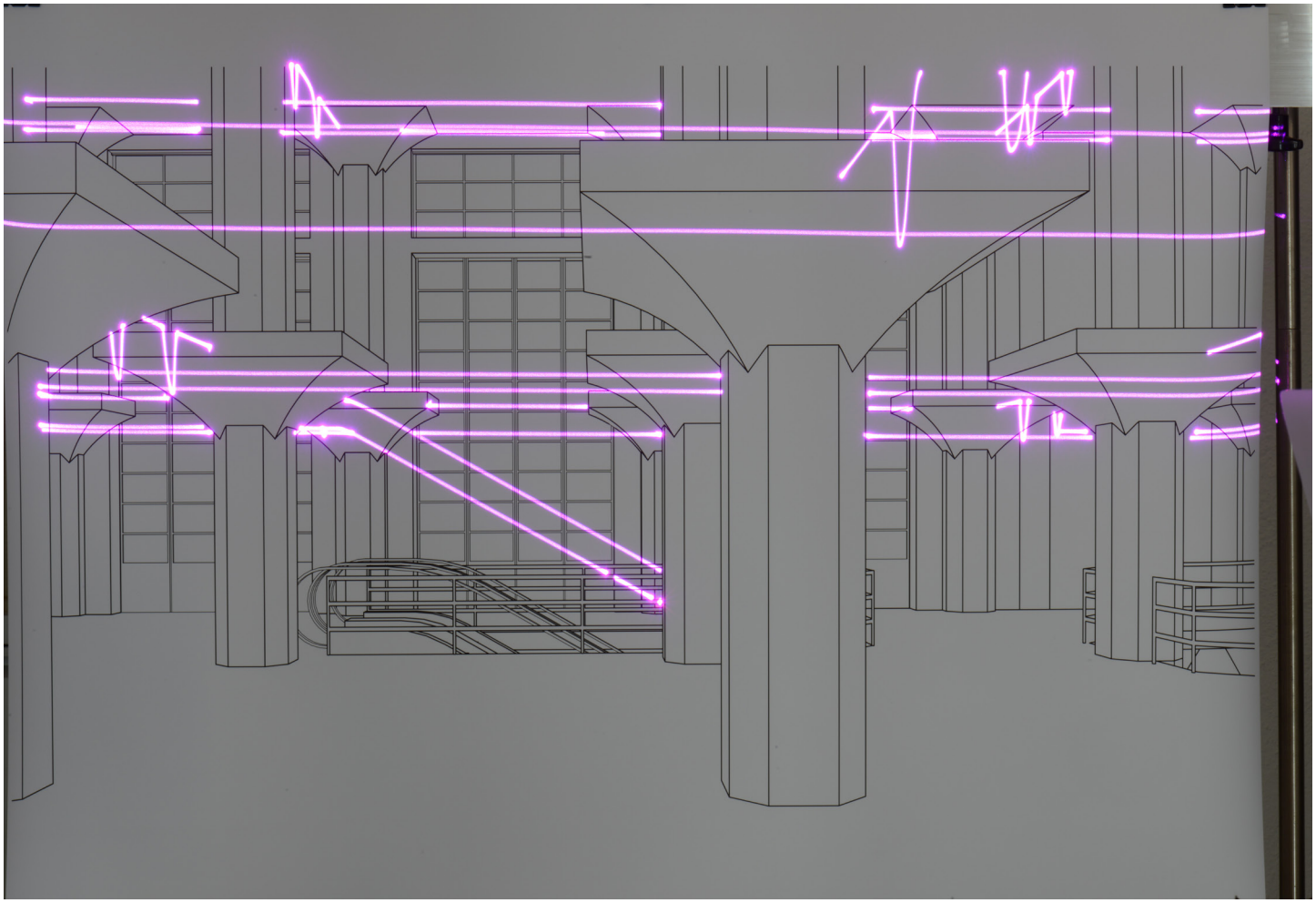


re-thinking binz
céline bessire, zürich

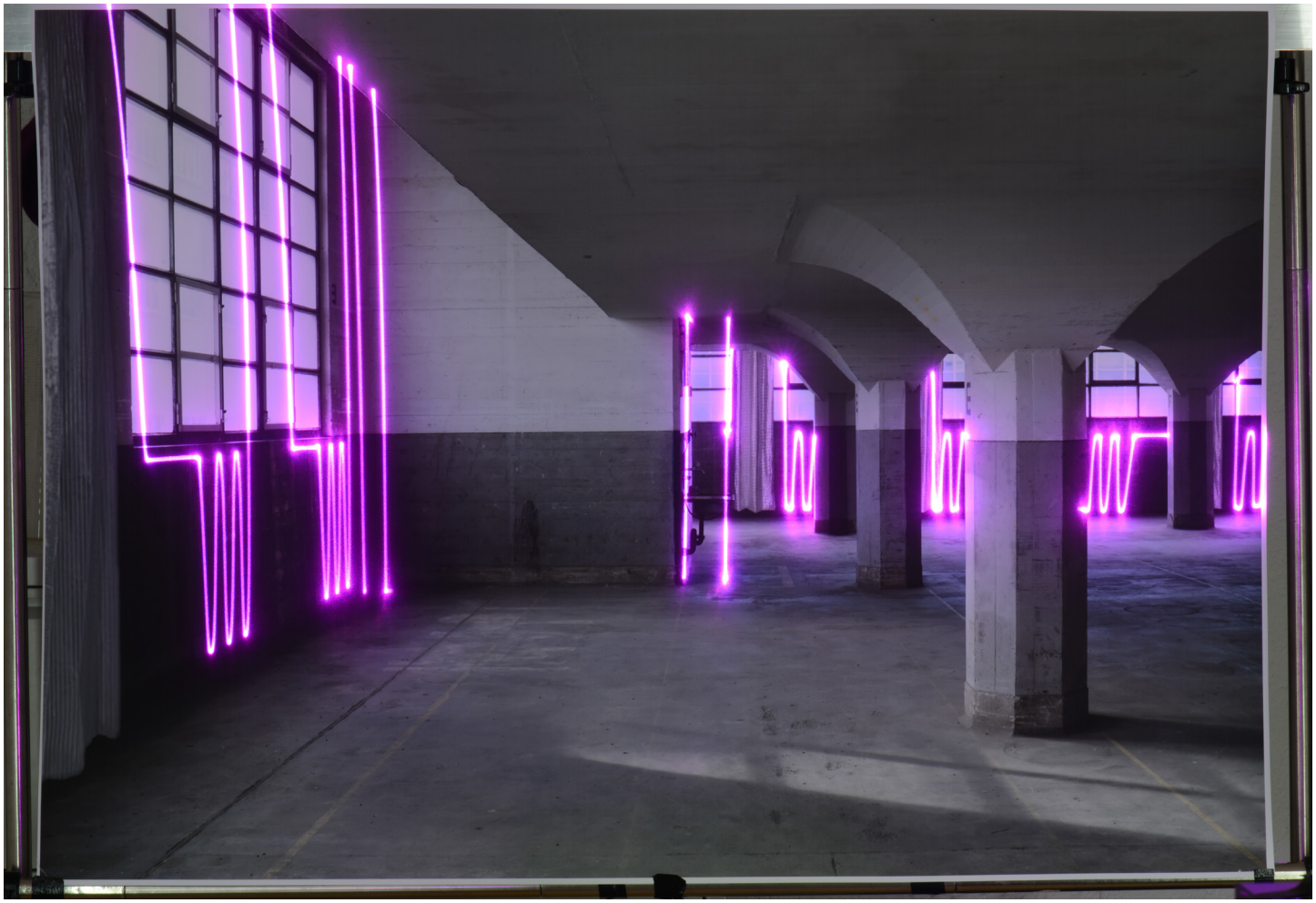


bildstudie
wärme VI

bildtechnik
laserprojektion

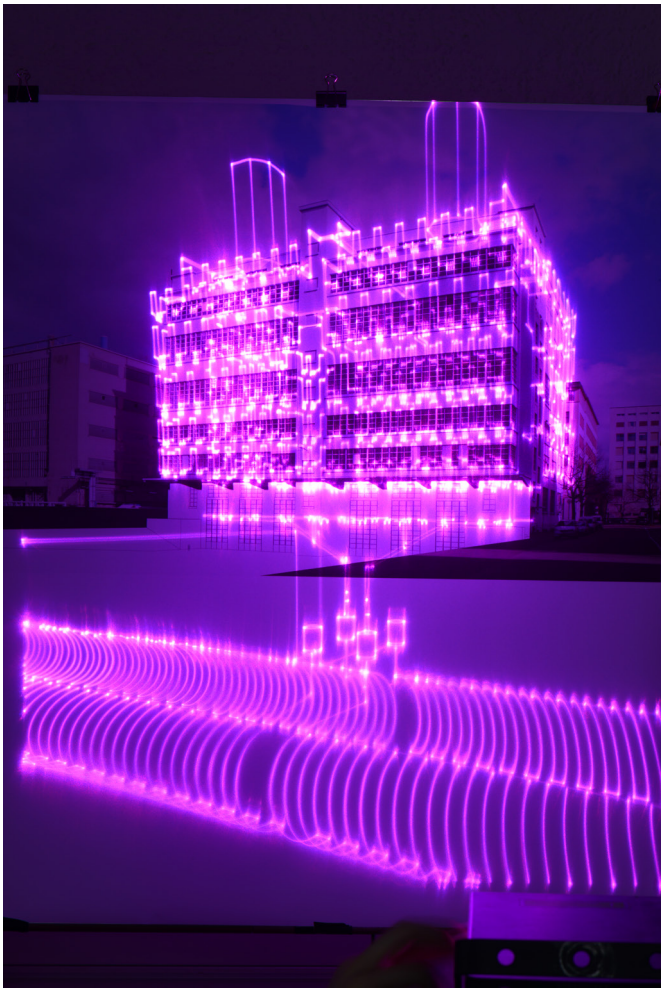


bildstudie
bahnhofshalle II

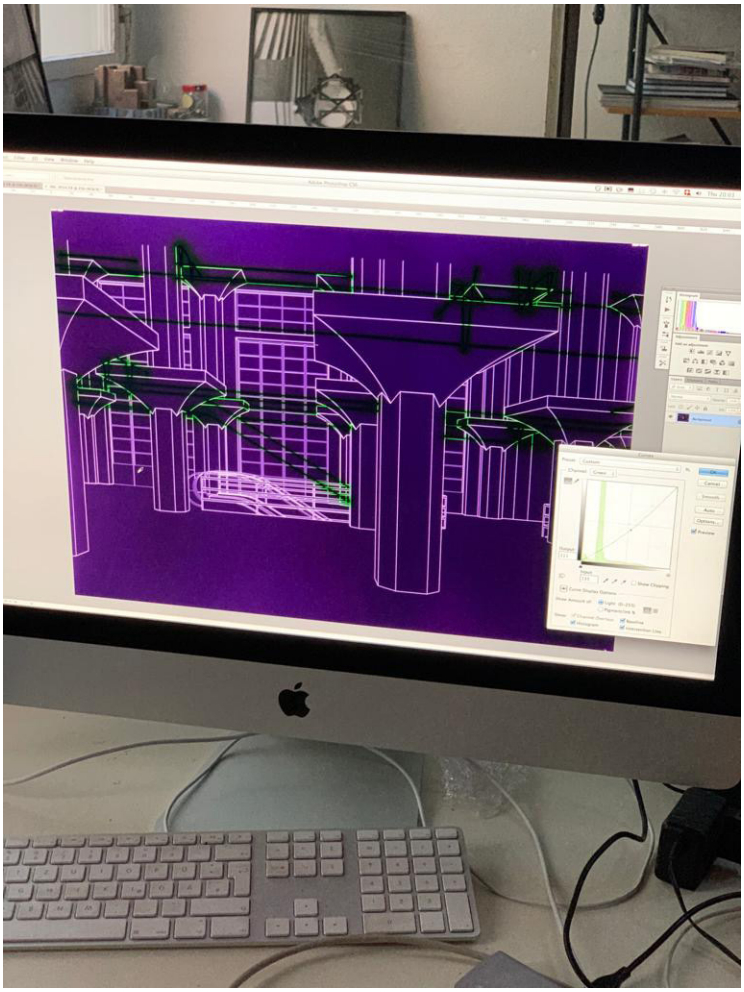


bildstudie
galerie II

bildstudie
dachgeschoss I



bildstudie
wärme VII

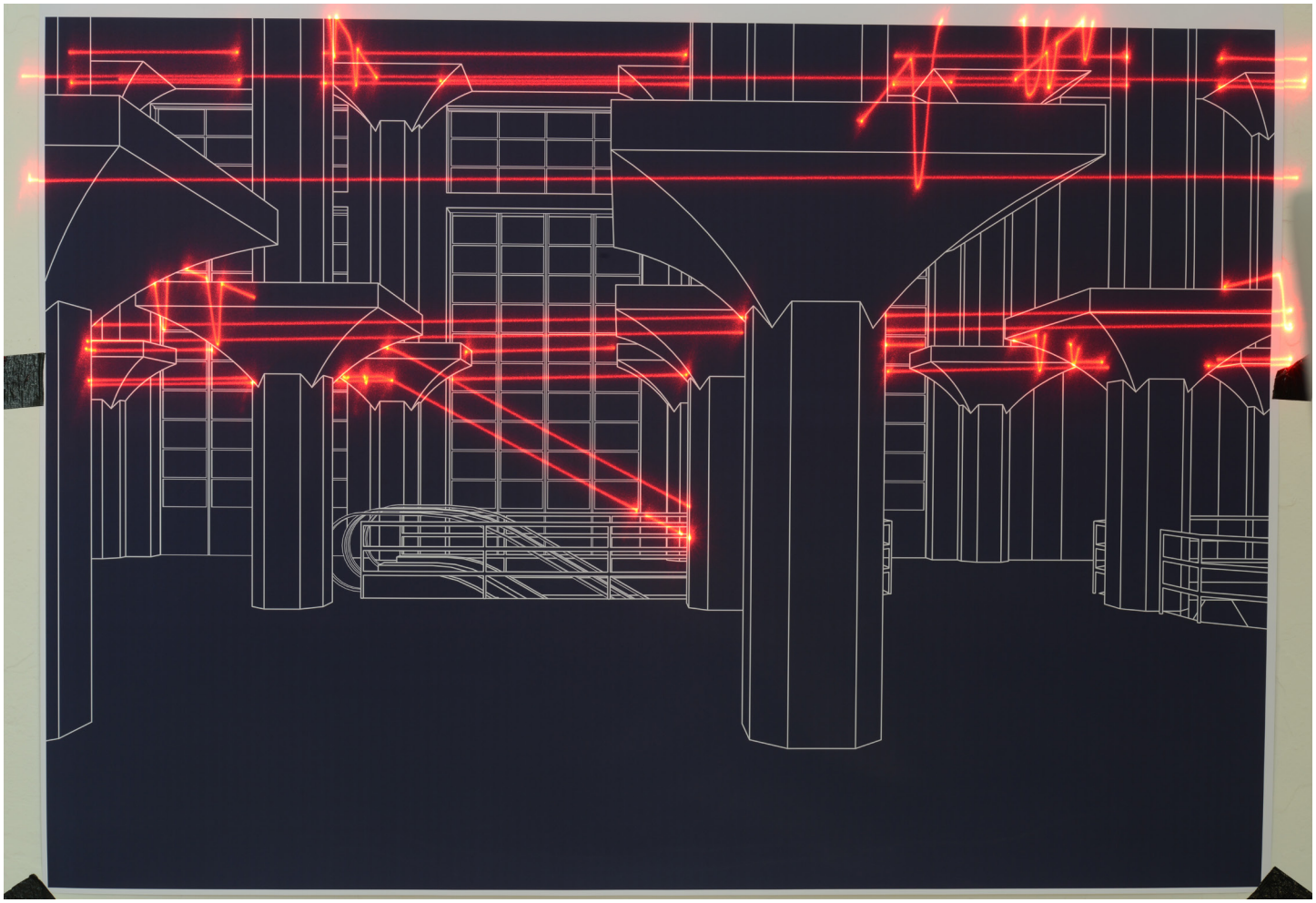


bildstudie
color re-think

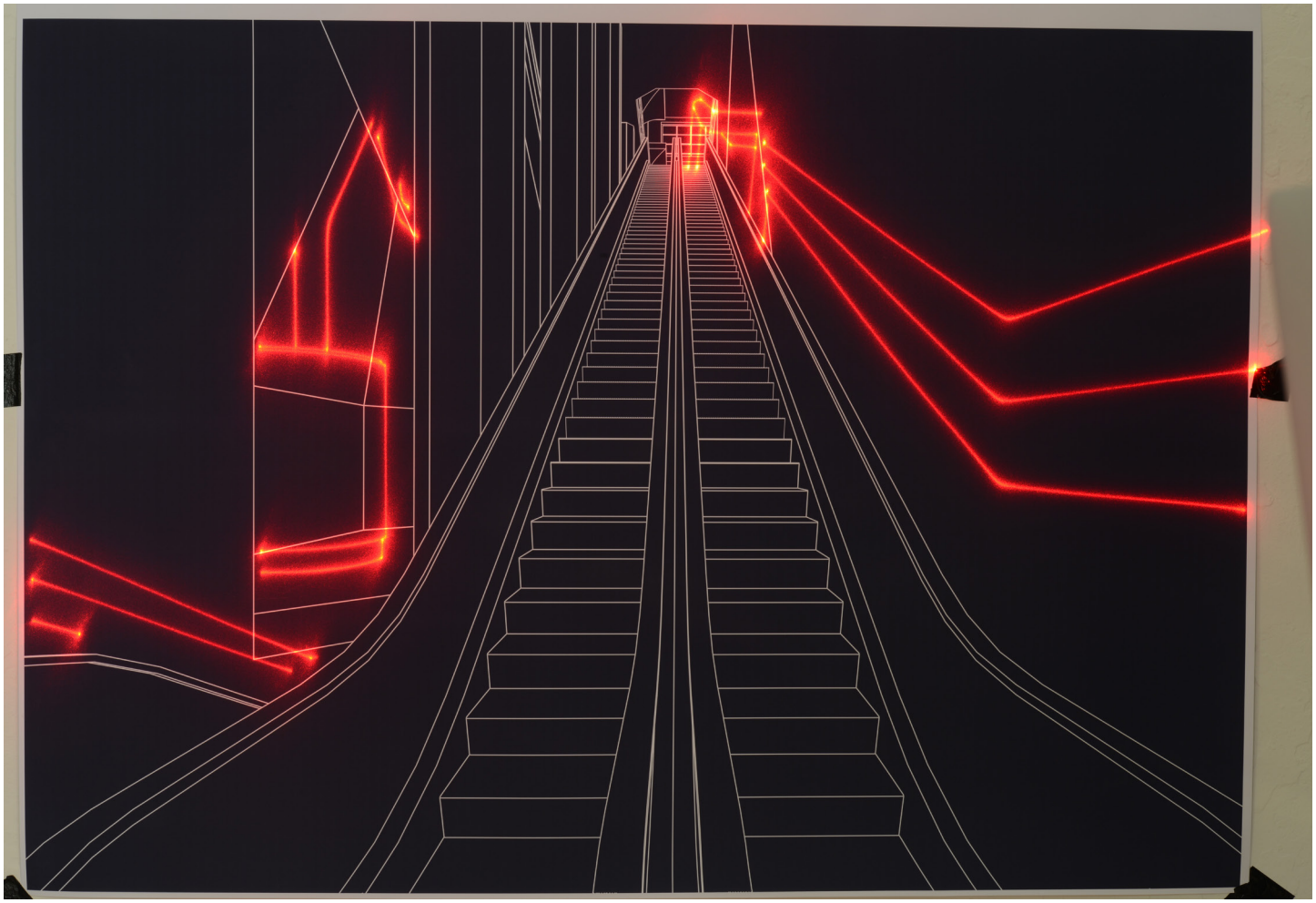
bildstudie
Bahnhofshalle III

bildstudie
erschliessung I

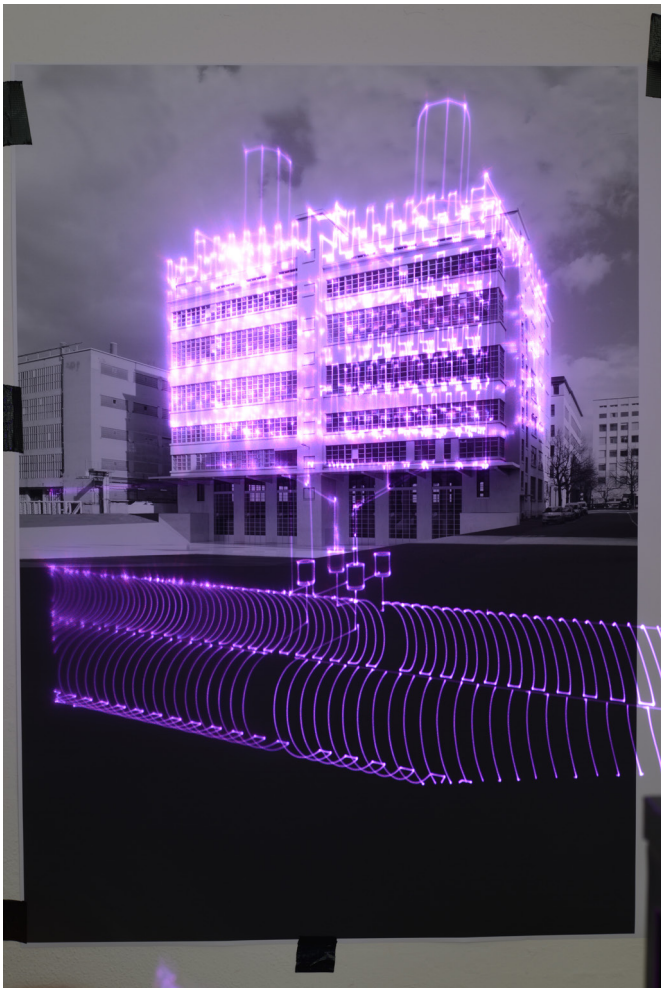
bildtechnik
laserprojektion II



bildstudie
bahnhofshalle IV



bildstudie
erschliessung II



bildstudie
wärme VIII