

Timber Construction

the natural choice

Pirmin Jung, B.Sc. in Wood Engineering, Pirmin Jung Ingenieure AG

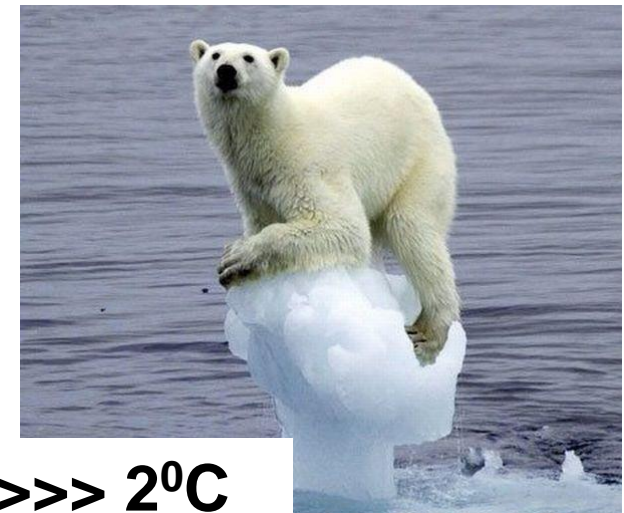
 Pirmin Jung
Ingenieure



World housing

	2015	2050
World population	8 Billion	10 Billion
Urbanisation	4 Billion	7 Billion

World needs urbanisation housings for 3 billion people in the next 35 years



Climate warming >>> 2°C

Building with wood is the only solution

Timber Construction

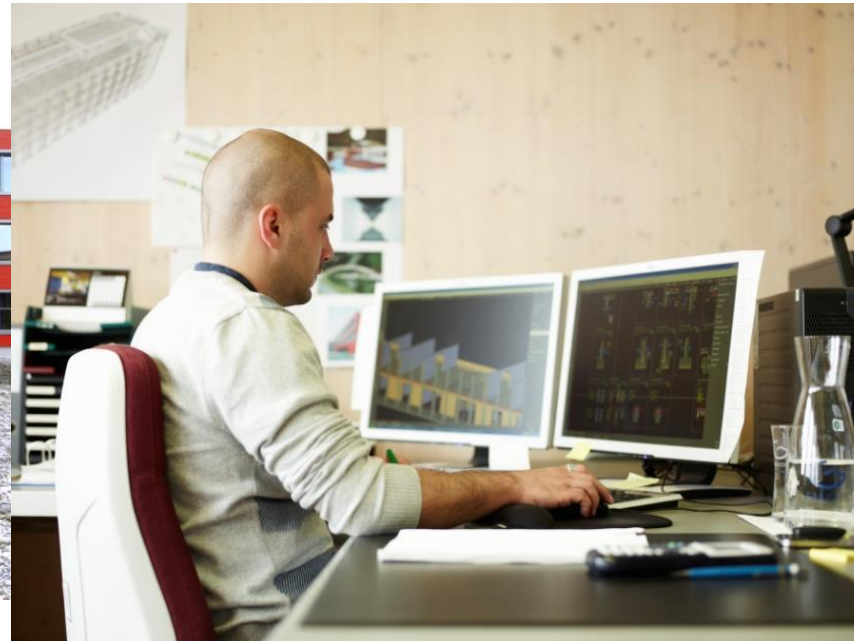
the natural choice

 Pirmin Jung
Ingenieure



We look together at

the development of multi-story timber buildings in Switzerland
teamwork: architects, engineers and carpenters
promoting timber construction in Switzerland



Timber construction in the past

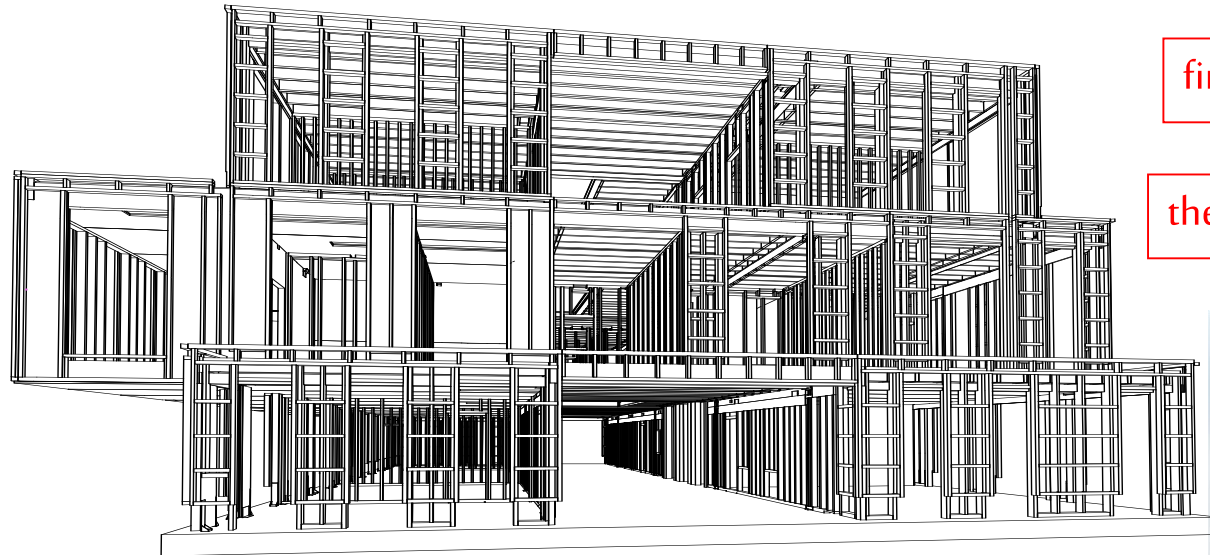
designed for simple needs



Timber construction today

new designs for new requirements

weather-proof construction



fireproof

thermal- and moisture-proof

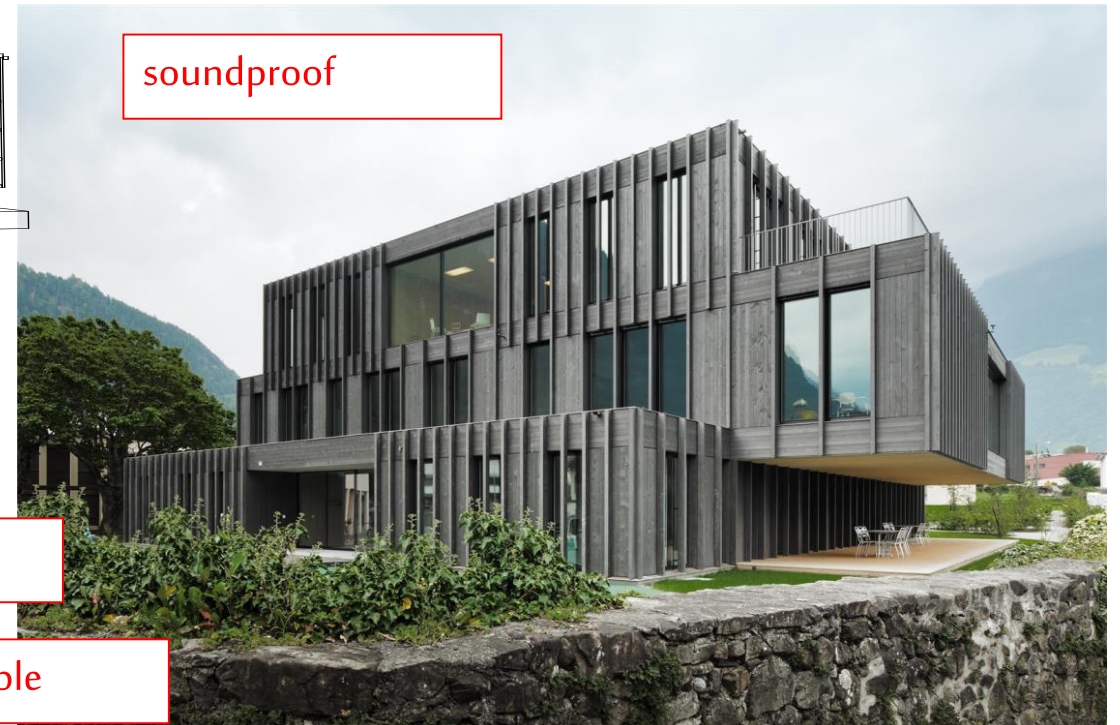
soundproof

engineering design:

- hidden
- minimal pillar construction
- earthquake- and windproof

economical

durable



**Why is timber construction more common today
in Switzerland?**

State-of-the-art architects

helping to expand timber construction

 Pirmin Jung
Ingenieure



Progressive building owners

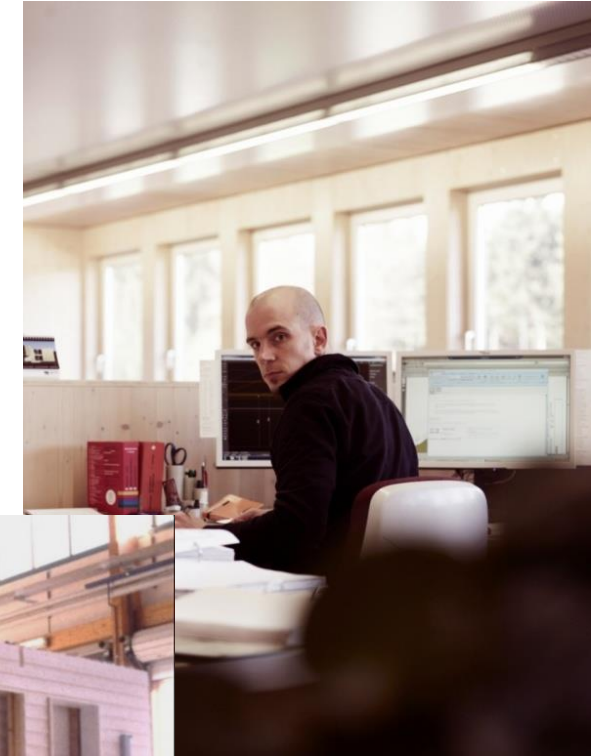
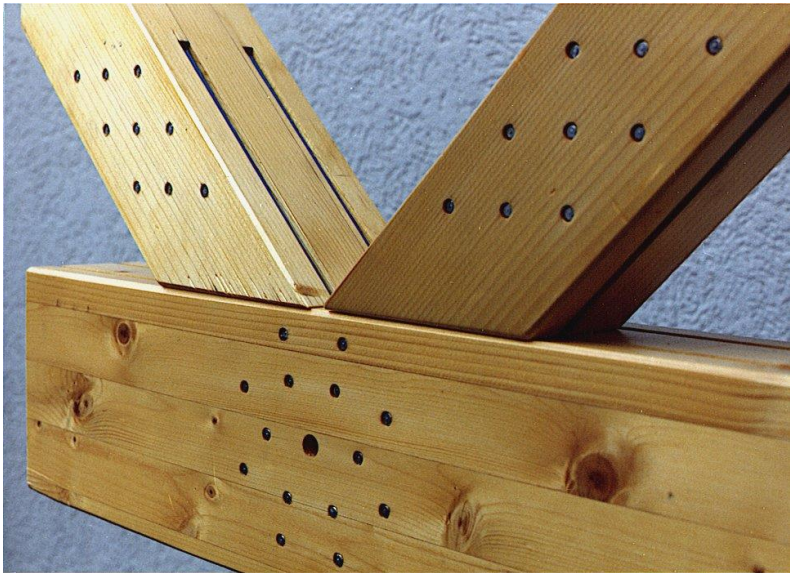
looking to build sustainably



Innovative timber industry

developing new wood designs and fabrication processes

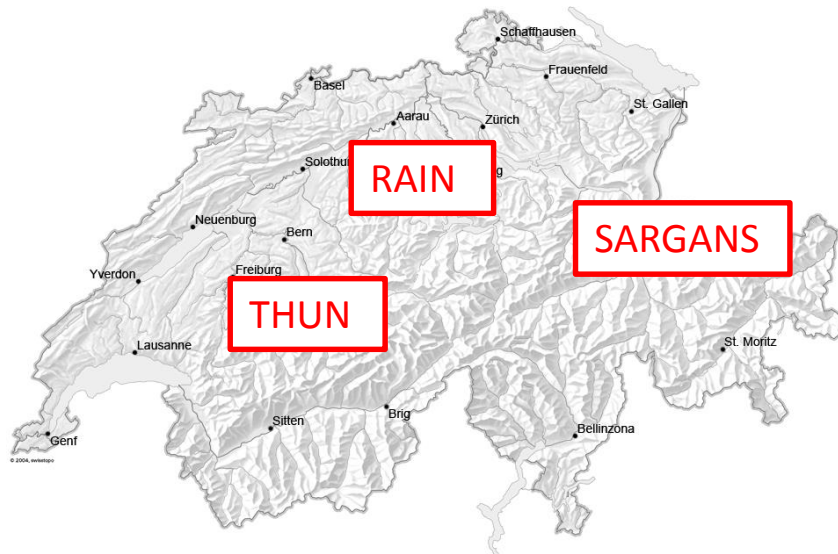
 Pirmin Jung
Ingenieure



**How I know
timber construction is our future.**

SINZIG / Köln

 **Pirmin Jung
Ingenieure**



Pirmin Jung Timber Engineers

- . Rain LU – 24 employees
- . Sargans SG – 3 employees
- . Thun BE – 6 employees
- . Sinzig D – 12 employees

Pirmin Jung Engineers of Physics

- . Rain CH – 7 employees
- . Thun BE – 1 employee
- . Sinzig D – 1 employee

What we do?



We support architects realizing their timber design dreams
multi-story, office and industrial buildings
schools, hospitals, arenas and bridges



The “*Berwerts, Stalden*“ two-family house (2001)

architects design small buildings to learn more about timber construction



Walls, ceilings and roofs constructed with massive wood
Showing new timber constructions and pictures to earn
new buyers



The “*Huwylers, Sarnen*” single-family house: (2005)

State-of-the-art architects have innovative ideas

 Pirmin Jung
Ingenieure



Cantilevered
living room and walls



exhilaration
maximized space

*architects and wood engineer collaboration is **key***



The *Stirnrüti, Horw* condominiums (1998)

the first 3- and 4-story condominiums in Switzerland

26-owner cooperative

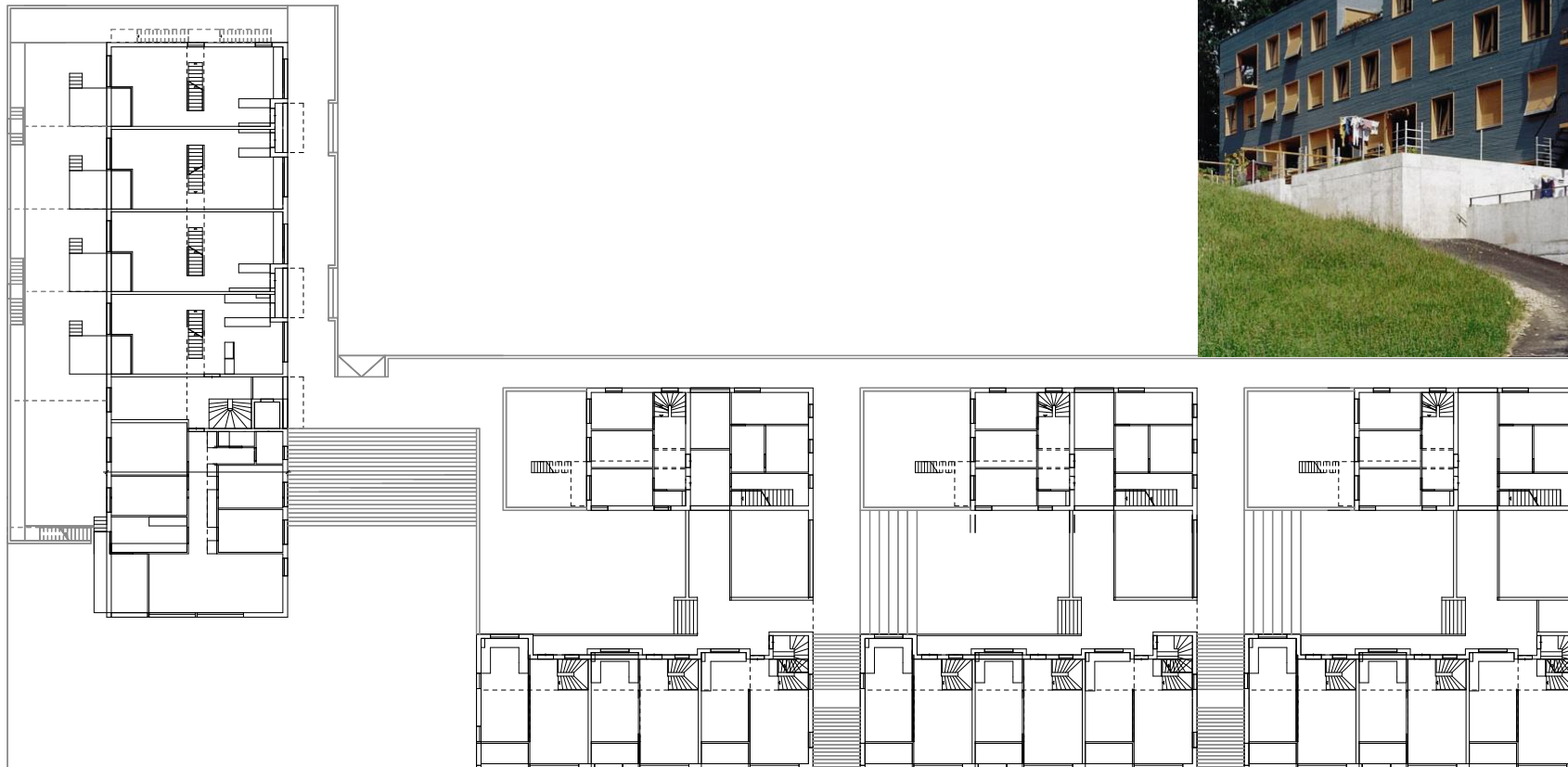
Individual layouts

Excellent sound insulation

30 minutes of fire resistance

Economical

 Pirmin Jung
Ingenieure





Individualized layouts and interior designs, i.e. lighting, ventilation...

Non-load bearing walls in the apartments

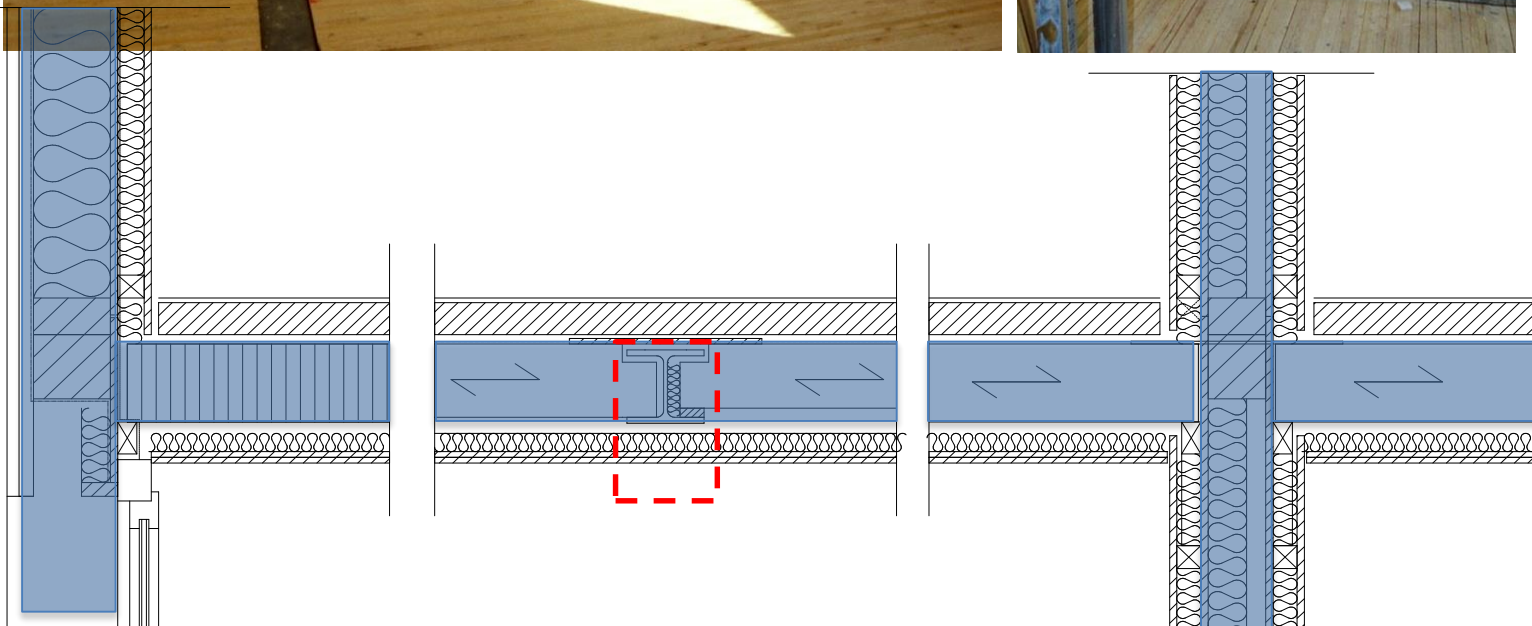
Main steel girder

Timber frame exterior walls

*Massive timber floors
(nail laminated boards)*

Interior metal plaster walls

Plasterboard-covered interior walls and ceilings





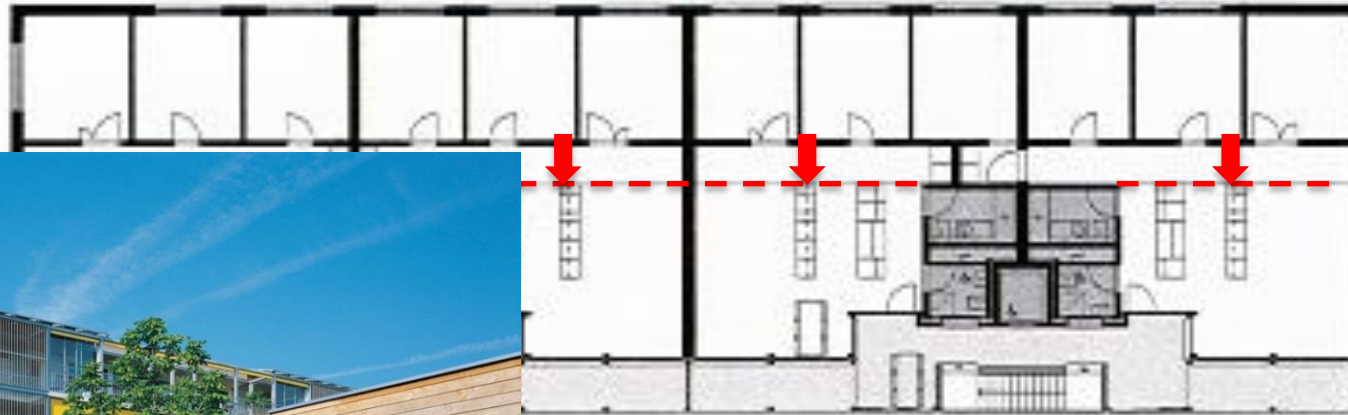
These condominiums were featured in many architectural magazines such as *tec21*, *Werk Bauen und Wohnen*, *Hochparterre*...



The *AWZ, Zug* apartment building (2001)

4-story cooperative with 14 units

 Pirmin Jung
Ingenieure

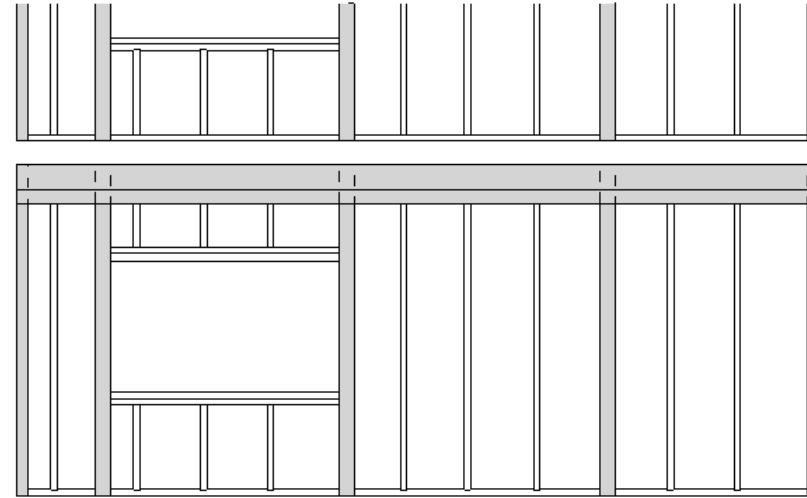
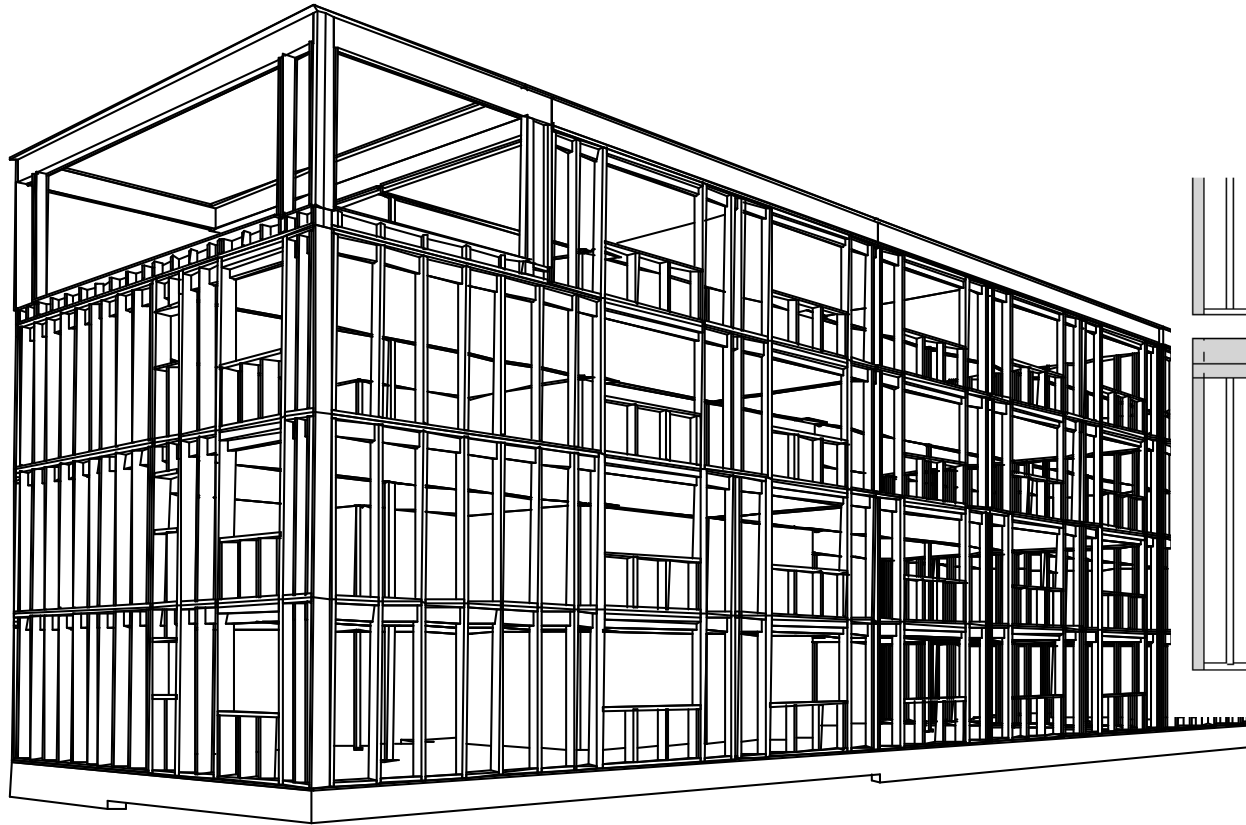


Elevators, stairs and laundry in concrete

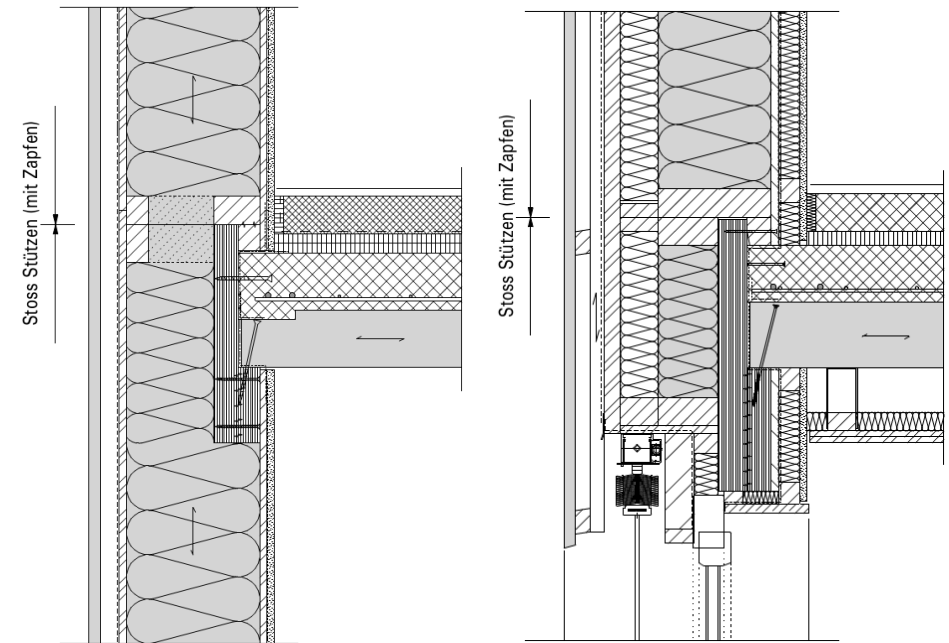
*Ceilings in wood concrete composite
with main girder in steel*

One steel pillar per apartment

Interior non-load bearing walls



*Outside walls with integrated main support columns
One column above the other – no transverse wood
Uniquely designed support girder above the window
Wood concrete composite ceilings*



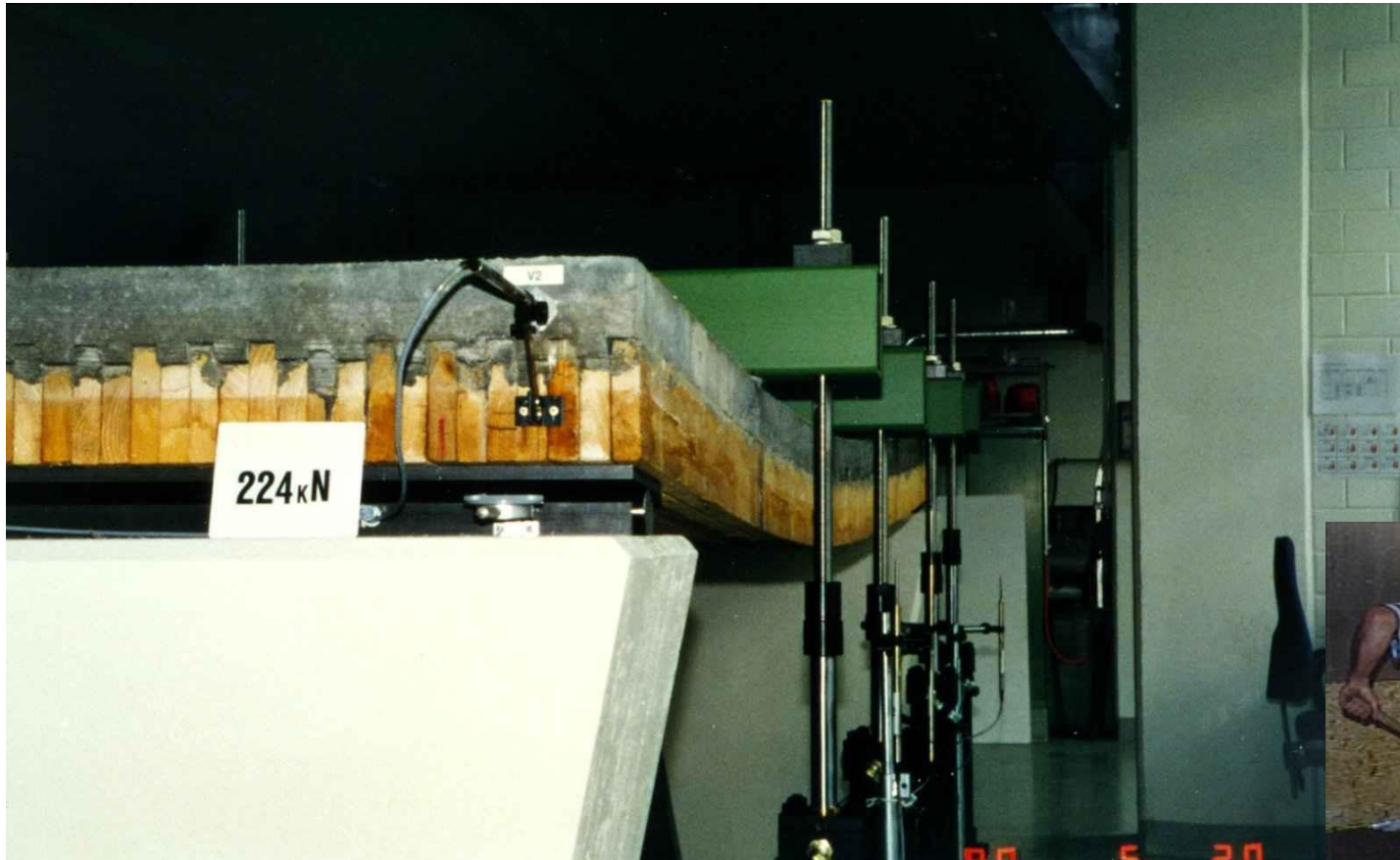


*Prefab walls and ceiling panels
50% assembled in one week
Temporary supported ceilings hold the concrete*



Wood concrete composite ceilings

stronger and more efficient for multi-story wood buildings

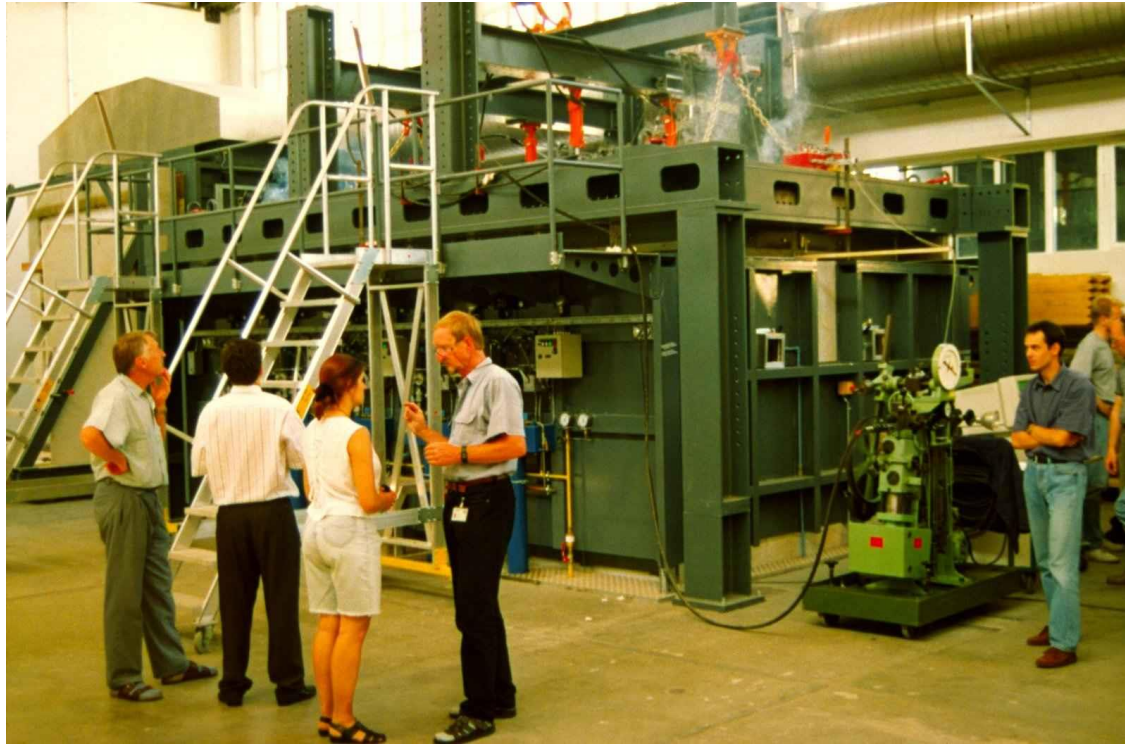


*Rough-sawn wooden planks of alternating heights
120 mm concrete pumped directly on the wood
The rough-sawn wood and concrete glue together
automatically*



Fire resistance experiment

90+ minutes at the EMPA Dübendorf/Zürich



Special laboratory testing room

Composition - 120 mm timber and 100 mm concrete

90 minutes open room fire

~ 64 mm of the timber burned (~ 0.70 mm/minute)

The *Sonnenberg, Kriens* condominiums (2003)

three, 4-story condos with 21 units

 Pirmin Jung
Ingenieure



The *Grosswil, Horw* condominiums (2008)

three, 4-story condos with 12 units

 Pirmin Jung
Ingenieure



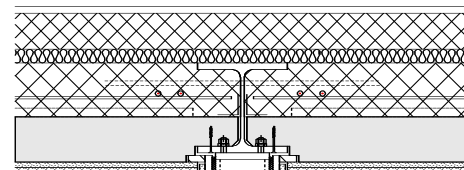
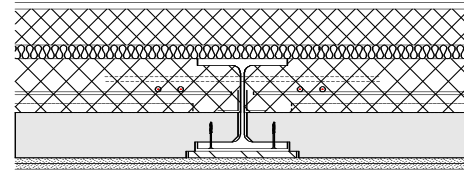
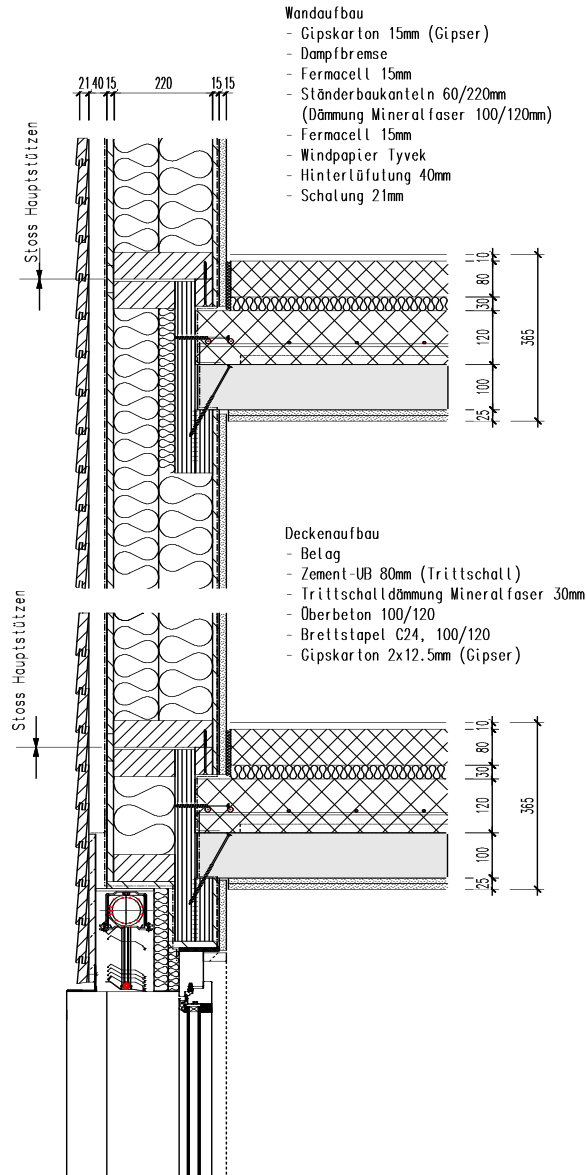
The *Suurstoffi*, *Rotkreuz* apartment buildings (2014)

nine, 4-story apartments with 160 units

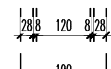


Standardized construction

greater building efficiency for multi-story units



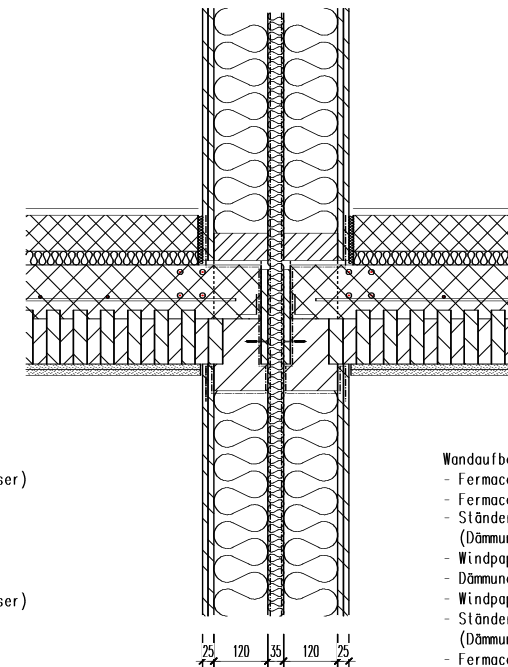
- Stützenverkleidung**
- Gipskartonplatte 12.5mm (Gipser)
 - Riduril 15mm
 - Dämmung 8mm
 - RHS-Profil 120/80/10mm
 - Dämmung 8mm
 - Riduril 15mm
 - Gipskartonplatte 12.5mm (Gipser)



Outside timber frame walls with integrated main support columns and unique support girders above the windows

Timber frame walls separating the apartments

Wood concrete composite ceilings with steel girders and pillars, and subfloors laid on sound insulation



One concept
endless designs

 **Pirmin Jung
Ingenieure**



The Swisswoodhouse, Nebikon

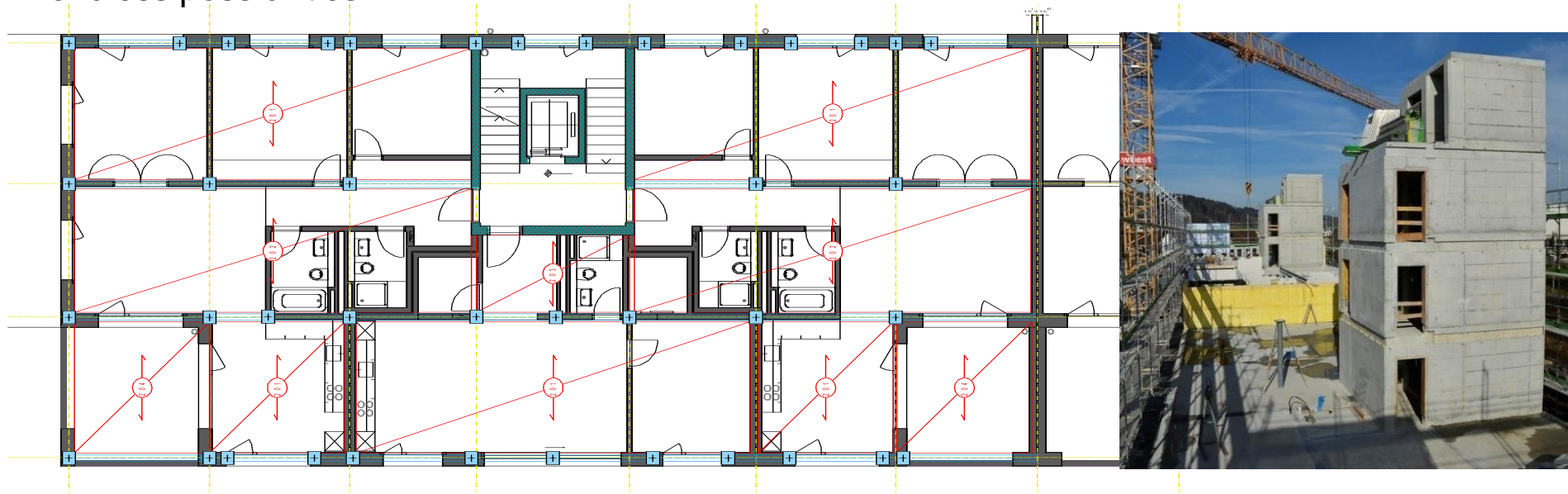
Developed by

Renggli Haus AG, Bauart Architekten, AG and Pirmin Jung Ingenieure AG



One space

endless possibilities



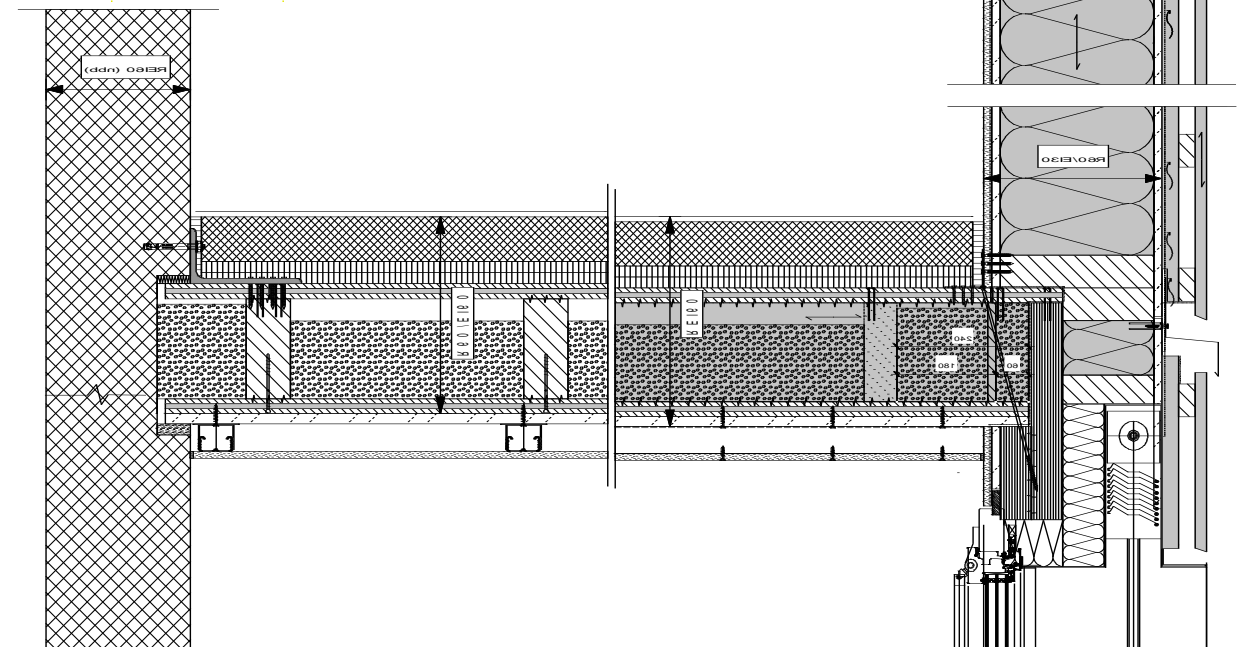
Standardized construction

concrete stairwells

no support walls in the apartments

exterior and interior timber frame walls

gravel-filled box ceilings, subfloors on sound insulation



Industrial fabrication

benefits of prefabrication

 Pirmin Jung
Ingenieure



weather protection for workers and materials
optimal workspaces
safer, faster and better quality

The *City Garden*, Zug Hotel (2010)

ultimate symbol of timber construction

 Pirmin Jung
Ingenieure



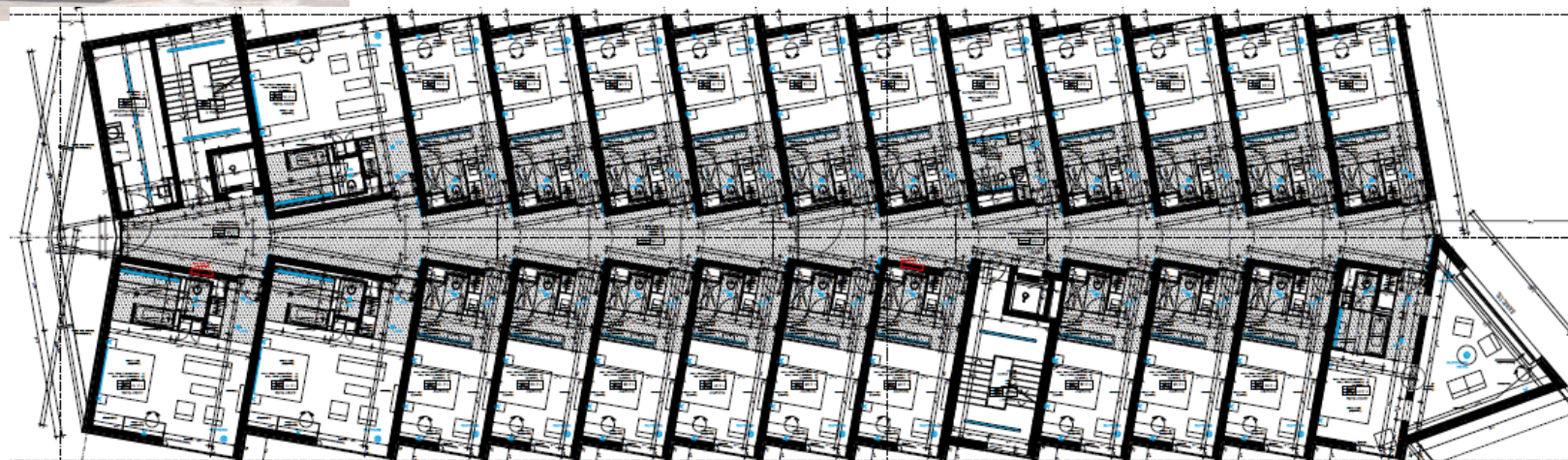
4 stories, 82 rooms, **** standard

60 minutes REI resistance with sprinklersystem

high quality sound protection

*centralized water, heating, air conditioning and
electricity on the 5th floor*

30 weeks of planning, 40 weeks of building

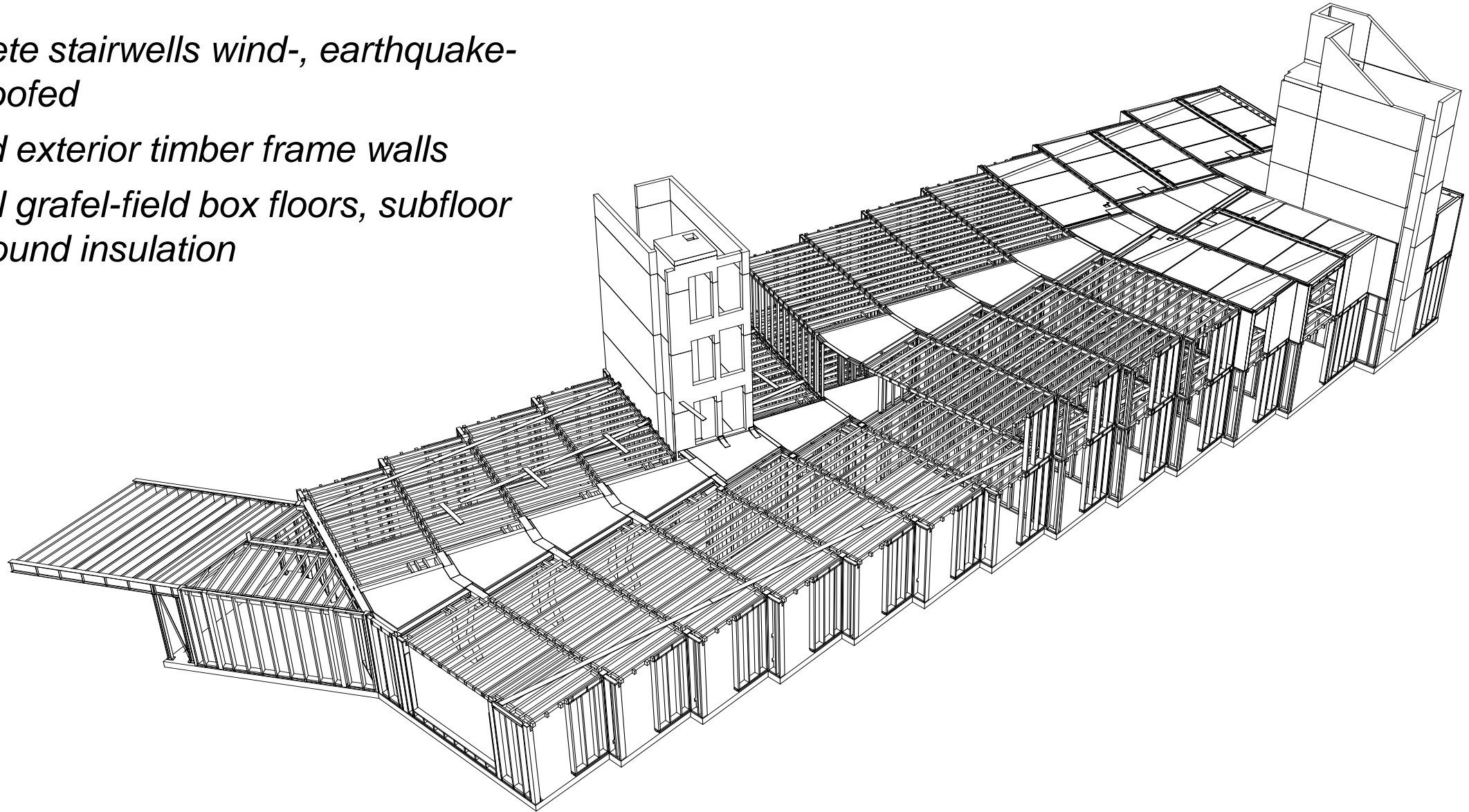


Structural design

*Two concrete stairwells wind-, earthquake-
and fire proofed*

Interior and exterior timber frame walls

*Wall to wall grafel-field box floors, subfloor
layed on sound insulation*

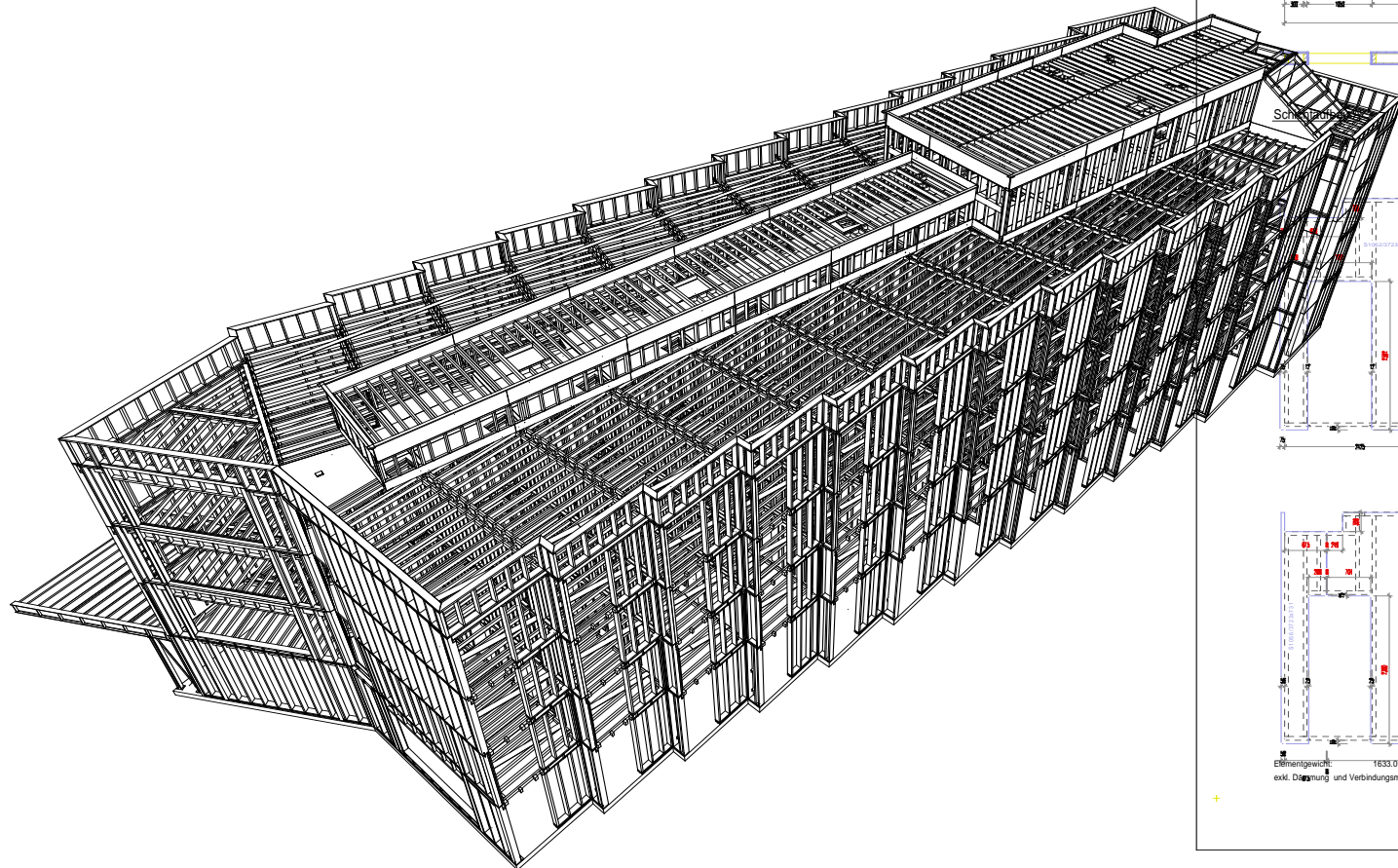


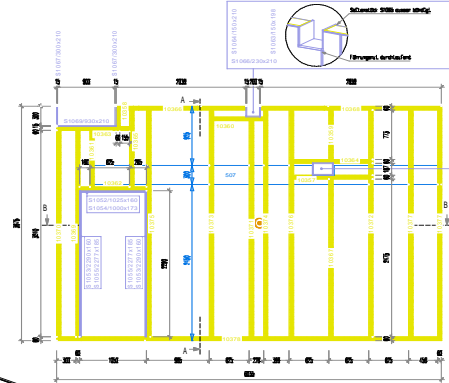
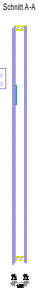
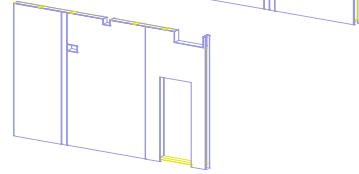
Workshop planning

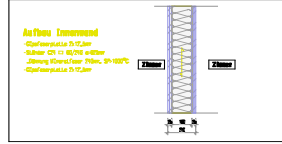
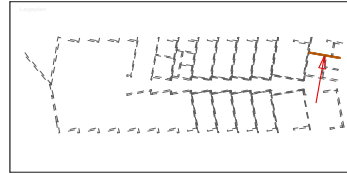
by Pirmin Jung

CADWORK designed 3-D and 2-D models

1,256 exclusive timber construction elements



INNENWANDELEMENT_EG		Material	Anzahl	Breite	Höhe	Länge
IW n01	507	Ausbohrung	DSP 9/9/9 E 7333	1	300	27 5516
IW n01	10357	Wochswal	Rahmenbaukasten C24	1	60	133 1200
IW n01	10358	Säbder	Rahmenbaukasten C24	1	60	160 285
IW n01	10359	Säbder	Rahmenbaukasten C24	1	60	160 783
IW n01	10360	Wochswal	Rahmenbaukasten C24	1	60	160 801
IW n01	10361	Säbder	Rahmenbaukasten C24	1	60	160 900
IW n01	10362	Wochswal	Rahmenbaukasten C24	1	60	160 1060
IW n01	10363	Wochswal	Rahmenbaukasten C24	1	60	160 1160
IW n01	10364	Wochswal	Rahmenbaukasten C24	1	60	160 1200
IW n01	10365	Säbder	Rahmenbaukasten C24	1	60	160 1215
IW n01	10366	Kopfholz	Rahmenbaukasten C24	1	60	160 2038
IW n01	10367	Säbder	Rahmenbaukasten C24	1	60	160 2485
IW n01	10368	Kopfholz	Rahmenbaukasten C24	1	60	160 2838
IW n01	10369	Säbder	Rahmenbaukasten C24	1	60	160 3250
IW n01	10370	Säbder	Rahmenbaukasten C24	1	60	160 3200
IW n01	10371	Säbder	Rahmenbaukasten C24	1	60	160 3400
IW n01	10372	Säbder	Rahmenbaukasten C24	1	60	160 3565
IW n01	10373	Säbder	Rahmenbaukasten C24	1	60	160 3565
IW n01	10374	Säbder	Rahmenbaukasten C24	1	60	160 3565
IW n01	10375	Säbder	Rahmenbaukasten C24	1	60	160 3565
IW n01	10376	Säbder	Rahmenbaukasten C24	1	60	160 3565
IW n01	10377	Säbder	Rahmenbaukasten C24	2	60	160 3565
IW n01	10378	Schwelle	Rahmenbaukasten C24	1	60	160 6035

Ohne besondere Angaben gelten:

Verbindungen gemäss BSK-Vertrag

Reif/Lager A

Produktionsplan
Innenwandelement IW n01 Teil 1
Hotel City Garden 208.223

Referenz:
 02/2020/10/10
 Innenbauwerk T
 6307 kg

Elementgewicht: 1633,01 kg
 exkl. Dämmung und Verbindungsanzug

Referenz:
 02/2020/10/10
 Innenbauwerk T
 6307 kg

Produktion:
 02/2020/10/10
 02/2020/10/10
 02/2020/10/10

Produktion:
 02/2020/10/10
 02/2020/10/10
 02/2020/10/10

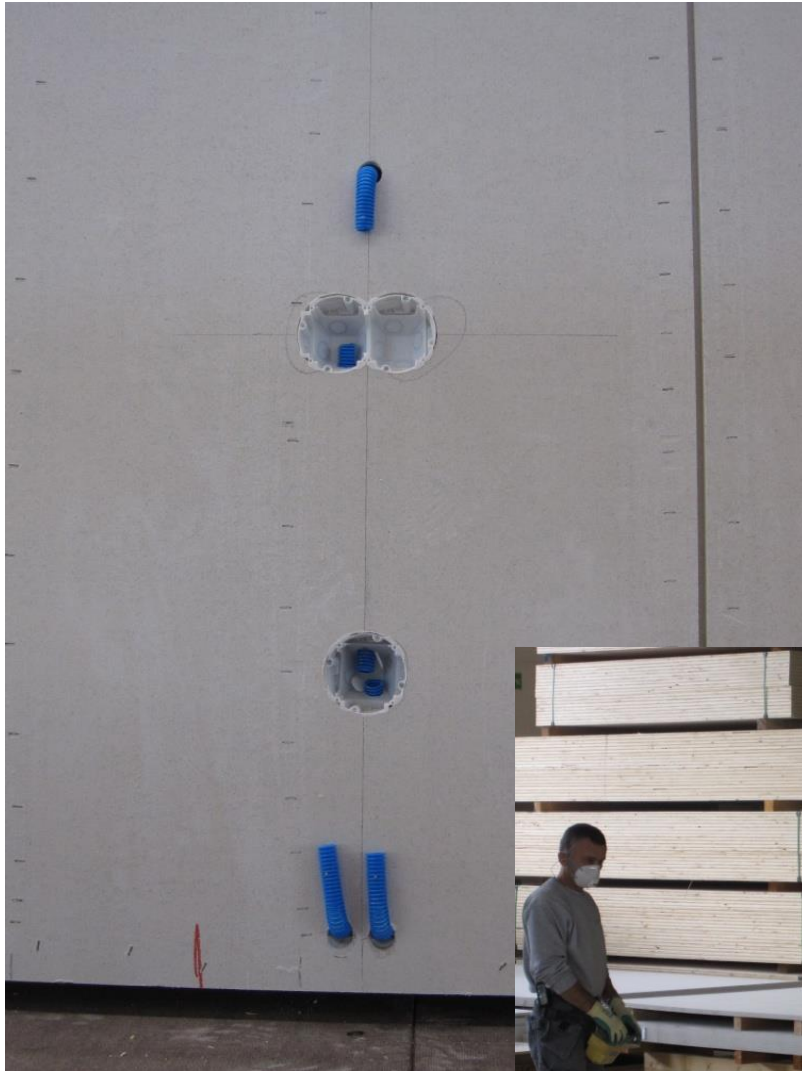
Produktion:
 02/2020/10/10
 02/2020/10/10
 02/2020/10/10

Produktion:
 02/2020/10/10
 02/2020/10/10
 02/2020/10/10

Prefabrication

by Renggli Haus AG - three shifts, five weeks

 Pirmin Jung
Ingenieure



Building site assembly by Renggli Haus AG - five weeks

 Pirmin Jung
Ingenieure



No trace of timber construction





Timeline of fire regulations in Switzerland

Nutzung	Geschosszahl								
	1	2k	2g	3	4	5	6	7	8
MFH / Büro / Schulen	combustible	combustible	combustible	non combustible	non combustible	non combustible	non combustible	non combustible	non combustible
Industrie- / Gewerbe q klein	combustible	combustible	combustible	non combustible	non combustible	non combustible	non combustible	non combustible	non combustible
Industrie- / Gewerbe q gross	combustible	combustible	non combustible	non combustible	non combustible	non combustible	non combustible	non combustible	non combustible
Beherbergungsbetriebe a (Kr)	combustible	non combustible	non combustible	non combustible	non combustible	non combustible	non combustible	non combustible	non combustible
Beherbergungsbetriebe b (Ho)	combustible	non combustible	non combustible	non combustible	non combustible	non combustible	non combustible	non combustible	non combustible
Bauten mit gr. Pers.-Belegung	combustible	non combustible	non combustible	non combustible	non combustible	non combustible	non combustible	non combustible	non combustible
Verkaufsgeschäft	combustible	non combustible	non combustible	non combustible	non combustible	non combustible	non combustible	non combustible	non combustible
Parkhäuser/Einstellräume MFZ	combustible	combustible	combustible	non combustible	non combustible	non combustible	non combustible	non combustible	non combustible
Objektbezogene Konzepte (Art. 11)	Objektbezogene Festlegung								

Nutzung	Geschosszahl		
	1	2k	2g
MFH / Büro / Schulen	combustible	combustible	combustible
Industrie- / Gewerbe q klein	combustible	combustible	combustible
Industrie- / Gewerbe q gross	combustible	combustible	combustible
Beherbergungsbetriebe a (Kr)	combustible	non combustible	non combustible
Beherbergungsbetriebe b (Ho)	combustible	combustible	combustible
Bauten mit gr. Pers.-Belegung	combustible	combustible	combustible
Verkaufsgeschäft	combustible	combustible	combustible
Parkhäuser/Einstellräume MFZ	combustible	combustible	combustible
Objektbezogene Konzepte (Art. 11)	Objektbezogene Festlegung		

Nutzung	Geschosszahl								
	1	2k	2g	3	4	5	6	7	8
MFH / Büro / Schule	combustible	combustible	combustible	combustible	combustible	combustible	combustible	combustible	combustible
Industrie / Gewerbe q klein	combustible	combustible	combustible	combustible	combustible	combustible	combustible	combustible	combustible
Industrie / Gewerbe q gross	combustible	combustible	combustible	combustible	combustible	combustible	combustible	combustible	combustible
Beherbergungsbetriebe a (Kr)	combustible	combustible	combustible	combustible	combustible	combustible	combustible	combustible	combustible
Beherbergungsbetriebe b (Ho)	combustible	combustible	combustible	combustible	combustible	combustible	combustible	combustible	combustible
Bauten mit grosser Personenbelegung	combustible	combustible	combustible	combustible	combustible	combustible	combustible	combustible	combustible
Verkaufsgeschäfte	combustible	combustible	combustible	combustible	combustible	combustible	combustible	combustible	combustible
Parkhäuser / Einstellräume MFZ	combustible	combustible	combustible	combustible	combustible	combustible	combustible	combustible	combustible
Objektbezogene Konzepte	Objektbezogene Festlegung								

 combustibile
 non combustibile

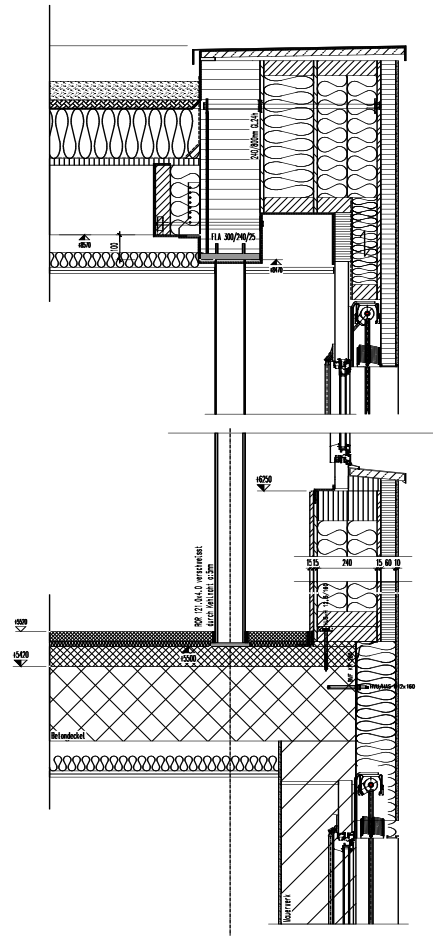
2015: Realität

The future of timber construction



Replacing new buildings

Building skyscrapers



 Pirmin Jung
Ingenieure



Improving exterior walls
renovation

Adding new stories and
extensions

Replacing new buildings

The *Grünmatt, Zürich* apartments: (2012)

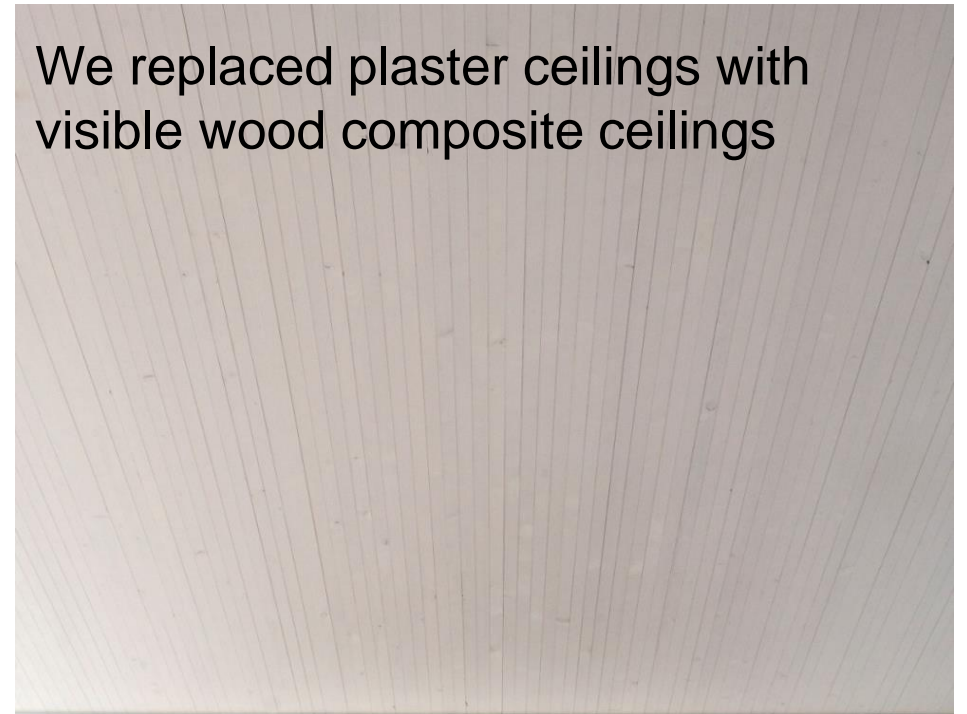
Fourteen 3 and 4 story buildings



168 apartments have replaced 56 single-family houses



We replaced plaster ceilings with visible wood composite ceilings



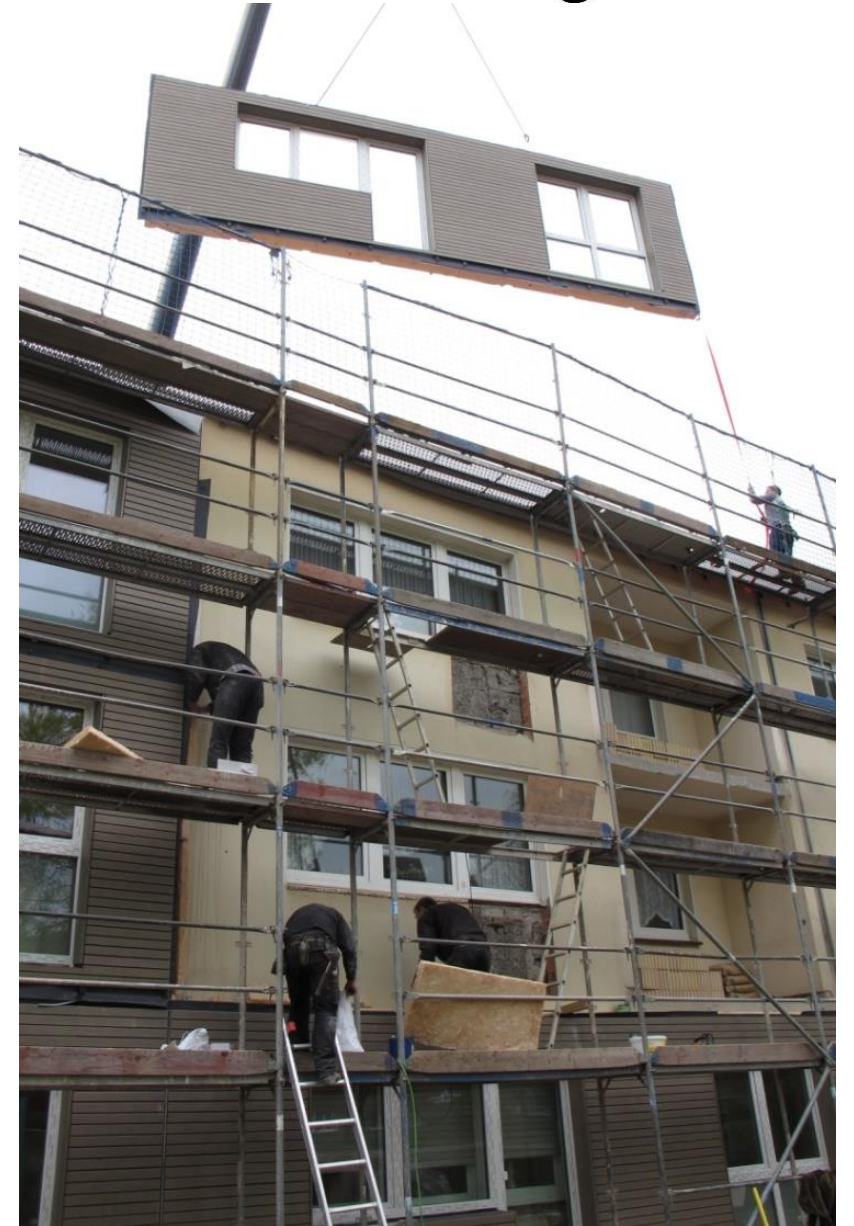
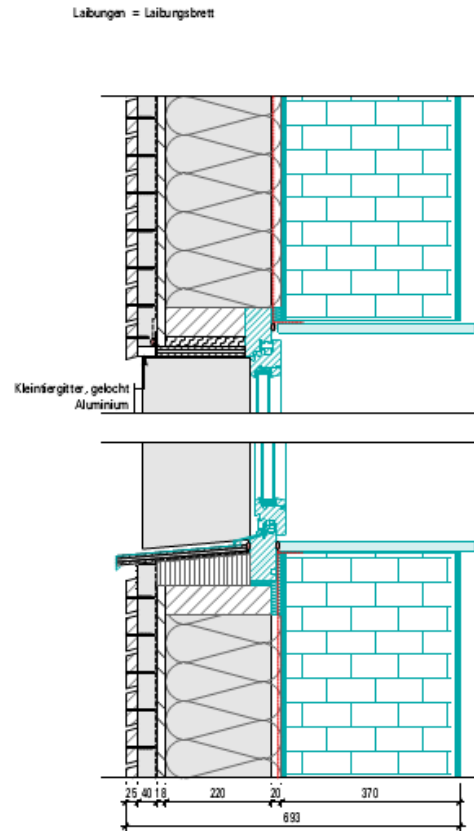
Improving exterior walls renovation

The *Duisburg* cooperative apartments (2014)

3- story building



Tachymeter Leica TS12



Adding new stories and extensions

The *Heinrichsallee, Aachen* (2014)

Add an apartment on top of a 50th year building





Timber skyscrapers around the world



Bergen, Norway
(2015)



Vancouver, Canada
(2016)



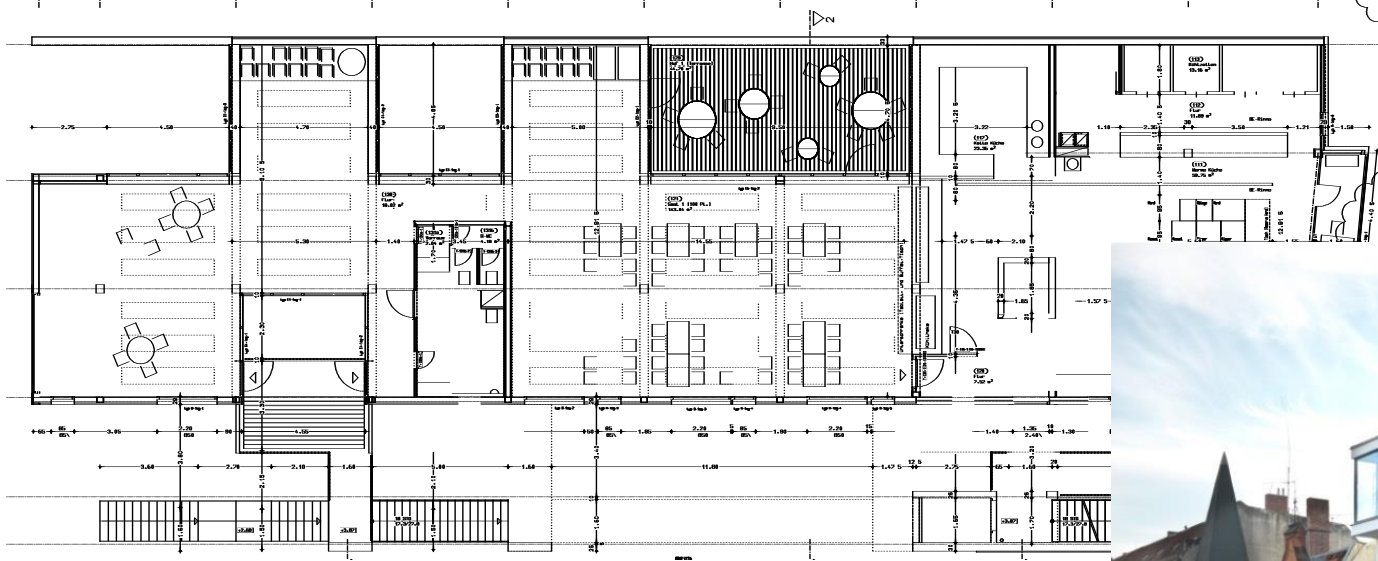
Vienna, Austria
(2017)

Skyscrapers technology on smaller scale

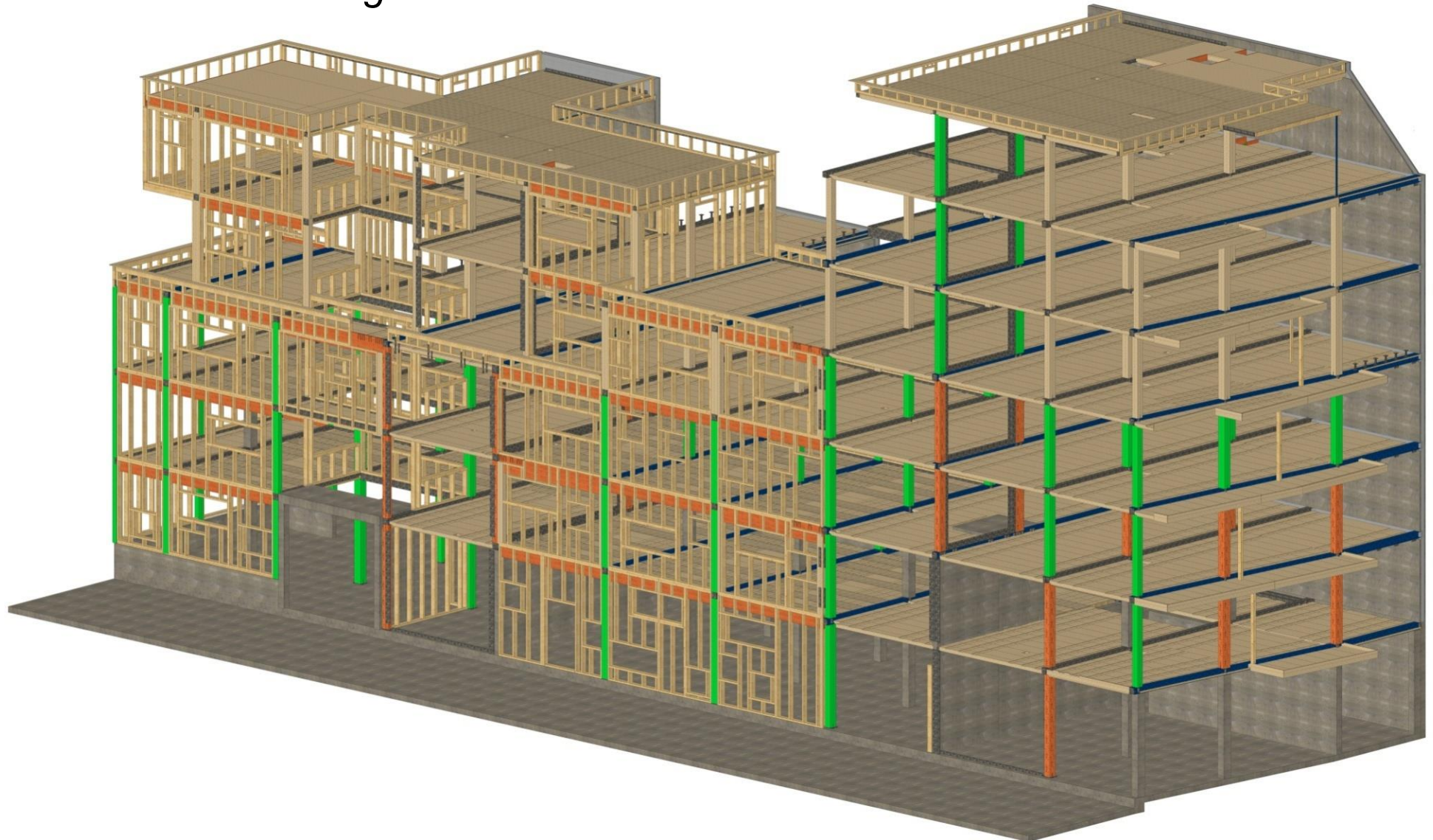
The **C13, Berlin** condominium (2012)

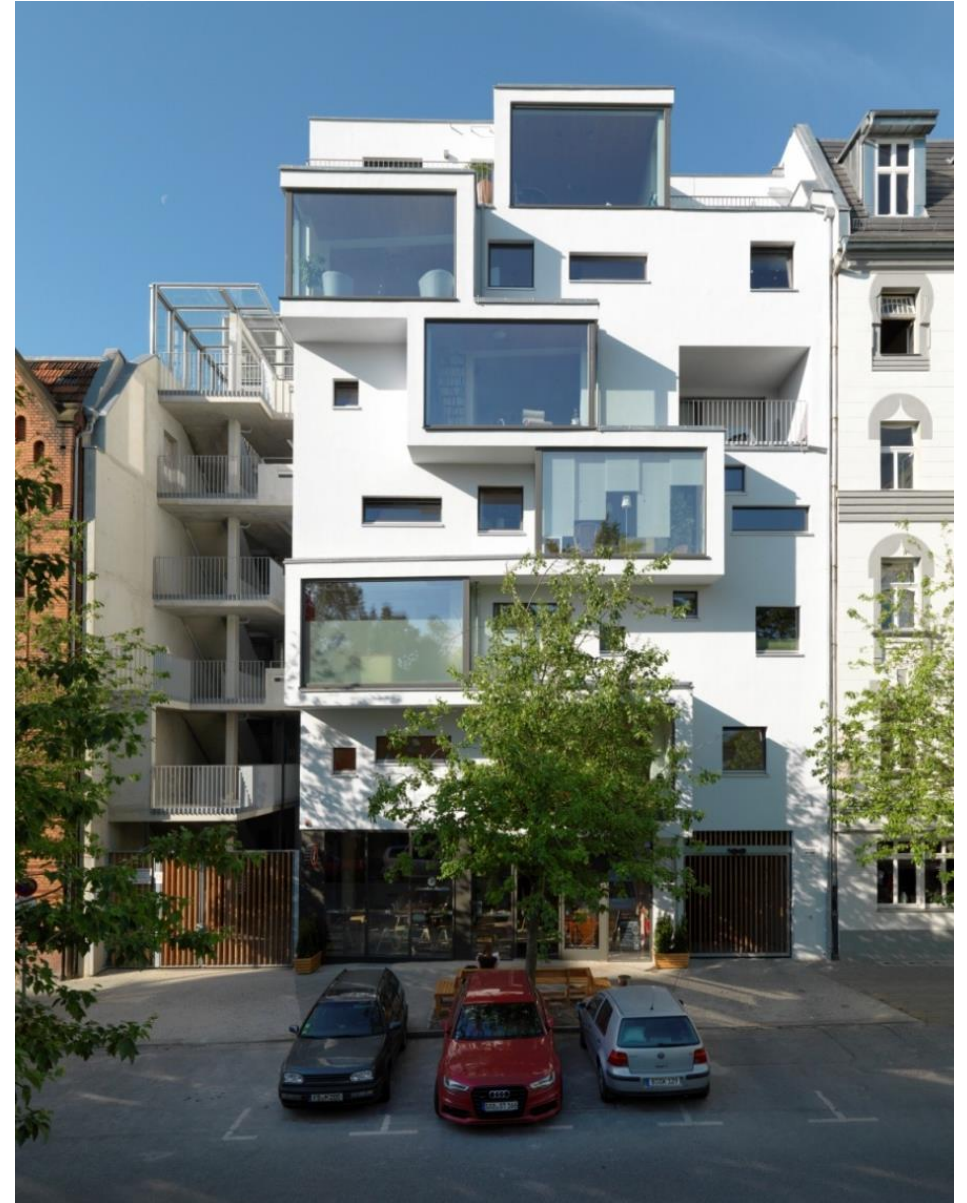
7 story condo with commercial space

 **Pirmin Jung
Ingenieure**



Primary construction build with pillars and girders
Flat ceilings between the girders
No interior or exterior load-bearing walls





Skyscrapers technology on smaller scale

The Bern EMT Center (2014)

3 story building with potential for six stories

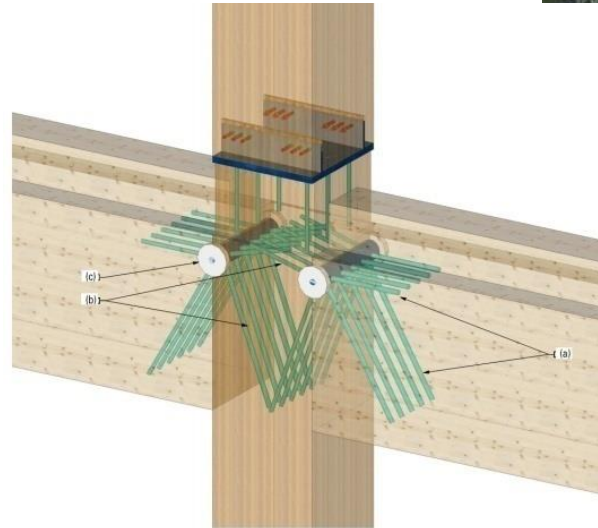
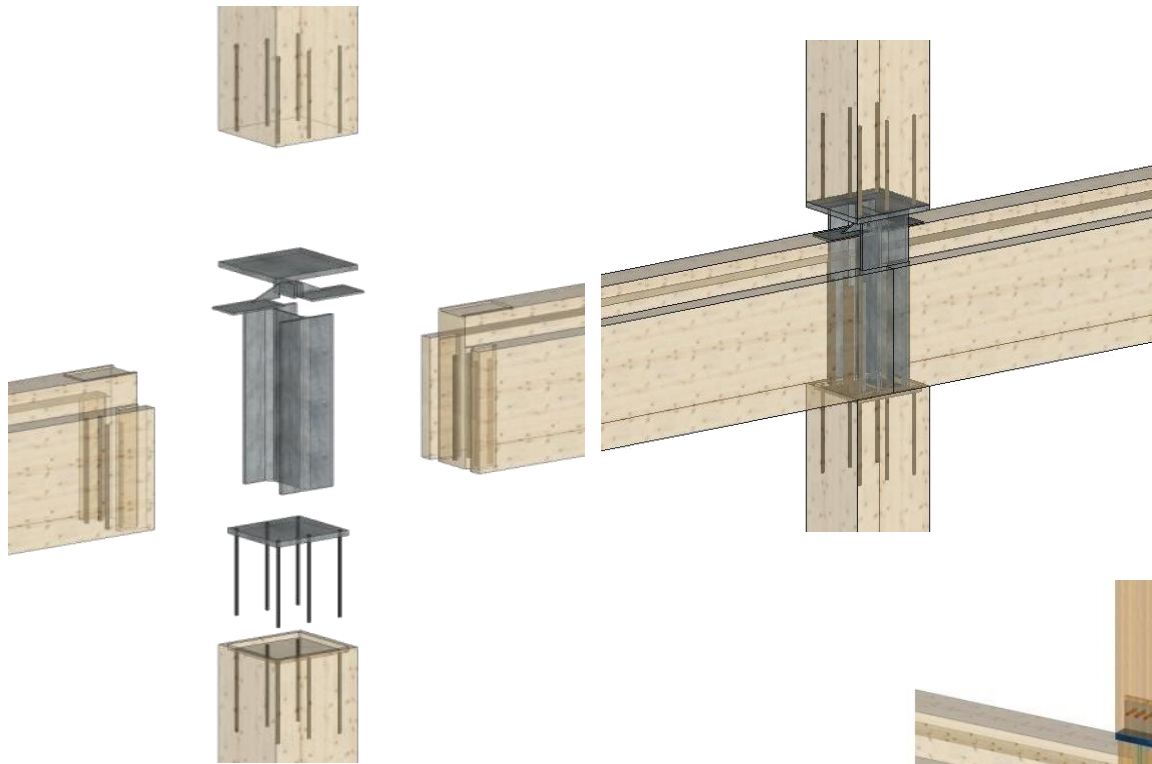
Primary construction with pillars distanced at 8,5 x 7,5 m and girders

Customizable layouts

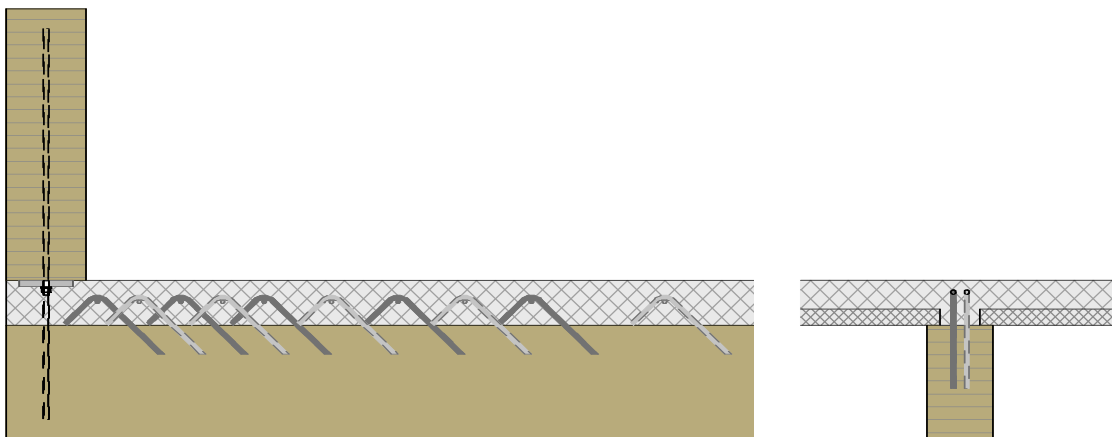
Exterior water, heating, air conditioning, sprinkler and electricity mounted utilities

Class III earthquake-proof building





*Newly designed 1,000 kN-bearing
connectors sustained by hardwood
columns and girders*



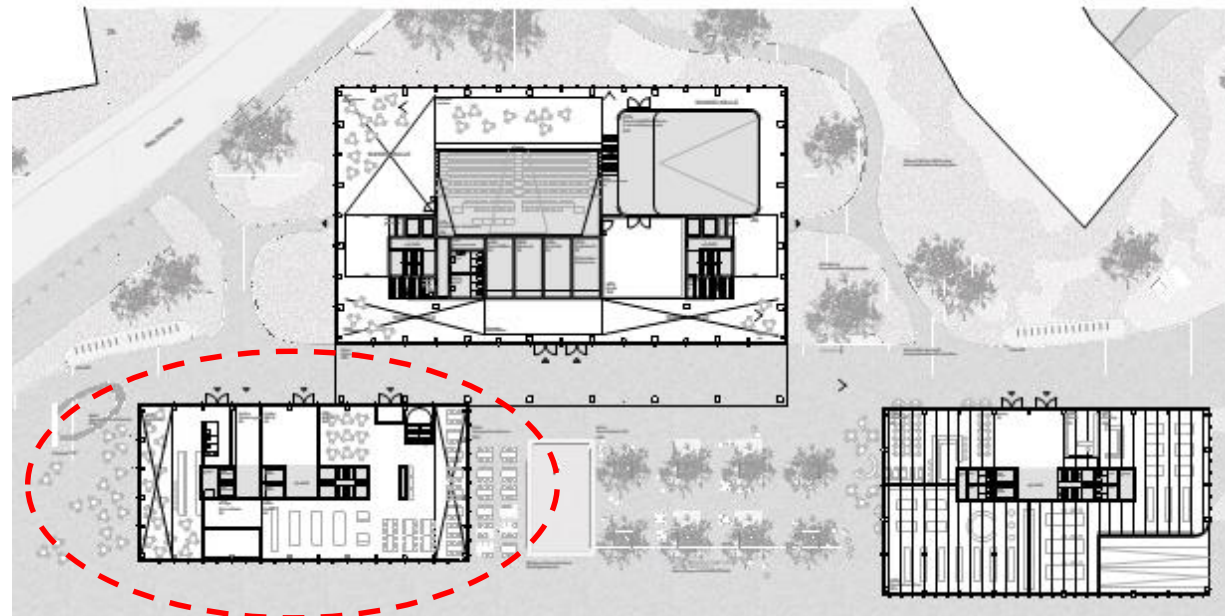
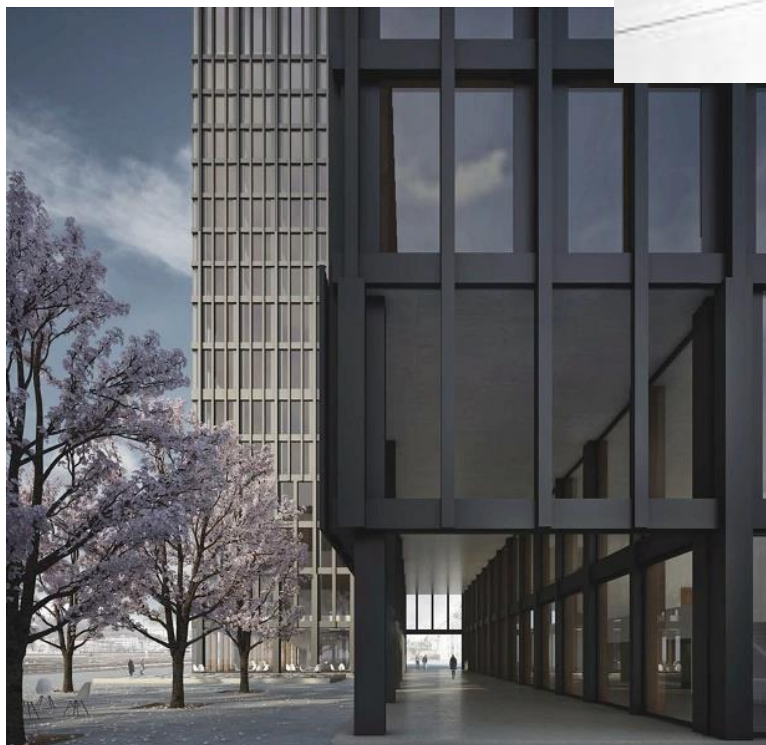
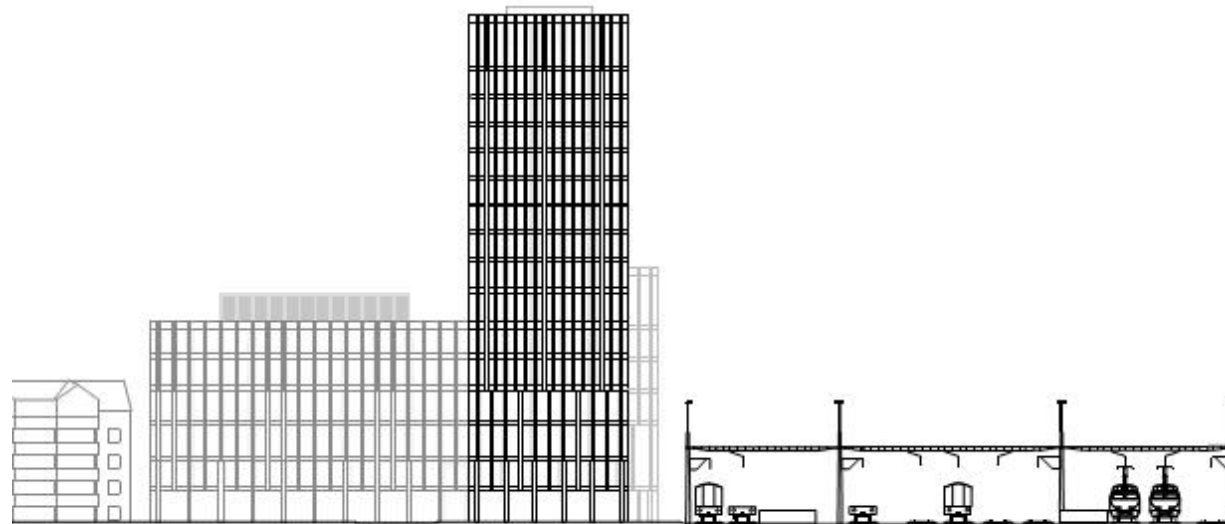
New wood concrete composite construction allows for more width between girders and walls

Skyscrapers in wood

The *Suurstoffi Baufeld 1, Rotkreuz* (2017)

18 story wood building

 Pirmin Jung
Ingenieure

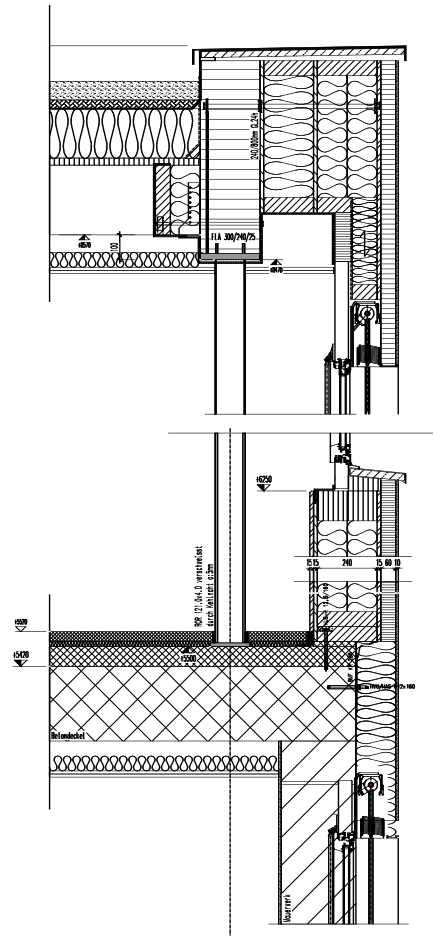


The future of timber construction



Replacing new buildings

Building skyscrapers



 Pirmin Jung
Ingenieure



Improving exterior walls
renovation

Adding new stories and
extensions

World housing

	2015	2050
World population	8 Billion	10 Billion
Urbanisation	4 Billion	7 Billion

World needs urbanisation housings for 3 billion people in the next 35 years



Climate warming < 2°C

Wood buildings are the natural choice

Pirmin Jung, B.Sc. in Wood Engineering, Pirmin Jung Ingenieure AG

 Pirmin Jung
Ingenieure

