



# RESEARCH THESIS

TITLE





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Trondheim

### Colophon



Master's Thesis "Titel"

Explorelab Graduation Lab  
Faculty of Architecture  
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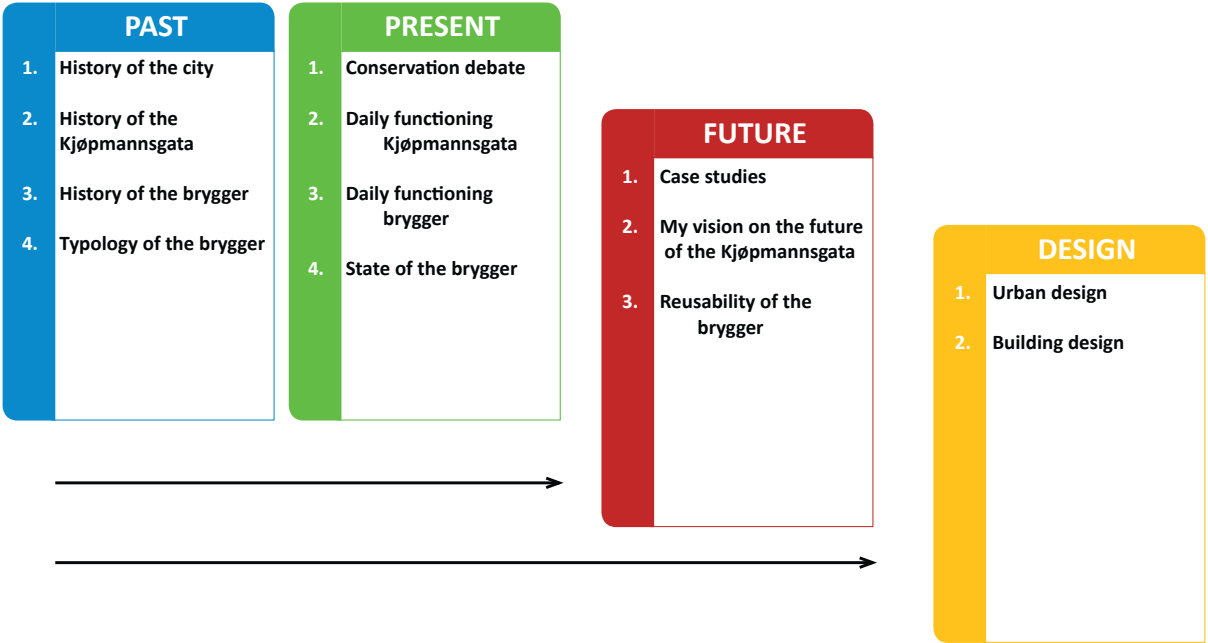
Ir. D. Vitner

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# RESEARCH THESIS

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TRONDHEIM WAREHOUSES (BRYGGER)

PAST – PRESENT – FUTURE

>> gefocused op Kjøpmannsgata  
Hoe dat noemen in titel??



## PREFACE

### *Semester in Trondheim + fascination > warehouses*

In the autumn of 2010 I studied for one semester in Trondheim, Norway. I choose to study there because of the subjects about wooden architecture. While studying there, I fell in love with the brightly coloured warehouses (*brygger*) along the river Nidelva in the middle of the city centre.

To find the warehouses, you can follow the tourists, who gather on the beautiful old wooden bridge to take loads of pictures from the warehouses.

Being a (temporary) citizen and an architecture student I looked at the warehouses and the whole area different over the time.

...Blabla over zonde dat er veel leeg staan, straat verpauperd... kan veel meer mee  
Tijdens studie in Trondheim wel geleerd over allerlei moderne houtbouw en renovatie, terwijl de stad zelf... blabla

I have always been fascinated by transformations of buildings. My whole youth I have been living in an 100 year old house which my parents were renovating. But the buildings do not necessarily have to be really old, I also like the transformation of vacant industrial buildings into dwellings for example. And it is not just buildings, at the moment I am restoring an old Volkswagen van into a small campervan. I just like to give battered buildings a new life.

blabla...

Hier of ergens anders nog iets over de conferentie vertellen!?!  
 >>>

>>>

Plus erbij vertellen over mijn beperkingen...

Niet wonen in Noorwegen

Niet de toegang hebben tot de gebouwen enz

Daardoor technische en geen gedetailleerd onderzoek..

Vooral niet grondig genoeg...

### *Acknowledgments*

I would like to thank...

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- Bergersen Arkitekt > Elisabeth Kahrs (+ Jan ... ?)

- (Aurora/Ivar?) Koteng??

- Eileen Garmann Johnsen (> KG27)

-

- Kjell Andresen als grootste bron...

Daarnaast:

- Groepsgenoten Explorelab 12

- Family & Friends... blabla

- Dames in NO, Inger Johanne, Annette (en Steffi), voor blijven slapen en de nodige hulp, enz

GLOSSARY

(Verklarend woordenlijst...)  
Enkele Noorse termen niet te vertalen...

Allmening (Allmenninger plural)  
åstak  
Brygge/Brygga (Brygger plural): warehouses used for maritime trade and fishing  
Bryggerekke/bryggerakka: uberhaupt wel gebruiken in tekst? Zo ja, welke?  
Bryggegata:  
Bod (Boder plural): opslagruimtes/opslaghokken... o.i.d.  
Dobbelt gårder  
Enkelt gårder  
Elvehavna:  
Flatbryggene:  
Krysslåft:  
KG: KG + number > f.e. KG 27 > refering to Kjøpmannsgata 27  
Laft(verk):  
Langbrygge:  
Langloftene  
Loftsbygningene  
Midtbyen:  
Nidelva:  
Riksantikvaren:  
Sinklåft:  
Sperretak  
Søgaden:  
Sval(gang):  
Torget:  
Tverrbrygge:

-----  
constructed as a sval wall, that is to say a post construction with tiles (footnote stolpekonstrukjson med og sviller tiler). At the end of the 1700's, instead of tiles the more solid tømmermanskledning - a type of wood siding pattern - was used. In the middle of the 19th century this wall was fully laft - a solid wooden wall of stacked logs.

>>> Tekst checken  
Checken op brygge/brygga/brygger/bryggen/bryggene  
Checken op flatbrygge/flatbrygga/flatbryggene enz.  
Checken op Kjøpmannsgata en KG met ø

EN CHECKEN OP FONT >> ITALIC!





## INTRODUCTION

Wat komt er in dit gedeelte?  
Hoe is het opgedeeld in welke delen??

Problem field  
Field of objectives  
Research questions  
Methodology  
Relevance



## PAST - HISTORIC BACKGROUND

Wat komt er in dit gedeelte?  
Hoe is het opgedeeld in welke delen??

Iets van intro

Besides being a known and beloved cityscape, the brygger in Trondheim have an interesting historical and structural background, related to the trading activities.

...

The oldest of the wharves along the River Nidelva date back to the 18th century; nevertheless, they still give the impression of the waterfront as it was long before then. The wharves remind us of the importance of Trondheim as a merchant city.

...



>> in voetnoot vertellen over voornaamste bron.. tenzij anders vermeld. ....apart from where otherwise stated.  
En soms aannames van Kjell Andresen of soms aannames van mij...

## 1. THE BRYGGEN BEFORE 1681

None of the existing brygge are from the period before the big city fire of 1681, but much of what happened in that period is of great significance for how the brygger were built after the fire.

### *The Oldest stories*

The Sagas tell us how King Olav Tryggvason of Viking fame founded the city by the mouth of the River Nidelva in 997. The site was based on account of its topographical and geographic position. Nidelva was the only sheltered and relatively flood-free estuary on the Trondheim fjord. A fertile stretch of hinterland that was among the best corn-growing districts in the country, abundant fish by the coast, as well as large forests; all these provided resources for the commercial activities. A medieval city was primarily a trading center, but also a loading point, i.e. a place where one could build a stock of goods one traded.

As the city grew, and increasingly became more important, the citizens got connections in other parts of the country, particularly north, and the city became a sort of hub for trade between the northern regions and the southern, and even foreign countries. The city's merchants had to, except housing, have warehouses, like the craftsmen had to have workshops.

We find these warehouses along almost the entire Norwegian coast, located at trading places both in cities and towns and one by one linked to a (farm)house. At least in northern Norway the term "brygger" is used for these storage buildings associated with maritime trade and fishing.

The brygger in Trondheim along the westside of the river Nidelva can be traced back to the city's oldest history. The good river port and the central location in the fjord were the basis for the site's position as a marketplace. We can assume that it is certain that the brygger were built in

this context, many written stories from the Middle Ages suggest this. (>> voetnoot!?) The brygger in Trondheim are already mentioned in 1182 in the Saga's of Sverre.

After a stagnation and recession in the Late Middle Ages the city grew again in the 1600s. Ships came from abroad to load up with timber, fish and copper and discharged their cargoes of salt and spices, wines and spirits, cloth and silk. The foundation for the growth of Trondheim was the export trade with timber, fish and copper, and these goods can be seen as the main foundation for city's economic life until the end of the 1800s.

### *City structure in the Middle Ages*

Around the year 1300 the city had four long streets running north to south, roughly parallel to the river. These were criss-crossed by east-west facing lanes. The built-up area was, in the main, arranged with building lots running east to west, that branched off the main streets. The former *Kaupmannastretet*, for instance, was only four meters wide between the walls of the buildings.

The first buildings to appear on the banks of the Nidelva were simple log houses, with their foundations on sunken corner piles. The roofs were covered with turf and birch bark, and the walls were treated on the outside with tar. The building methods and customs probably did not undergo any drastic changes through the centuries, and the tarred log houses with turfed roofs were a dominating feature in the city landscape until the 1600's, when the use of outer panelling came into fashion.

In the Middle Ages it was common for a (farm)house that the different functions had their own buildings forming a complex on the property. The merchant's properties along the river in Trondheim had similar structures.

Excavations determine to some extent the information, but there is very little material from the 1500s and 1600s. There are indications that suggest that in the Middle Ages that the merchant's properties were either *dobbelt*

*gårder* - double plots - or *enkelt gårder* - single plots -, that is to say plots on which the buildings were placed on both sides or on one side from the passage from the street to the river Nidelva. A fully developed plot consisted of a living room, a storehouse, a cookhouse, stables, cattle sheds, wells and a brygge along the river.

A document from 1540 about the terms of sale at the brygger, states that fresh fish should not be offered on the merchants grounds or inside the warehouse, only "on the river", that is to say from a boat or on the flatbrygge - an internal quay on the first floor. Furthermore there is mentioned that "malt, flour, wine, beer and other goods may not be sold from the boder - the storage rooms or from the warehouse. The farmers will sell their goods on the market." This implies limited sales at the brygger and that the main market was at *Torget*, the market square.

### *The building structure before the fire*

With the capture of the city by the Swedes in 1658, an officer, Naucler, produced a map of the city, and some years before the major fire occurred, a priest, Maschius, produced a copperplate engraving of great historical value showing a quite detailed engraving of the city viewed from the east. These two documents provide us with a good reference point for what the city looked like in the last half of the 17th century.

The building structure which was developed during the Late Middle Ages was basically identical to the current building pattern in the "*bryggerekka*". At least, this is what the drawing from Maschius from 1674 indicates.

If we look at the plan of the medieval city right up to the big city fire in 1681, we will see that the eastern street, which is parallel with the river, was what we call today the Krambugata. South of the current Kongensgata it went some distance along the west side of the current Kjøpmannsgata, and then turned east to the river.

Between this street and the river were the large



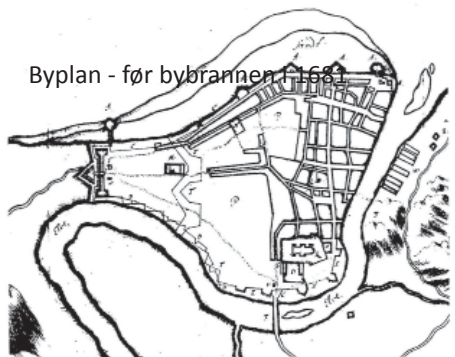


Byplan - 1658 - Nauciers kart - eldste kjente kart over trondheim - uit Spor tidschrift 1992



Byplan - 1658 op gebaseerd - voor 1681

14. Trondhøien byplan fra 1681 med planene som ble bygd i 1680-årene. Tegningen er basert på Olav Thoresen kart av 1680. På den høyre siden er det en plan av byen som ble bygd i 1680-årene. Kartet er basert på Olav Thoresen kart av 1680.



Byplan - før bybrannen i 1681

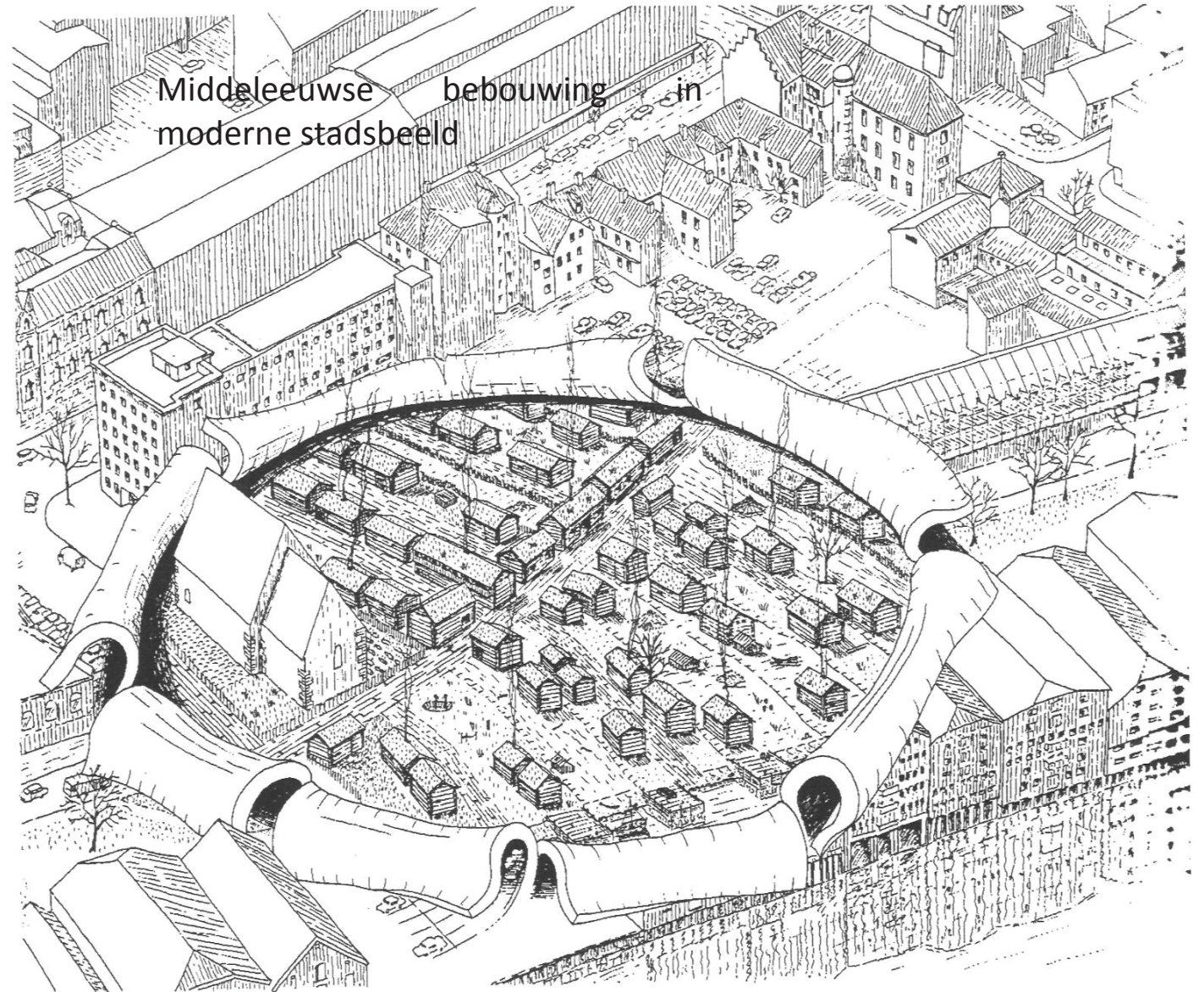


Krambugata i middelalderen - knipsel uit arkitektur i 1000 år

Krambugata i middelalderen sett sørover mot Olavskirken. (Ø. Ekroll, Karl-Fredrik Keller (tegn.)).



Rekonstruksjon av middelalderbebyggelsen



Middelalderbebyggelsen i moderne stadsbehold

Bebyggelsen på Folkebibliotekstomten i høymiddelalderen satt inn i det moderne bybildet. Tegning: Snorre Bjerke









# URBS NORRIGIÆ CELEBERRIMA

Af Trond en Herre Kjæck og Kjøn  
 jeg Trondhjem nævnt man vær.  
 Dend mættig Oluf Tryggvason  
 Mig bygte sig til ære.

# NIDROS IA

Hos mig er Nid dend vandfild sta.  
 Sig fjorden til mig vender.  
 Mand god tilførl her land faar.  
 jeg mine Skib ijsfender.

# ÆRI INCISA

Guds oerd, som eo min bedste Skat.  
 Her u=forfalt heres.  
 Med Politien vel er fat.  
 Mig got af Gud beskares.

# HIC EXHIBETUR Aº J 674

Domkirken højt berømmes Land.  
 Med Sandhed hand mand sige.  
 For dend blev skad af jõe Brand.  
 Dend neppe havde lige.

# ÆRI INCISA

I hober jeg iidskikken fies.  
 Som de nu hand begreemme.  
 I kroniker min roes betees.  
 Min velstand Gud forfremme.

A. Dandichen  
 B. Provant Brygger  
 C. Broens over Glevan  
 D. Byghytt til Gaars Haven  
 E. Høghuizen  
 F. Kisthøft  
 G. Nøst og smaa høfter paa brædder  
 H. Løst  
 I. Skibbygger  
 K. Dens Fru kircke  
 L. Raad høft  
 M. Høghuizen kircke  
 N. Skands Porten  
 O. Skans brygge  
 P. Digtet mæren  
 Q. Skibet  
 R. Skandebela  
 S. Skans kælders Næder





merchant's properties and they were built so that the merchant's house was situated along the street. Behind this the outbuildings, like a storehouse and a barn, were built around a courtyard, and towards the river the warehouse was constructed, partly on piles in the water. This was the brygge. The ships could sail right up to the brygger, and the goods could be lifted directly on the right floor to store.

It is difficult to say whether the brygger or the *bryggerekka* came first. We know that it took place in the Middle Ages, and it is not uncommon that we find these rows of warehouses in a number of medieval seaside cities. The likelihood indicates that it was not long after the founding of the city that the first brygge was built. Back then the terrain was 3-5 meters lower than it is today, so the first brygger were presumably situated some meters further west than where the brygger are right now.

#### *Brygger before the fire*

As mentioned before, the drawing from Maschius from 1674 provides us with a good reference point for what the brygger looked like in the last half of the 17th century, just before the big city fire.

If we take a look at the drawing, we can conclude that most of the brygger are situated with the gable towards the river, but that there were also some exceptions, which had their long gable towards the river. Therefore these brygger were called respectively *tverrbrygge* (transverse-brygge) and *langbrygge* (long-brygge). All the outbuildings on the merchant's plots also had their gable towards the river, even if the brygge had not. The *langbryggen* disappeared with the medieval town, nowadays all the brygger are perpendicular to the riverside. Probably since it is a more efficient use of the waterfront.

According to Dag Nilsen (voetnoot, interview) the choice for the *langbryggen* also had to do with topographical reasons. These brygge were built where the water was deeper, the shoreline is more steep where the Gamle Bru

is nowadays - at the left part of the drawing - a *langbrygge* would be easier to built here than a *tverrbrygge*.

The right part of Maschius' drawing is the main source of information. The warehouses, all *langbrygge*, were situated close by the riverside. An internal quay, called the *flatbrygge*, runs along the river on the first floors of the brygger. The *flatbrygge* is not interrupted at the vacant plots but it continues on a bridge.

The width of the brygge seems to vary greatly, most of the smaller brygge seem to be situated on the northside of the *bryggerekka*. Some of the widest brygge appear to have two ports next to each other on the top floor. Later we find this in the so called *dobbeltbrygge* - a double warehouse - and is a clear sign that the *dobbeltbrygge* were also built before the fire of 1681 (this will be explained later in the section plan types).

Only a few brygge appear to have a closed facade on the floor above the *flatbrygge*, most brygge appear to have a *sval-wall* - solid poles with partial filling between the poles. The brygge indicated with .... (number!) on the drawing clearly also has a *sval-wall* on the south side of the *allmenning* - the public square between the bryggen - on the ground floor and the first floor.

>>> op de tekening nummertjes of letters aangeven en hiernaar refereren

The common building method concerning the bryggen was a *laft*-construction - a solid wooden wall of stacked logs. On brygge number ... there are lines marked on the long wall, which probably indicate the heads of the transverse walls. In this case the transverse walls have not been built on top of each other on the ground floor and first floor, something we also find in the brygger built after 1681.

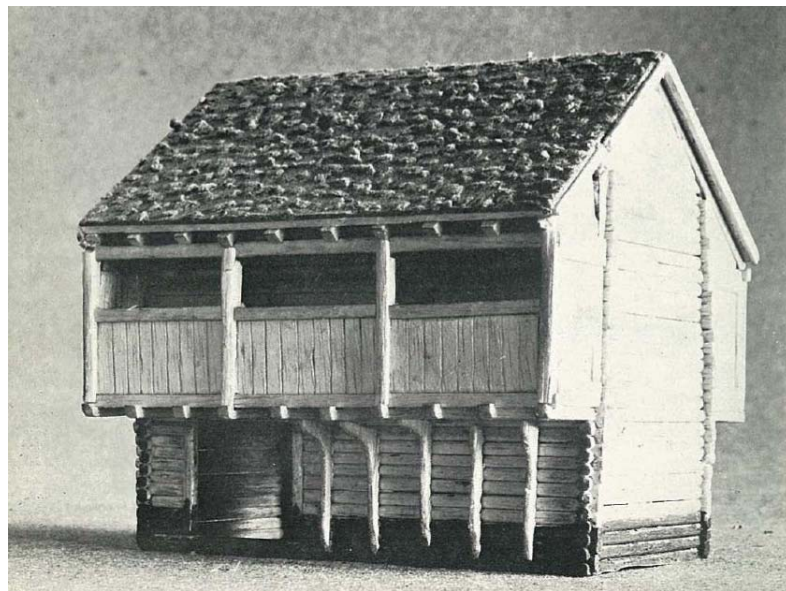
On some warehouses we find an extension of the ridge (see number ...), this is probably to protect the jib against



the weather, as we find on many warehouses in Trøndelag.

Besides the drawing there are also some written sources (\* bron erbij!) which give detailed information about the brygger before the fire. One building is described as “the brygge with downstairs three boder on both sides, upstairs on the south side a bedroom containing a stone stove and a loft above it”. This information is very interesting, the building is described as a langbrygge along the river. More information about warehouses being used for habitation is not found, but on Maschius drawing we can see the named langbrygge and many other brygger with an indication of a chimney.

From this material there are clear signs that these bryggen are related to the loftsbygningene, mainly the langloftene. This corresponding relationship was also pointed out in Bergen. The function (with storage of supplies and partly with a bedroom above) and construction (combined laft- and post- and beamconstruction) are clear signs of this relationship. An important difference is that the brygge are much larger than their close relatives on the Norwegian farm.



## 2. KJØPMANNSGATA AFTER 1681

Generally speaking the medieval age lasted in Trondheim until the city fire of 1681. When the city rose again from the ashes its appearance had altered dramatically.

The rest of this thesis is focused on the Kjøpmannsgata and the bryggen after the fire of 1681.

### *The fire of 1681*

In the night of 19 April 1681 fire breaks out in the brygge of Henrich Hornemann (\*therefore people also refer to the Hornemanns fire). The fire must have spread very quickly in the dry, tarred wooden houses. In a part of the warehouses gunpowder was stored, and there was enough for the fire to literally explode. The city was hopelessly lost in the course of twelve hours. Ninety procent of the buildings were lost, nothing remained except ashes. And in addition to that, everything that had been stored in the quayside warehouses, corn and seed grain and fishing equipment, stockfish, hides and skins, was lost in one night.

### *Cicignons regulation*

King Christian V sent a few thousand barrels of rye and despatched two generals to Trondheim. The rye was to be distributed to the needy, whilst the two generals, Cicignon and Coucheron, set about surveying the city and making proposals for a city development plan that would aim at preventing any more major fires from happening in the city. At the same time, they were to put forward a proposal of improving the fortifications of the city – it was after all thirty years ago when it had been captured by the Swedes without any resistance. The new plan did not prevent major fires as effectively as had been hoped, but it gave the city a new appearance and turned it into a fortress city.

The street network was formed in accordance with the then ideals in Europe, the baroque city with broad, straight streets in rigid and or rectangular shapes.

There was one main axis in the new city: Kongens gate. The other main street, Munkegata, was arranged on the south-north axis from the cathedral to Munkholmen. At the junction of the streets a new square was formed, a rectangular area spanning about 100 metres. Along the river, between the quays and the built-up area, Kjøpmannsgata was laid down in two sections, with a steep slope down to the row of quays. These three streets were about 40 metres wide, but the other streets – in a grid system parallel to the Kongens gate, were to have a width of about 23 metres.

Cicignon's development plan had a major disadvantage – it provided no guidelines for how the large urban quarters should be developed to allow all the inhabitants access to their properties. This resulted in many of the old streets and alleys being unaffected by the new development plan. The medieval patchwork of streets weaves itself into the rigid network of streets of Cicignon's plan, thereby creating flair and contrast in the urban landscape.

### *New streetprofile Kjøpmannsgata*

After the fire Cicignon placed the Kjøpmannsgata straight through the former brygge building block, so that the bryggen were separated from the other buildings.

Just behind the brygger, where there had been deep and narrow properties with dense rows running up the buildings, the impressive two-plane (two plateaus..?) Kjøpmannsgata was constructed. The construction of the new street led to a complete reorganisation of the building traditions when it comes to the merchants properties. As before the merchants house was situated at the street, but now with the façade to the east, and the brygge was built on the low plateau down by the river, partly on piles out in the river. All the bryggen were now constructed with the gables towards the river and the street. This way the bryggen can now serve on the streetside in the same way as on the river side, but now with wagon and horses under the hoisting beam.

In this way the Kjøpmannsgata consisted of two streets: one, the so-called *bryggegate* (brygge-street), on the lower plateau along the brygger, and the actual main street on the higher plateau, which later unofficially became *Søgaden*.

Zie profieltekening > Ook hoogtes in profieltekening!

### *Functions of the street*

With the construction of the Kjøpmannsgata Cicignon must have had in mind that the new road would serve many different functions.

- *Cities fortification with east*  
Cicignon did fill up and smooth out the riverbank so that is formed a low plateau along the river, and from there the terrain rose steep up to the new street, which in reality was a bastion that could easily be supplied with barricades and guns. In case of danger of a siege or assault, the *bryggerekka* could be demolished or burned and the embankment behind could serve as fortification with control over the River. The burning brygge plots could serve as an even more effective protection than the embankment could. There was of course the risk that with a unfavorable wind there was the possibility for a new town fire.
- *Fire separation between the city and the Brygger*  
Previous fires clearly showed the inhabitants of the city how catastrophic it was to lose both the buildings and all the stocks. To avoid repetition, the new street became 60 alen (ca. 36 metres) wide. Furthermore rows of trees were planted on the embankment to catch sparks in case of a fire and thus avoid fires from spreading between the city and the *bryggerekka* or the other way around.
- *The need of a main street*  
With the reconstruction of the city after the big fire one's opinion was that the city was in need of main

streets. The Kjøpmannsgata became one of the most important streets of the city and also one of the widest. A large part of the city's finer buildings were situated along the street and the richest merchants had their properties here.

- *Harbour needs control from the street*

Although the riverside will for a long time still be the true front of the bryggen, the harbour needed an easier access than from the bryggen. At that time there was no place to access the water with the bryggen and fortification all around the city. Therefore the allmenninger - open squares between the bryggen - were used. These squares would also serve as the city's public port.

#### Allmeninger (public places)

The brygger along the river were constructed in a denser and more voluminous structure than before. Now all the brygger were built with the gable towards the river, and they stood (?) side by side along the complete west side of elvehavnen, only interrupted by the open allmeninger. These allmenninger also served to protect the bryggen from another fire catastrophe. The *bryggerekka* was divided into three large and two small blocks with the allmenningen situated at the end of the new east-west orientated main axis: Rådstueallmenningen (at the end of Kongens gate), Hagerupallmenningen (at the end of Dronningens gate), Mustallmenningen (at the end of Olav Trygvassons gate) and Brattøra. Along the main axis important buildings were situated, such as the Town Hall, the Royal Residence, a church and the big Market. The allmenningen have all been kept as open, vacant spaces at the riverside right up to today (with the exception of Mustallmenningen, which was partially used for the construction of the bridge Bakke Bru in 1887).

The allmenningen played an important role as the place where most people had access to the river, since everywhere else was occupied by private brygger or by the fortifications. (>> zie kaart blz 6 van havnen i

trondheim.) The birdseye perspective from Dag Nilsen from 1976 gives an impression of the *bryggerekka* on a summerday in 1859. As seen on the drawing the allmenningen were used for smaller boats, presumably from the citizens. Dag Nilsen also mentioned that from these small boats, farmers tried to sell some small goods (\*note > interview).

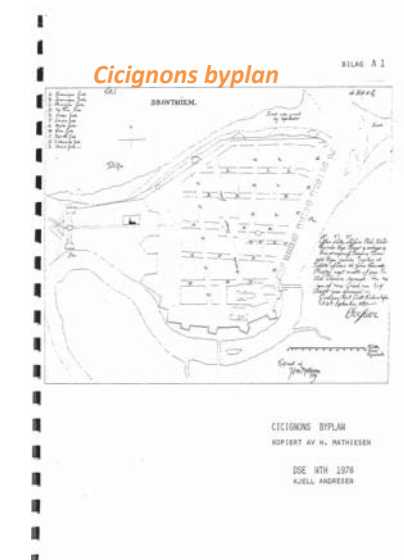
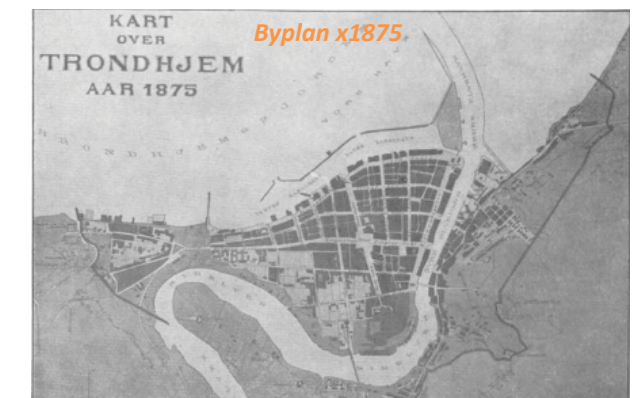
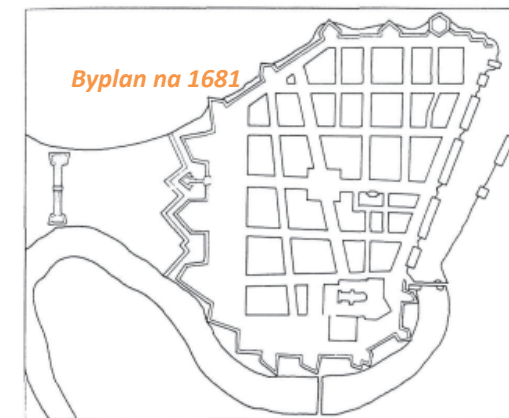
#### Larger vessels

Based on the map it looks like the bryggen from before the Hornemannss fire were not that far into the river as the current bryggen. It is likely that the development of larger trading vessels in the years before the fire were the cause of this. Larger ships require deeper water because of a greater depth, and because this was a problem before the fire, it is logical to build the bryggene further into the river during the reconstruction.

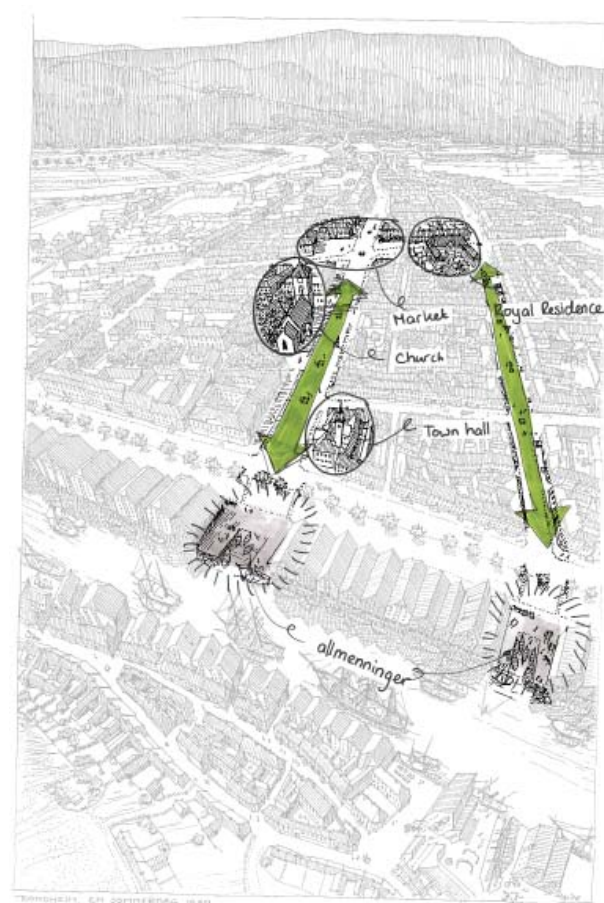
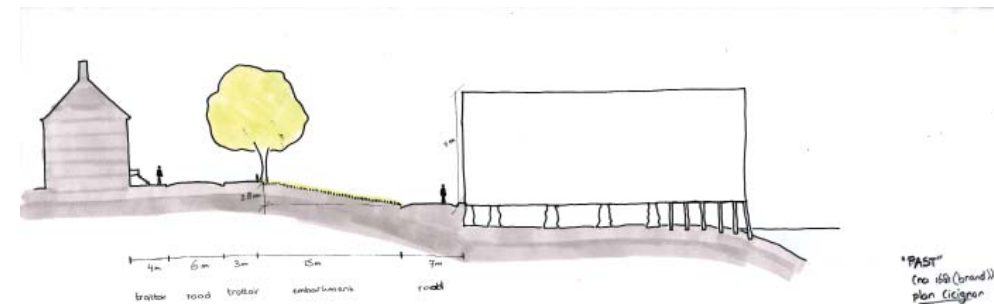
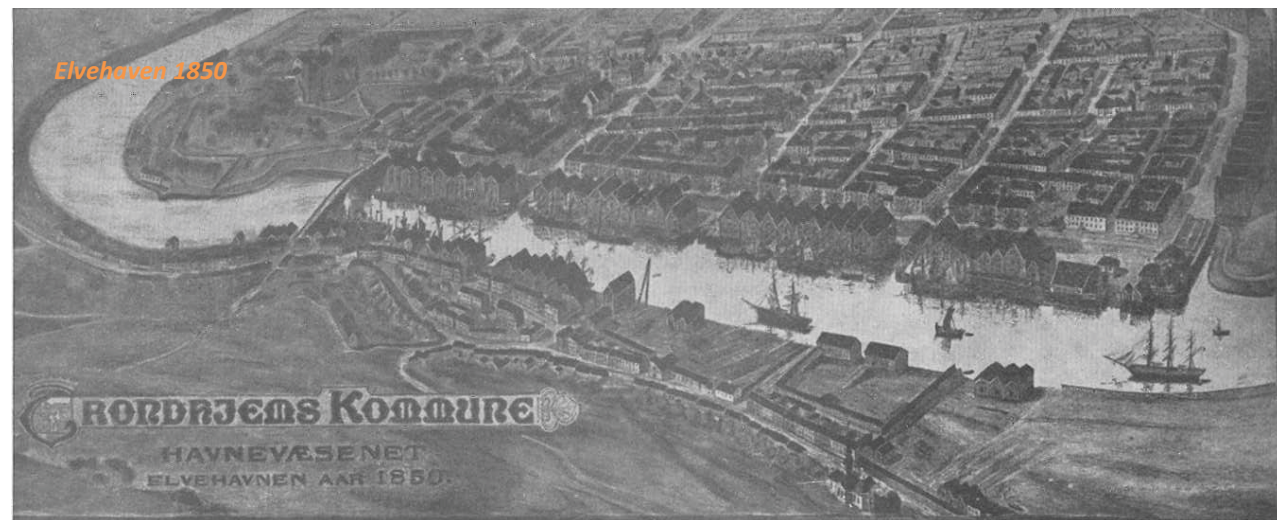
#### New fire regulations

With the big fire fresh in their memory new fire regulations for the city were made. Combustible goods were to be stored at Bakklandet, on the riverside opposite of the *bryggerekka* along the Kjøpmannsgata. And the use of naked flame was prohibited in or near the quayside buildings. But not only inflammable items were restricted, also goods with a bigger fire load than wood had to be stored outside of the brygger and the city.

The people working in the brygge had to move almost blindly through the dark warehouses, since they were not allowed to use any oil lamps. But it was even more difficult for sailors to live on their vessels while they were moored in the harbour, they could not prepare or even warm up their food. The guesthouse-owners could thank the magistrate for a significant contribution in guests.







Vogelvluchtperspectief - Dag Nilsen  
Een zomerdag 1859

Eigen toevoeging  
Originele tekening in bijlage



-----  
 Weinig info van bryggene voor 1766 (branntakstene uit 1766) >> tax report.

Vanaf 1766 bronmateriaal tamelijk rijk. En vanaf 1860 ook Bouwcommissies onderhandelingsprotocollen goed bronmateriaal.  
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### 3. THE BRYGGER AFTER 1681

The rise and fall of the Kjøpmannsgata brygger...

#### Reconstruction [1681 – 1766]

After the fire 90% of the city was in ashes, and the new regulations contributed to the delay of the reconstruction. The stocks were lost, but the trade relations were still intact and many of the merchants still had outstanding claims. Moreover, the city got tax relief during the first years after the fire to stimulate the reconstruction.

How quickly the reconstruction took place, we can not say with certainty. A map (>> die van bijlage A2 > pg 76) reportedly of 1691 shows that the two northernmost brygge blocks were almost rebuilt, the block between Rådstuealmenning and Hagerupsalmenning partly built and that two brygge were built in the southernmost block.

General Vibes' map of 1708 (>> die van bijlage A3 > pg 77) shows the new pattern which took place after the division of the Kjøpmannsgata. As mentioned before, most of the merchants had their houses along the new Søgaden (former name for Kjøpmannsgata) and their bryggen across the street. It remained this way for as long as the merchants along the Søgaden were the most powerful men of the city.

In the beginning of the 18th century the merchant fleet of the city was twice as large than in the years before the 1681-fire. From this we conclude that the income of the city's merchants were good and this is probably also the reason why the bryggen were rebuild so quickly.

This period ends with the Great Northern War (1709 - 1720) during which a third of the merchant fleet was either hijacked or lost in a period of just three years time. During the war there were probably little to no bryggen built.

#### The city's leading merchants [1720 - 1814]

When a war breaks out between the seafaring nations in Europe, Denmark/Norway stays neutral which was good for the export of timber, fish and copper. Since the foreign ships were at war, Trondheim's neutral ships were used for the export of the goods. This was good for the bryggen in the Kjøpmannsgata, since the ship owners and brygge owners were almost always the same person. The big profit was probably partly invested in property, including other bryggen. In the 1700's they were also the largest owners of the copper mines in the surroundings.

The commercial life in the town was undergoing a change and the new generation merchants took over, and one of them, workmen Hans Hagerup, was soon the leading merchant from 1720 to 1744.

One of the leading merchants from 1744 to 1766 was Hans Hornemann. He took over the business from his father in 1716, he traded nearly no timber, but began mainly with fish from the 1730's and later with copper trade. At a certain point he was Trondheim's largest merchant and shipowner. If Hornemann used his large income to built bryggen was unknown, but two years after his death his two sons owned 7 bryggen, with an estimated value of more than a quarter of the entire *bryggerekka*.

In the latter half of the 18th century we find signs of building activity on the allmenningen. A map of Wilters of 1742 shows that Hans Hagerup has built an expansion on the south side of his brygge. In 1766 a similar structure was built on the other side of the allmenning. Further north, on the streetside in front of number 73 and 75 the owners had built a shed for their wagons. We also find other public buildings on the allmenning used for fire fighting, such as a storage for lime and a extinguishing unit, both on Rådstue- and Hagerupsallmenning.

The harbour conditions were bad in the latter half of the 18th century. The ships could not moor and unload at directly at the bryggen. The depth of the water in front

of the bryggen varies, the deepest part is in front of the southernmost bryggen, but the two northernmost blocks have the worst depth. It was not only the depth of the water in front of the bryggen which made it difficult, the actual outflow of river Nidelva was very shallow and many heavy loaded vessels could only pass during high tide.

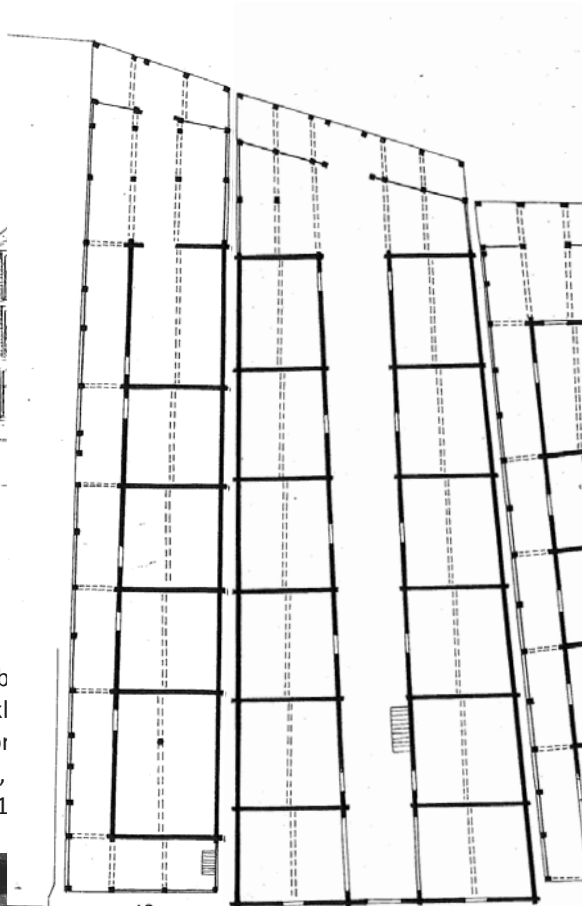
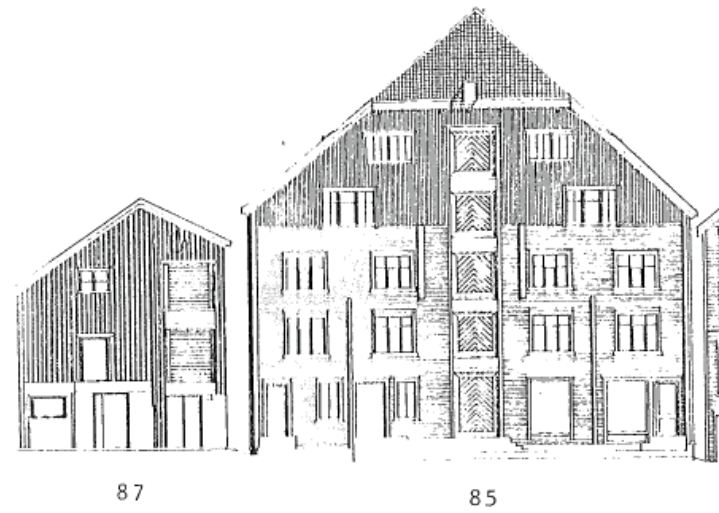
#### Crisis [1814-1850] and upturn [1850 – 1875]

In these times of crisis the exchange rate drops, the Norwegian kroner is worth nothing and many merchants went bankrupt. However, there was a group of merchants which had placed their money abroad in the course of the war. When the war was over and the exchange rate dropped, their fortune was increased. They could now buy real estate at very low prices, and they also bought bryggen. The construction of new brygger did not take place around 1820, since they could buy bryggen for a fraction of what a new construction would cost.

#### The brothers Hornemann:

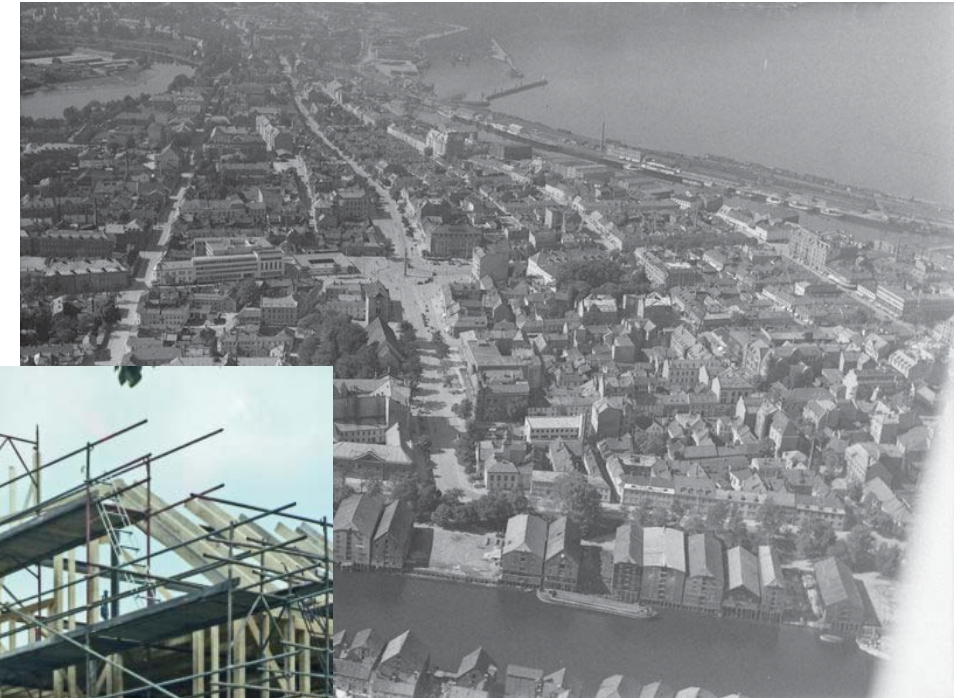
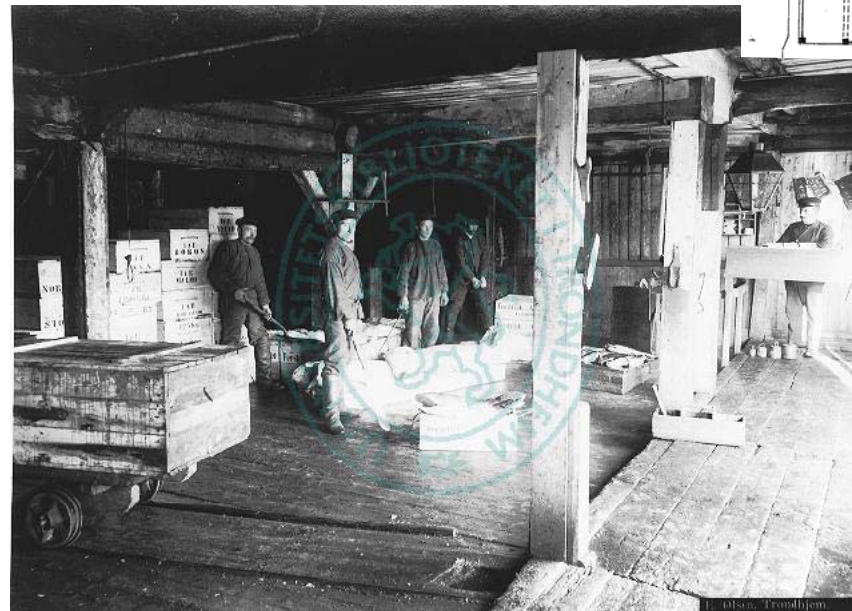
*The brothers Gerrit and Henrich Hornemann inherited father's properties in 1764 and they shared it between them. In 1766, Gerrit owned number 85, a sidegangsbrygge and the brothers were both owners of number 87, a dobbeltbrygge which was "double built". A year later, Gerrit Hornemann demolished his sidegangsbrygge and his half share of the dobbeltbrygge and builds a new brygge, while his brother keeps the other half of the dobbeltbrygge standing, which the plan and roof shape indicates. Gerrit builds his new brygge a little further in the river, thus his brother also extends his brygge, so the continuity of the flatbrygge is restored.*





LET OP RAILS >> 1901-1906

Beskrivelse Interiør med personer fra pakkerommet i Ferskfiskb Kjøpmannsgata 77. Bildet viser stabler med kasser og fisk som ligger kl 5 menn i arbeid. Ferskfisk-Aktiebolaget ble etablert i 1888 og omgjort i 1895. Forretningen hadde kontor, utsalg, lager, salteri, fryseri, kassefabrikk i Kjøpmannsgata. Firmaet sysselsatte ca 20 personer i 1



Gesloopte panden WWII?!?



Flickr trondheim byarkiv - KG 5 verbouwing (1978)



In these years the harbor maintenance was problematic, clay masses had gathered in pastures Ingen. Earlier ships could enter with high tide. But at that time the major part of the load had to be discharged outside and transported by rowing boats to the bryggen. This affected first and foremost the wholesalers who traded with large ships.

The time of the upturn brought money and desire to invest. The harbor was deepened and breakwaters were placed. And many old bryggen were demolished and replaced by new ones. If these old bryggen actually proofed to be unsuitable is difficult to say. In a few years time, more bryggen were built than in the previous 50 years. Brygge number 7, built in 1872, was one of the last bryggen built in the traditional form, that is to say with the layout of storage rooms of *laft* walls.

Also other developments bring major changes. In 1875 a proposal is made for a new harbor and railway station on a new island just north of the Fjordgata. In the east a new district grows, connected with a new bridge. These changes have a major affect on the dominance of the old traditional trading houses, specialized companies start taking over the sale and the *elvehavne* - the old river harbour - receives the death blow; most trading houses disappear completely.

The bryggen undergo new developments, in the tax reports of 1867 we encounter for the first time information about wet cells. Internal laft walls are being demolished and new technical installations like hydraulic lifts are in use.

#### *The significance of the brygger weakens [1875 – 1978]*

The hectic upturn was followed by another serious crisis up until the 1890's.

Another development contributed to the further weakening of the bryggens significance in economic life. In 1884 the new railway station opened. The harbour along the Fjordgata was deepened and the harbour

conditions for the Fjordgata bryggen were strongly improved. In 1887 the Bakke Bru - the northern bridge over the river - is opened, which hinders the use of the *elvehavna* - the harbor along the Kjøpmannsgata - further.

Nevertheless, some of the bryggen were raised. Number 11 and 41 were reconstructed in 1877 and number 33 in 1880, all raised with 2 floors. The structure of the new upper floors have the same structure as the upper floors of bryggen from the 1850's and 1860's, externally a traditional laft wall and an internal bearing structure of posts and beams. Hereafter 24 years follow with no registered building activities in the *bryggerekka*.

If there were other building related changes done at that time we can not know with certainty because such work was not required to be reported to the Building Commission. However, it is likely that the tendency to demolish internal partition walls and to create small shops has continued to a certain degree.

The following upturn - 1895 til 1920 - was one of the most powerful booms the city had experienced, the industry expanded greatly, and this led to increased trade and turnover. In the years after the turn of the century it stagnated completely, but the first World War brought new times of prosperity for the industry. In the bryggerekka there was no registered building activity in the most hectic turnover years, but the bryggen trade was extensively and against soaring prices. A few years later building activities can be registered. Number 35 was demolished and was built up new from scratch, while numbers 43, 59, 77 and 79 were raised with several floors. In Fjordgata the same happened, but in far greater extent. Common to all the new brygge-constructions from these years is that the external walls are constructed as timber frame construction and the inner bearing construction consists of posts and beams, furthermore the roof pitch is very small.

After 1910 no significant amount of goods have been

brought to or from the bryggen from the riverside. During the First World War there were on new building activities among the bryggen, but there were many transfers of properties.

In the years between 1920 and 1978 the significance of the bryggen in the city's industry had become small and was still declining. Small shops, particularly in the fish trade were the dominant owners and users in the bryggen. These economic shifts had many small building related consequences for the brygger. Fires are now a major thread for the bryggen. The upper floors of number 59 burned down already in 1912, in 1927 number 43 and number 5 in 1939. In addition other brygger were affected with smaller fires.

In 1924 number 69/71 were demolished to make room for the expansion of the Bakke Bru - the northern bridge over the river Nidelva. The area use became more differentiated, the tendency to start up offices, small shops and workplaces continued, but decreased again in the days before the Second World War. During the war the Germans demanded that four brygger had to be demolished to create fire barriers between the buildings. The efforts from the conservation department led to the fact that only two brygger were demolished, number 31 and 61, but unfortunately these were among the oldest and most worthy of preservation.

>>> Vanaf ongeveer 1950 naar Present!

Hier nog kort iets schrijven.

<<< -----Vanaf 1950 naar present?! -----

The destruction of the brygger continued also after the war. Kjøpmannsgata 11 burned in 1950, but the four lower floors were repaired. Number 17 burned in 1952 and number 41 in 1955, both buildings were demolished. In 1957 Kjøpmannsgata 77 burned, but the brygge was

repaired. On 19 October 1967 Trondheim was hit by a fierce fire that left six brygger, number 75 to 85 in ashes. Hegstadbrygga number 73 was saved, however number 87 was demolished a couple of years later. A powerful fire gripped number 65 in 1968, the building was demolished years later. In addition to the fire ravages number 45 and later number 39 were demolished to make room for a multi-storey car park.

New buildings rise on the fire and demolition plots. Because of its central location, the amount of floors are raised up to five floors and the new brygger became therefore higher than their older neighbours, this is particularly the case between the neighbours number 59 and 61. The transformation to offices and retail purposes slowed before the war, but takes up again in the 1960's.

Only in very recent years, architectural preservation has been a contributing driving force in the reconstruction work. It has been reflected in the form of an extension (? Of juist weer terug naar de oude hoogte?) to the former height and disclosure of the old structures as a backdrop for an office. (?) "det har gitt seg utslag i form av påbygging til tidligere høyde og avdekking av gamle konstruksjoner som kulisser i forretningslokalene." However parts of this development are in violation with the fire department's vision and a clarification on this point seems/appears/thinks/finds... for further rebuilding and preservation work.

>> Nog meer brygger sindsdien gesloopt??

Nr 67? Nr 63? Beiden volgens artikel afgebrand in 1983.

>> Komt hier nog iets uit dat stuk van Kjell Andresen van brannvern? Of is dat allemaal toekomst?

<<< -----Vanaf 1950 naar present?! -----



#### 4. TYPOLOGY OF THE BRYGGER

This section describes the different aspects and components of the brygger - a typology.

##### *Function and use*

The brygger were used as storage for the large trading houses. The trading vessels could sail in completely to the brygger and the goods could be hoisted up from the ship along the brygge gable directly to the floor the goods should be stored in. Imported goods were distributed further on to the buyers through the streetside - for transport over land - or back through the riverside - for transport over sea. For exported goods it was the reverse cycle. The riverside was therefore used the most. This also illustrates why many of the brygge had a more primitive lift installation on the streetside.

How work was organized and run inside the brygger, how many persons worked there daily, which tools were used, which goods were stored where, and so on, we know little about, but we can imagine the situation. From the buildings themselves we know that it must have been a dark and draughty workplace; the buildings great depth, few and small windows and the prohibition of fire - thus also light - make that clear.

The activities were closely related with the trade, and from that we know it was seasonal. The vessel in foreign trade usually made only one to two trips each summer, the rest of the year they lay still. The insurance costs were so high that it did not pay off to sail in the winter. Domestic trade was less seasonal, but there was less overland transport during the winter and trade with the north only took place in the summertime. We must therefore assume that there was long and great activity in the brygger in the summer half year and that the brygger were not used to a certain extent in the winter half year, except to retrieve the stored goods when needed.

How many people there must have been busy with loading

and unloading the ships is uncertain, but for grain, fish or copper barrels at least two, but certainly more men were needed to operate the lift installation. A few men to grab and store the barrels on the right floor and in addition some are needed on board of the ship. Probably there were more persons working in the brygger than those mentioned. The harbour in Trondheim was small and the mooring time for each ship had to be as short as possible, therefore the loading and unloading had to be as efficient as possible.

How the big and heavy goods were brought to their place, we can only speculate about. Grain and fish barrels could possibly be rolled into place, but the copper had almost certainly be carried to the storage place. The oldest brygger were not built for rolling stock, the high thresholds of the boder - the storage rooms - show this. When rolling stock came into use we know nothing about, but from the middle of the 1800's the openings of the storage rooms had low or no thresholds, this possibly indicates the period.

As mentioned before the mooring time of each ship at the brygge had to be as short as possible. This made it necessary to put aside the unloaded goods as quickly as possible and to have the cargo ready at the same time. Each brygge had a space on the ground floor at the riverside called a sval - a semi-open ventilated place. The function of the sval was probably to quickly and temporarily store the goods (>> zie tekeningen). The fact that a lot of the brygge had such a sval also on the first floor at the riverside and just a few brygge had a sval on the ground floor on the streetside, again shows that the activities mainly took place on the riverside. The fact that the sval was not build anymore from the middle of the 1800's could be related to the start of using rolling stock.

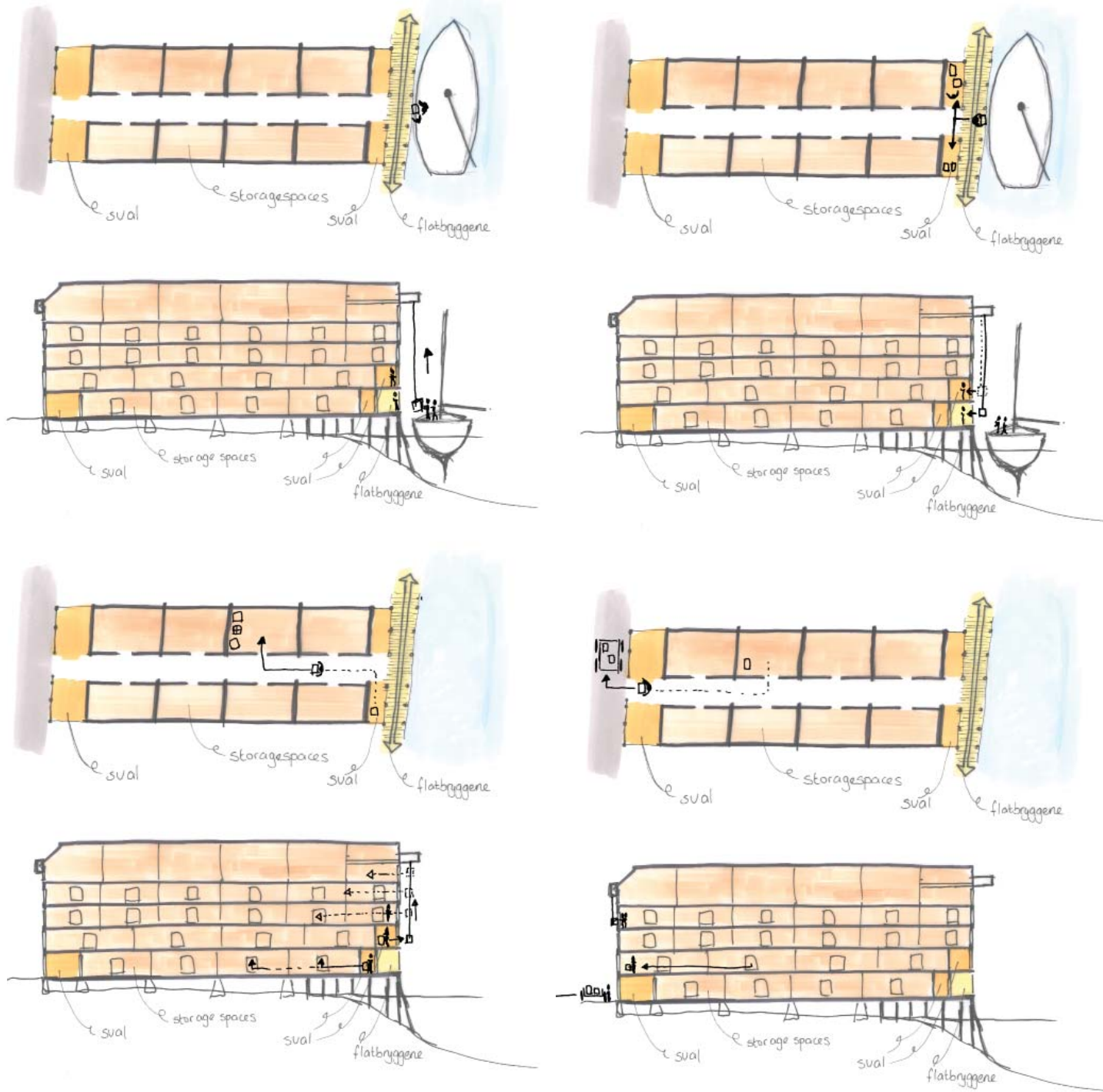
Light was prohibited under the fire regulations of 1689 except in the morning if it was too dark. If we go in the same boder today, it is difficult to understand that in those dark circumstances the workmen could find the goods they were looking for. In his document Kjell

Andresen (>> bron noemen > pg 50) names sliding shutters on the long side of the building, through which some light came into the boder from the space between the brygger. But this light was very scarce because of the height of the buildings and the small space in between the buildings. (footnote: However, these sliding shutters are not shown on the drawings and I can not find more information about them. Only in a document about KG 29 windows in the long facade are mentioned, but only after the neighbour brygge KG 31 is demolished in WWII.)

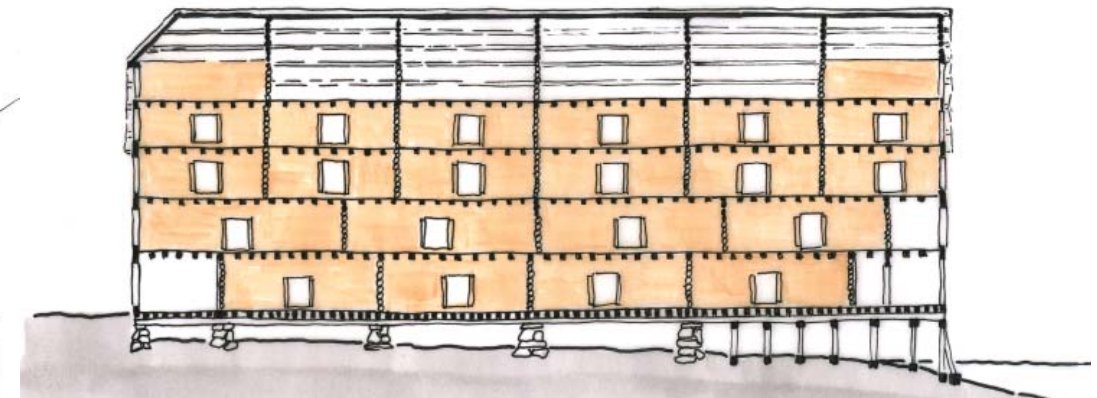
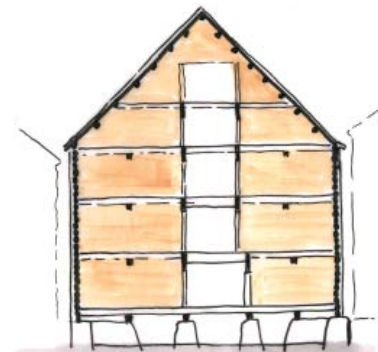
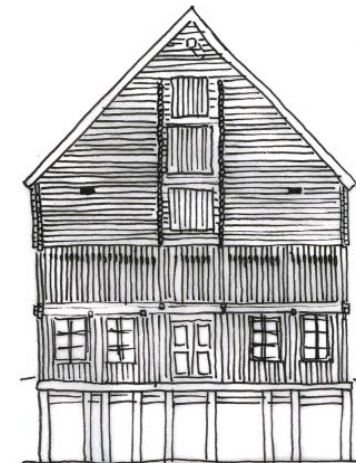
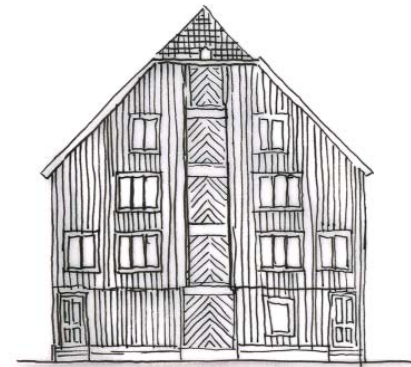
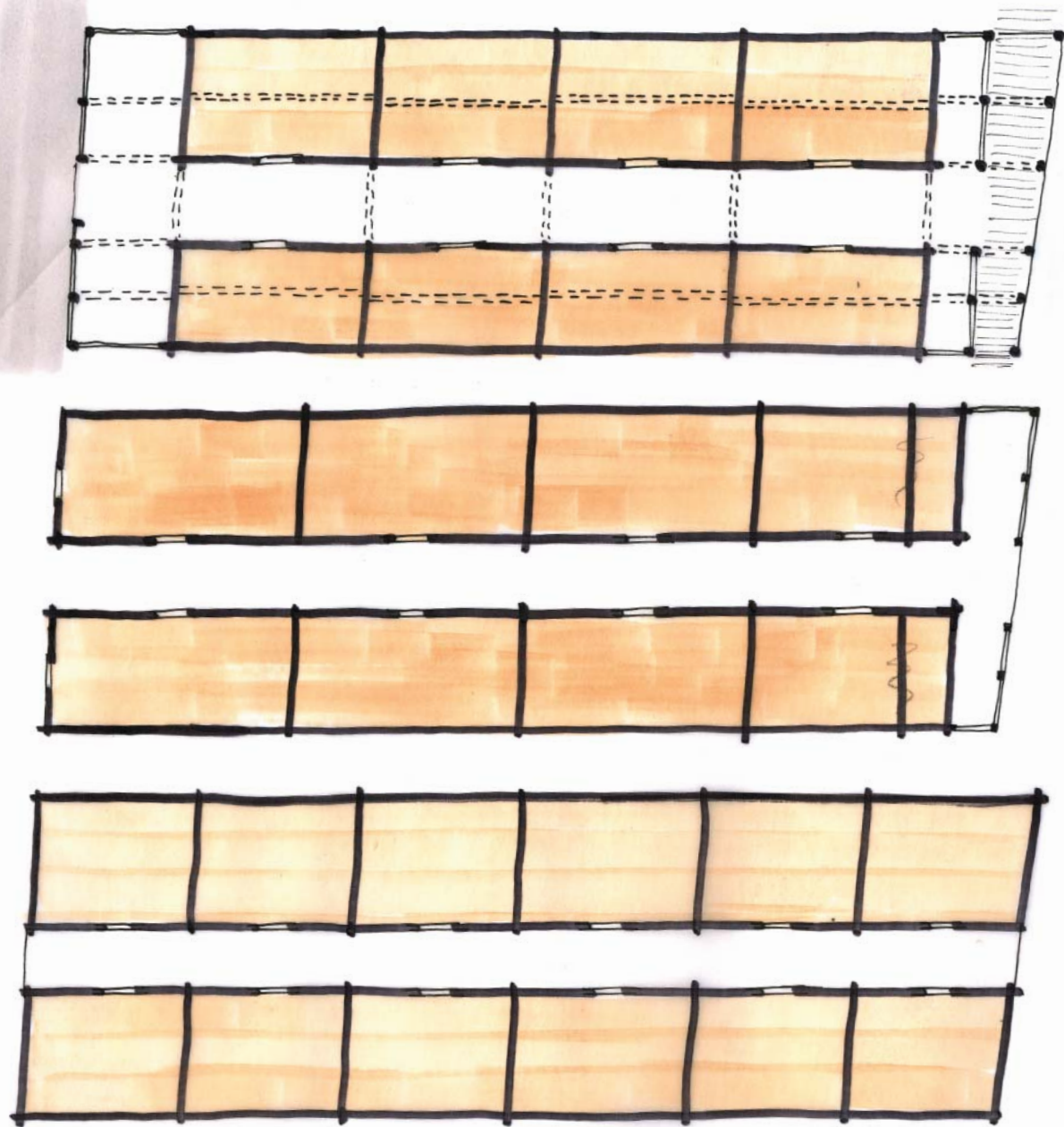
In the sval however, it was lighter as a result of the semi open facade (this will be explained later in the section wall construction) and when the ports would be open there would be enough light. When artificial light came into use is difficult to say, the fire regulations of 1767 required decent lighting in buildings, but whether this was allowed in the brygger was not mentioned. The installation of gas was allowed from the 1880's.

##### *Plan types*

We can mainly divide the brygger in the Kjøpmannsgata in four plan types. All brygger have a passage in the longitudinal direction of the building and it is the placement of this aisle which determines the plan. Over time, the plans developed somewhat because the construction of the sval eventually stopped.







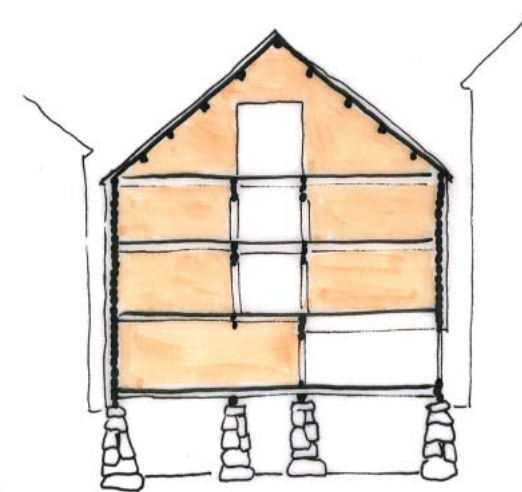
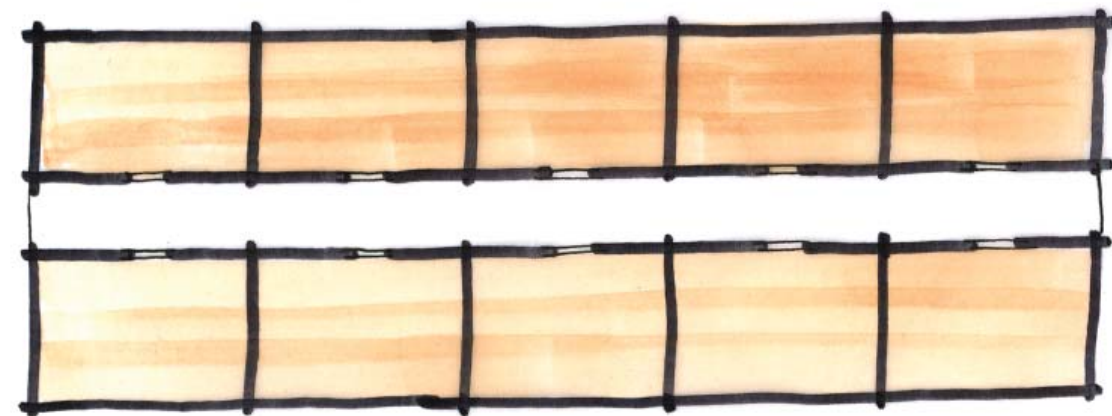
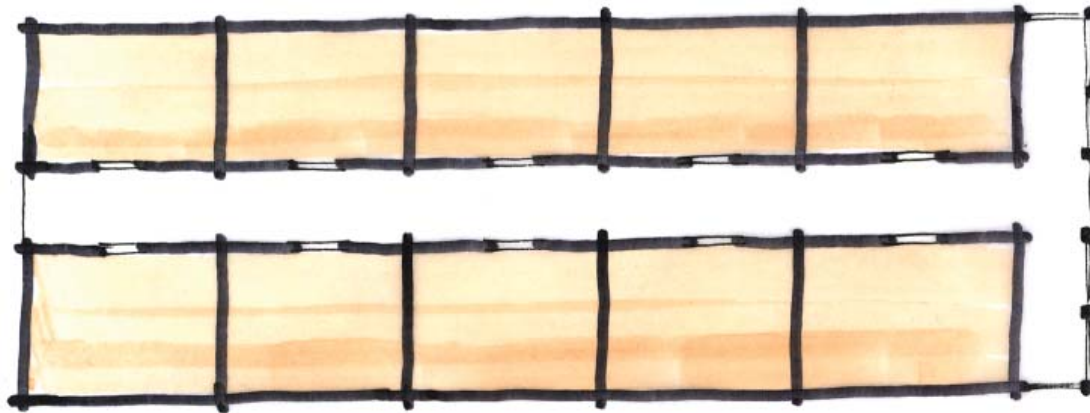
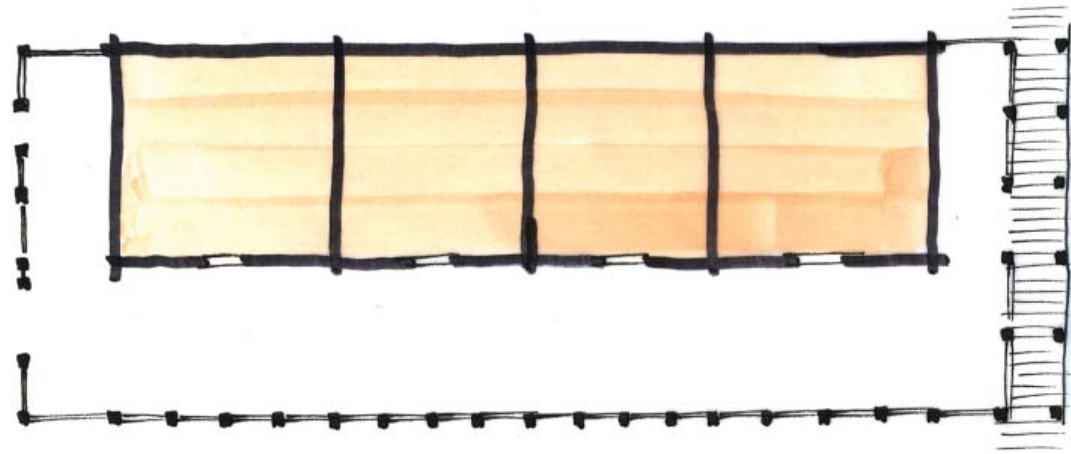
### Midtgangsbrygge

The midtgangsbrygge is the most common type. Characteristic is that the aisle is centered on all floors with the boder - the storage rooms - on both sides. The entrance to the boder is usually on the central aisle, but some bryggene (no. 15, 37, 45 and 63) also had the entrances from the sval along the river.

This type eventually became more and more common, in 1766 11 out of 34 bryggene were of this type, while 5 of the 11 bryggene built in the period between 1766 and 1815 and 4 of the 10 bryggene built in the period between 1816 and 1875 were midtgangsbrygge. Today, about half of the remaining bryggene are midtgangsbrygge.

In tax reports from 1846 (footnote bron! >>pg 26) we can see that the width of these bryggen varied between  $15\frac{1}{2}$  alen (ca. 9,3 metres) (footnote about alen) and 32 alen (ca. 19,2 metres), but 12 of the 14 midtgangsbryggen were between  $18\frac{1}{2}$  alen (ca. 11,1 metres) and  $27\frac{1}{2}$  alen (ca. 16,5 metres) wide.





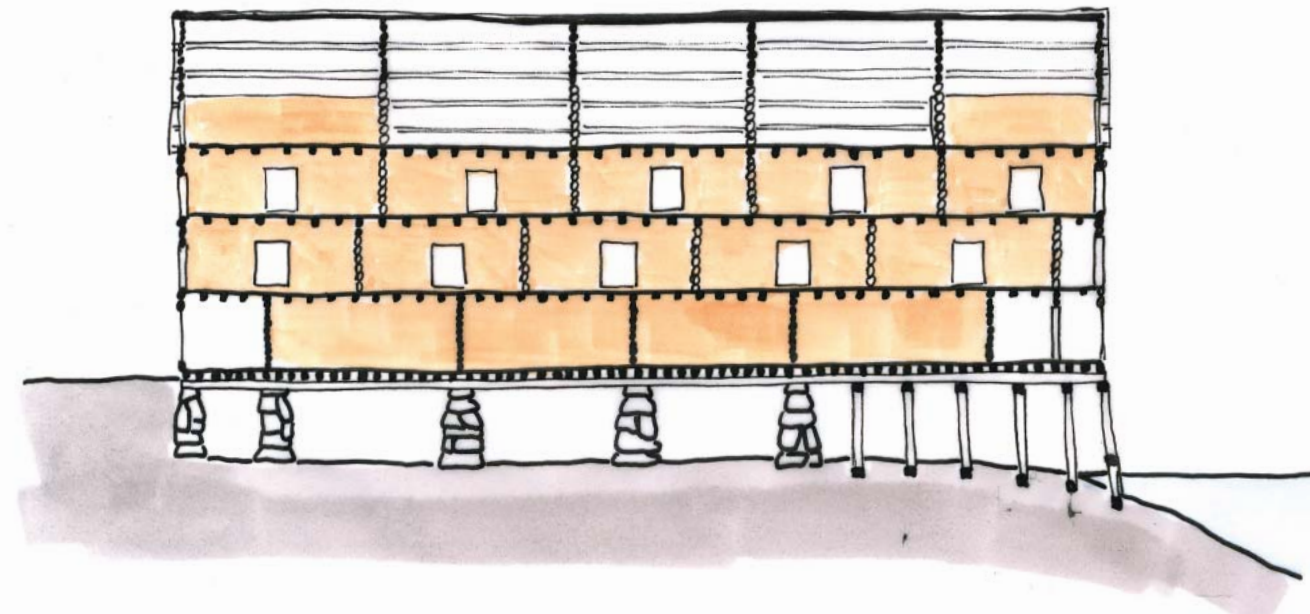
### Side/midtgangsbrygge

Typical for this plan type is the aisle on one side and the boder on the other side of the building. But in this case the side aisle only exists on the ground floor, because of the roof shape all the other floors have a central aisle with boder on both sides. This type was built until 1857.

The internal walls that the aisle on the ground floor was noticeably wider than the aisle on the other floors. The boder on the ground floor are deeper and therefore larger than the boder on the other floors.

It is remarkable that all these bryggen, with the exception of one (no. 19, built in 1857), have the aisle on the ground floor on the south side (**this will come back in the section 'what have the brygger evolved from'**). The south wall on the ground floor was in the 1700's always constructed as a sval wall, that is to say a post construction filled with boards (**footnote stolpekonstruksjon med og sviller tiler**). At the end of the 1700's, instead of tiles the more solid tømmermanskledning - a type of wood siding pattern - was used. In the middle of the 19th century this wall was fully laft - a solid wooden wall of stacked logs.

Brygge of this type were between 14½ and 22 alen wide, but 7 of the 9 bryggen were between 14½ and 18½ alen wide.





### Sidegangsbrygge

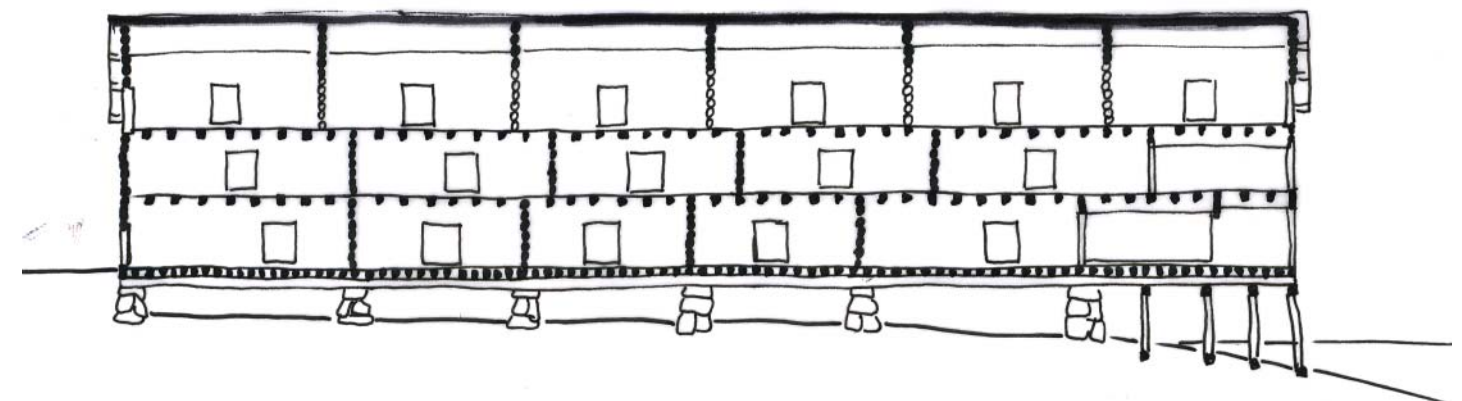
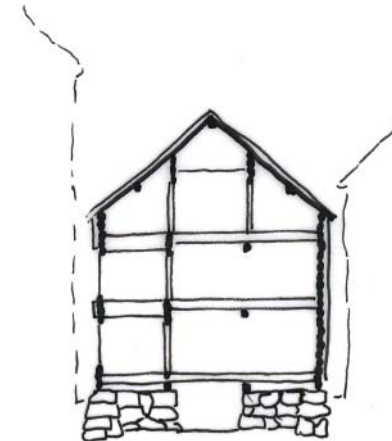
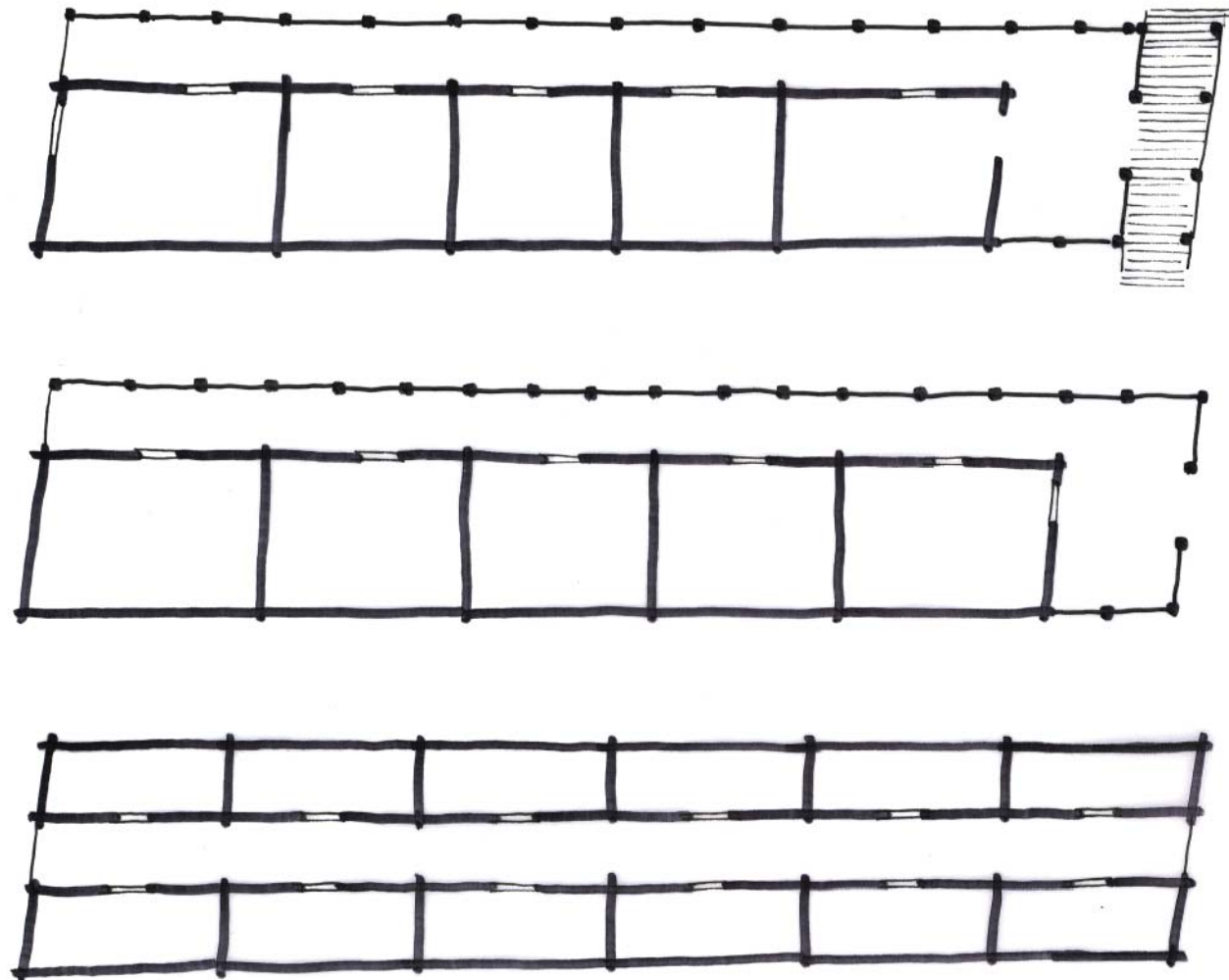
As the Norwegian name suggests, the aisle is on the side of the building. But in this plan type that is the case on all the floors except for the top floor where the aisle is in the middle because of the shape of the roof.

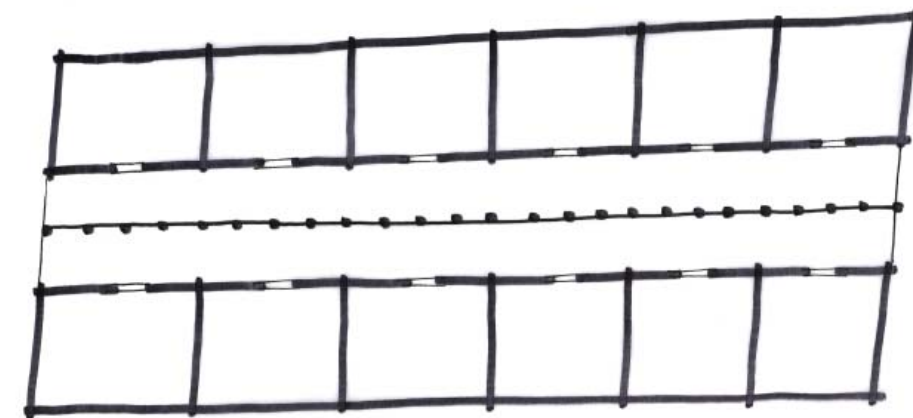
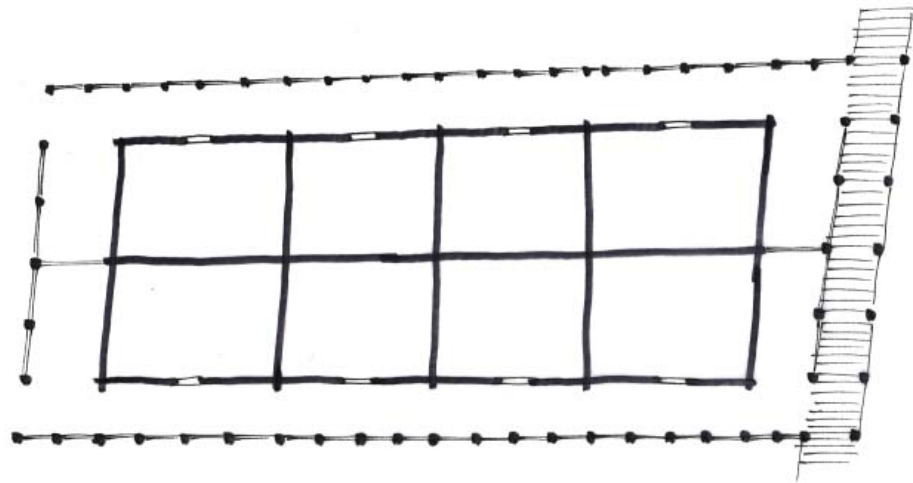
There is not much source material on this type, except for number 21 (from 1828), all others were demolished or burned for over years already. The sidegangsbryggen which the sources (>> bron noemen) mention, all date back from before 1766, except for number 21. This type of plan went out of use and when a sidegangsbrygge was demolished, it was replaced by for a different plan type.

In the documents from 1978 (>> bron noemen), all the existing sidegangsbrygge at that time had their aisle on the northside of the building (this will come back in the section 'what have the brygger evolved from'), with the exception of the second floor of number 81 (footnote: That only happens in one half of a dobbeltbrygge, is there a relation between these buildings?)

Like the aisle in the type type side/midtgangsbrygge also this facade along the aisle is constructed as sval wall, that is to say a post construction filled with tiles.

The width of this type was between 9 and 13 alen, but most of the buildings were between 12 and 13 alen.





### Dobbeltbrygge

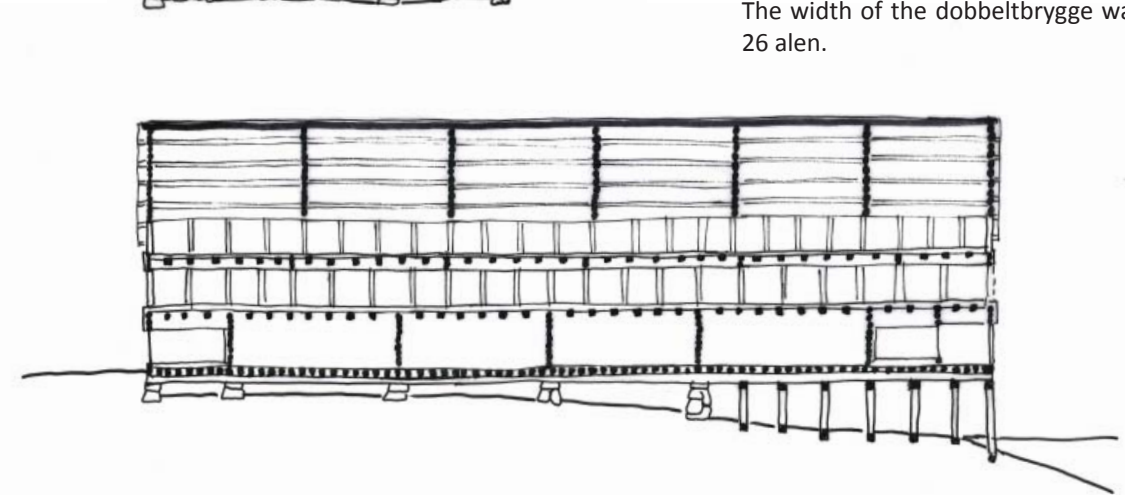
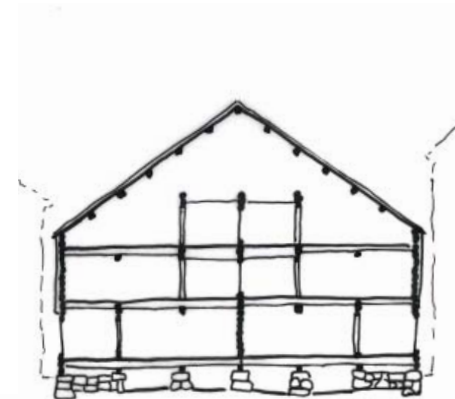
As the name says, this is a double brygge. Of this type we do not know much with 100% certainty, only number 59 still stands today, but after a fire in 1912 a lot has been changed.

The most common dobbeltbrygge had two aisles on each floor, to the north and the south side on ground level and a double aisle in the middle on the upper floors. Some of the middle aisles were single, but that may be due to recent changes. The aisles were probably most often separated by a wall built of a post construction filled with tiles.

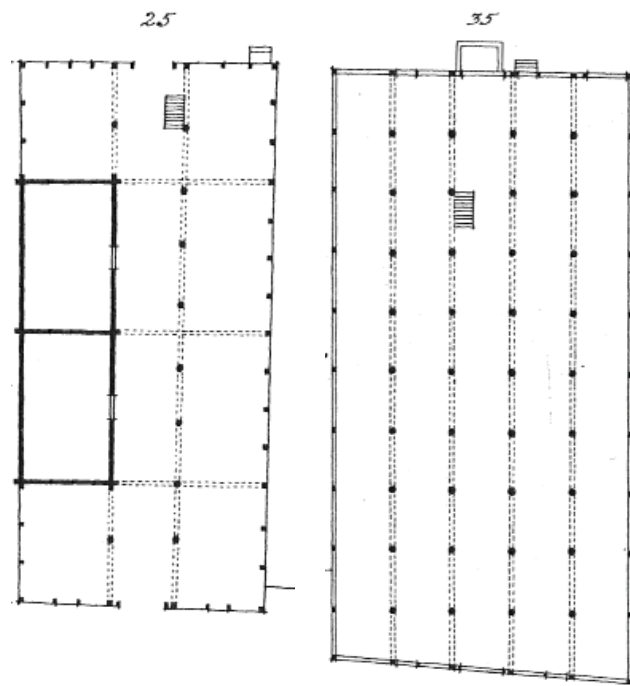
On the ground floor these buildings mostly had eight boder in the middle, a sval on the street side and a sval on the water side next to the flatbrygge. On the first floor there were usually five boder on both sides and a sval on the riverside and on the second floor there were usually six boder on both sides of the central aisle.

Dobbeltbrygge of this type were built before 1766. A more specific version was number 87, this brygge consisted of two similar mirrored halves. Because the structures were completely separated, one half could be demolished without the other half being affected. As mentioned before this was proven by one of the brothers Hornemann when he demolished his part of the building.

The width of the dobbeltbrygge was between 23½ and 26 alen.







### Other plantypes

In addition to the plantypes mentioned, there are some bryggen which can not be considered as one of these four types.

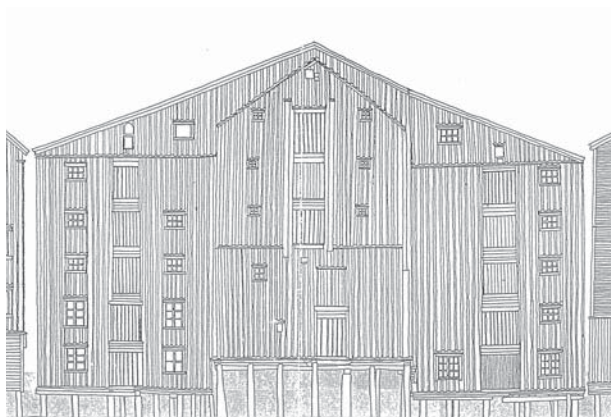
Number 13 is a result of a combination of three buildings. The central wing has a central aisle on the upper floors, but the aisle on the first floor and possibly the second floor is situated on the north side, but such big changes have been made, that it is difficult to say with certainty.

Number 25 had two boder on the ground floor, three on the first floor and six boder on the second floor. The boder on the ground floor were situated on the south side and the rest of the facade - which was along the allmenning - was constructed as sval wall.

Number 37, built between 1865 and 1870, is an example of the period in which they stopped building the original layout with storage rooms. The floors are completely open spaces. The external walls are still constructed as laft walls, the inner bearing construction consists of posts and beams.

In the middle of the period of change there were also bryggen which had both layouts, floors with storage rooms and open floor plans with posts. Nummer 23, built in 1858 is one of those brygge. The ground floor and first floor have the original layout of storage rooms with laft walls. But the second and third floor show no sign of original partition walls and the post-beam construction seems original. The same is the case for number 27, built in 1868. The ground floor has the original storage rooms with laft walls. But the first, second and third an original open floor plan with posts. The reason why this was done is unsure, this will be further explained in the next section.

Number 35 was built as late as in 1904 and represents the end of this period. All floors were built as open space with columns and the external wall is constructed with a timber frame, no longer as a laft wall.



### Development of the plantypes

The bryggen plan types have changed much over time. We can assume that these developments are essentially based on the experience gained while working in the bryggen, but also general development in the building customs and construction techniques may have contributed to these developments.

The major change that took place was that some plan types were no longer built, something that was certainly caused by the fact that these plan types no longer proved to be functional. The last *dobbeltbryggen* of the most common type (e.g. No. 59) were built before 1766 and whenever they were demolished, they were in most cases replaced by *midgangsbyggen*. Something similar happened with the *sidegangsbyggen* when they were demolished, the lots were merged and wider bryggen were built. Upon closer examination of these plans they appear not to be rational, the hallways are askew and the surface of the hallways seem large in proportion to the storage space.

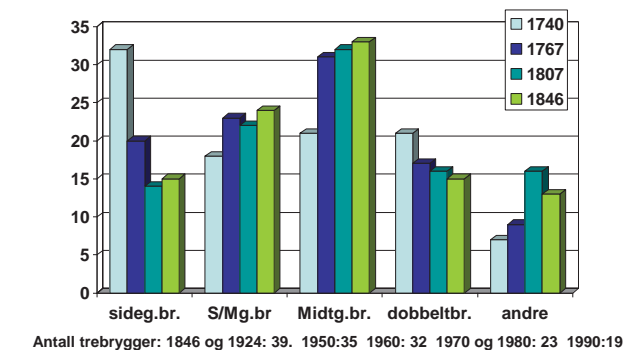
One element that must have directed the design of the plan was the lifting installation. If the load must be able to be hoisted up to the top floor, it was necessary that the lifts were placed as high as possible, preferably directly under the ridge. The ports must necessarily be positioned directly below the hoist, and the most rational plan on the basis of this was a sufficiently wide corridor directly between the ports on both gables. This rational consideration is required for the first floor and higher. On the ground floor there was the *flatbrygga* on the riverside and on the streetside it was not necessary to use the hoist to get the goods inside.

It follows that the *midgangsbygge* and *side/midgangsbygge* seem to be the most rational and if we look at the following trend we see that these types the remained the longest.

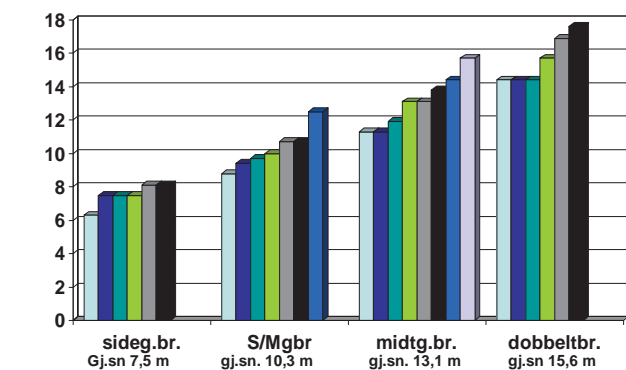
Throughout the 19th century the building of the storage

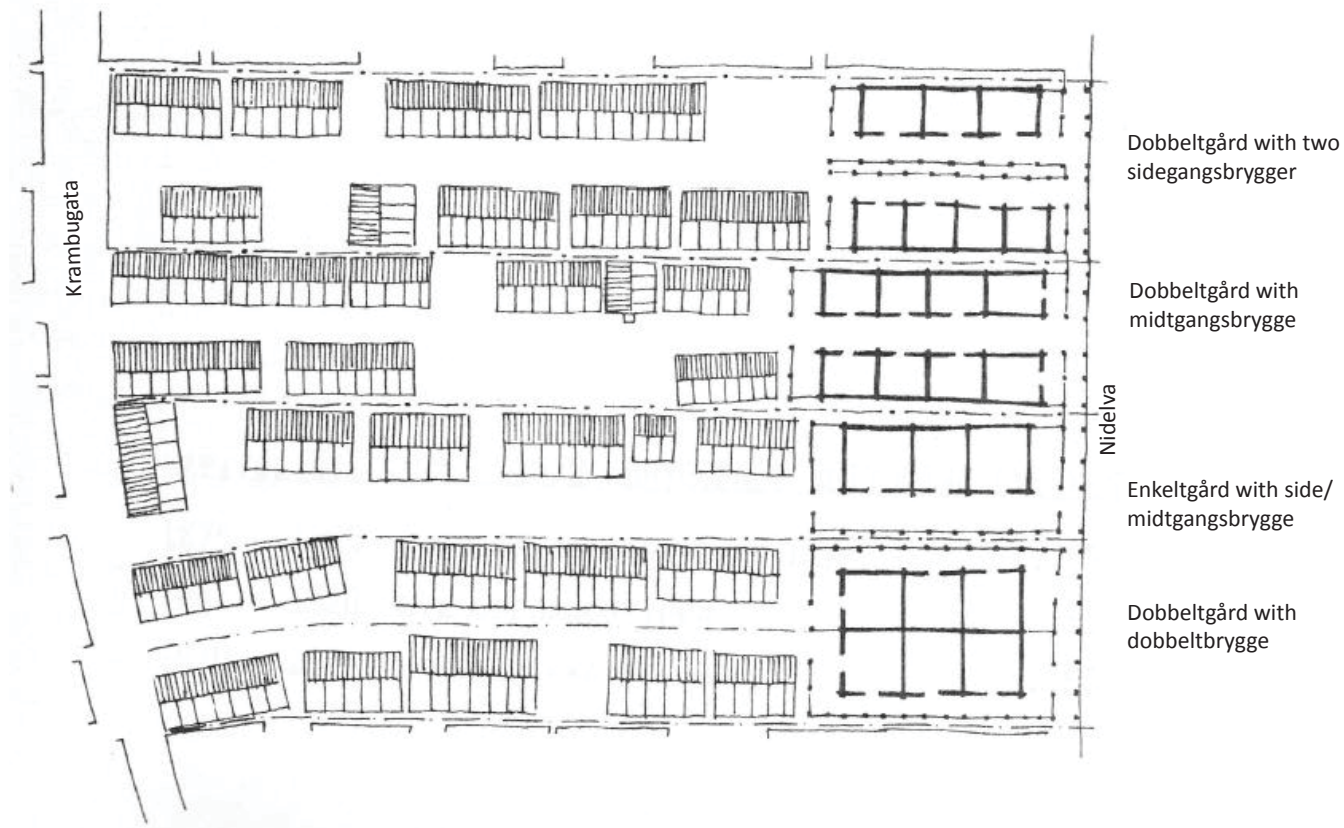
rooms on the upper floors stopped. The reason for this is unknown, but may be associated with the trend that began at the same time, the constant increasing specialization. The old trading houses traded with a wide product range, while most of the firms which started during the crisis years after 1820 were specialised stores with a smaller range of goods. With the range of goods becoming less, the need of the amount of storage rooms became less.

### Bryggetypenes andel over tid



### Sammenheng bredde/plantype





#### What have the brygger evolved from?

>> Dit zijn speculaties/aannemens. >> noemen. Sommige speculaties van Kjell Andresen > naam noemen  
Sommige speculaties van mij

It is interesting to try to find reasons for the development of the four plans types back in time, before the fire of 1681. The available information is unfortunately not sufficient enough for definitive conclusions, but assumptions can be made and probably more questions are raised.

With Cicignons new regulations after the fire, the urban situation for the bryggen changed quite a bit. Whether the brygge plan types changed simultaneously is uncertain, but it is not inconceivable that one still held to the old plan type.

As mentioned before there are indications that suggest that in the Middle Ages the merchant's properties were either *enkelt gårder* - single plots - or *dobbelt gårder* - double plots -, that is to say plots on which the buildings were placed on one or both sides from the passage from the street to the river Nidelva. It follows the question if we can find a coherence between bryggens plan type and the plots and proprietary conditions.

The width of a *gård* must have determined the width of the brygge up to a certain degree, we can assume that a *enkeltgård* must have been almost a house width narrower than a *dobbeltgård*. And that it is more natural to build the houses on the north side of the plot to get the best possible climate at the entrance of the house. It seems logical to assume that this type of *gård* is

connected to the *side/midtgangsbrygge*. This plan type is approximately 6 *alen* narrower than the *midtgangsbrygge* and the aisle on the ground floor is located on the south side.

It seems logical that the *midtgangsbrygge* fits well with the *dobbeltgård*, the passage of the *gård* leads directly into the aisle of the brygge and the plot was therefore used to the maximum.

The *sidegangsbrygge* has distinct characteristics associated with the Bryggen in Bergen, the *svalgang* on one side and the *boder* on the other. The possibility that there is a relation in the development of the situation, function and construction must be present.

The *dobbeltbryggen* are a little harder to explain. They seem to have been built for two users, otherwise the plan was very irrational. Where the users had (the rest of) their property is difficult to say. One possibility was that a merchant with a *gård* further down into the city used one half of the *dobbeltbrygga* with the right of way on the *gård*. Another possibility was that the *gård* divided over its length into two single properties, but that the building layout was retained and such a boundary would divide a brygge like a *dobbeltbrygge* is divided.

The development of the properties as mentioned above can give the building pattern as shown in the figure. It must be repeated that this is an assumption. More research with the help of for example archaeologists could be done.

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Zie tekst uit samenvatting K.A.

Zie ook nog tekst in een van de documentatieboeken

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Dus side/mitgangsbrygge gang aan zuidkant

Sidegangsbrygge gang aan noordzijde...

Waarom sidegangsbrygge aan noordzijde nog iets over zeggen.

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#### Bryggens architectural characteristics

The main feature is that all the buildings without an exception are with the gables to the street and the river. Another important feature is the vertical axis under the ridge formed by the lift ports. The color of the doors of the ports often differs greatly from the color of the cladding and the ports are all inward doors and thereby the doors are set back about 20 centimeters from the wall surface. The ports thereby create a strong shadows and relief in a furthermore sober designed facade. This vertical axis of ports give the façades a clear symmetry.

The symmetry around the axis is usually emphasized by the windows, but this is not always clear. The oldest windows were often placed on either side of the port on each floor. Larger windows which were placed in the last century often break a part of this symmetry.

The vertical lines give the brygge its main feature, but this is broken on the ground floor. On the riverside this is due the *flatbrygga*, since it was closed long after the Brygger were built (more about this in the section 'flatbrygga'), and apparently this was constructed without taking into consideration the type and the location of the older windows in the facade or the type of cladding used in the rest of the facade.

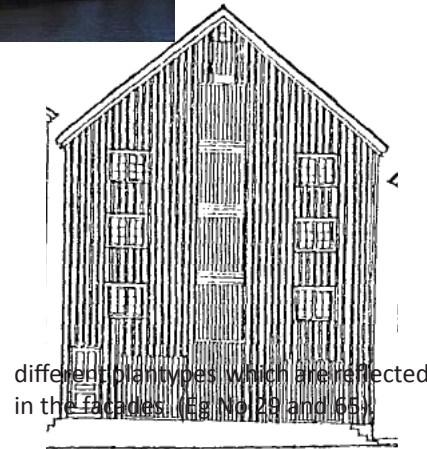
On the streetside the cause of the asymmetry is partly because the brygger have different plantypes which are reflected in the facades - which is a nice feature - and partly because of changes made in the course of time. The changes made range from less visible to very prominent.

The repetitive characteristic facades of all the old bryggen cause the *bryggerekka* to work as an ensemble. Within this ensemble there are many characteristics that create variety:

- The dimensions of the bryggen vary greatly, both in width and in height. Extreme cases of contrast are seen at the neighbors number 21 and number 23.



Hoogteverschillen



different plantypes which are reflected in the facades. (Eg. No. 29 and 65)



Verboouwingen BG

Verschillende dakvormen en hellingen



- The slope and the shape of the roof vary greatly. Between the buildings we find pitched roofs with a slope between 5 and 45 degrees (more about this in the section 'roof').
- Like the color, the panel type is different from brygge to brygge, although the standing panel is the most common.

#### Foundation and basement

The bryggen are partly founded on stone walls and stone stacks on the streetside and partly on wooden piles towards the river. The stone foundation usually carries the major part of the building.

Because of the practical difficulties to get under the bryggen it is difficult to investigate the foundation.

#### Wooden piles

The piles usually rest on the so-called *puter* - horizontal beams which either rest on the ground or on or in the ground or on piles which are rammed in the ground. Many of these *puter* may subsequently be covered by stones, gravel or mud. Often there is a slot in the top of these horizontal beams in order to facilitate the replacement of the piles.

As a result of drifting ice in the river the piles and especially the outer row of piles are strongly subjected to severe wear and the need for a simple replacement of the piles must have existed since the bryggen were founded on piles. Replacing the wooden piles became a routine maintenance.

#### Stone foundation

The stone foundation in bryggen without a basement are not (easily) accessible. From the outside we see that the stone wall is shaped in the form of a ring, inside this ring stone stacks are used as foundation. Inside the ring is completely inaccessible.

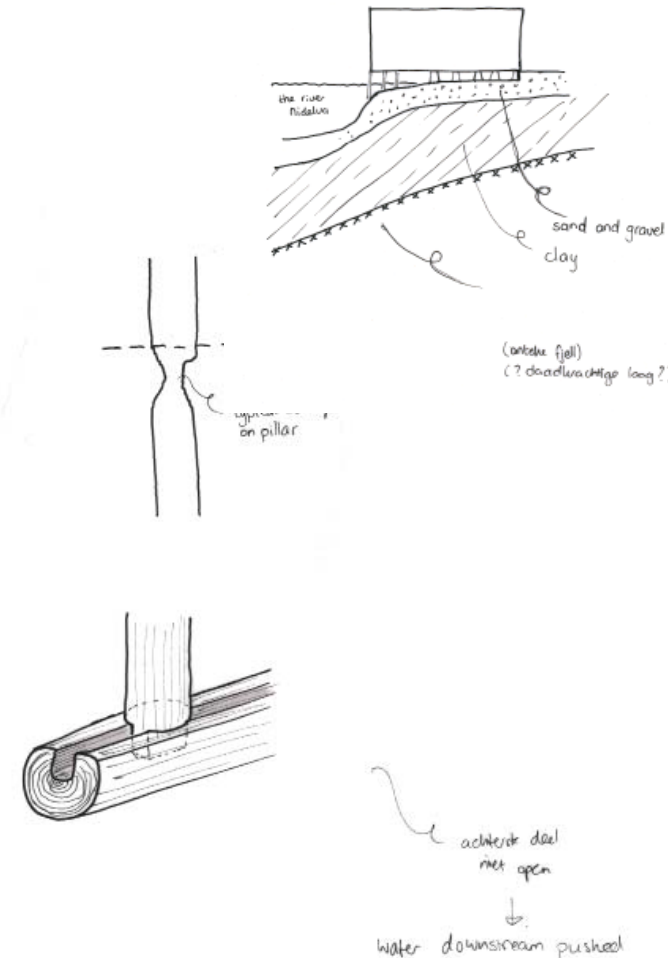
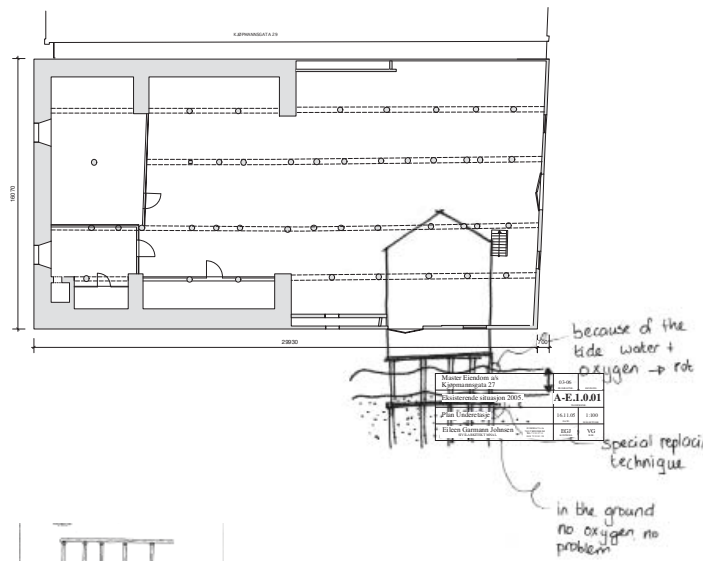
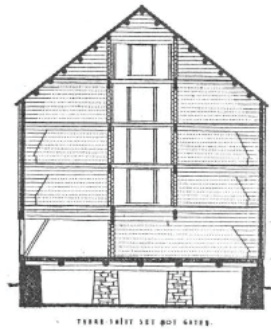
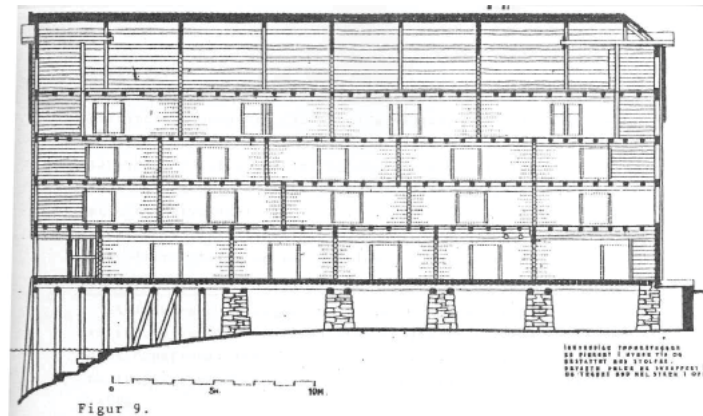
In bryggen with a basement the walls are usually constructed as a dry wall of natural stone in a U-shape with the opening towards the river. Along the walls short transverse walls were built, partly as a stabilizer and to carry parts of the building.

#### Basements

Basements in bryggen were first mentioned in the tax reports of 1846, at that time 11 of the 40 bryggen had a basement. But we only find those in the two southern brygge blocks and only in bryggen built after about 1750. We have little information on how these basements must have looked, but there are indications that many of the basements only consisted of the part in the stone foundation. With later constructions basements under the entire building become common. In the oldest basements an earth covered floor was more common, but in the newer basements a wooden floor became common. It is difficult to say exactly which basements have their original form, as many were later dug out or extended.

In two of the bryggen (No. 21 and 51) parts of the basement wall are a laft construction. Of these number 51 has a sort of double laft wall. Parallel laft walls within about ½ meter and 5 meters long, connected to three short transverse walls. The reason for this construction was probably that they wanted the wall to give sufficient stiffness, the weight of the five upper floors must have been enormous if the brygge was filled with goods.

In bryggen built in the period between 1853 and 1872 (f.e. KG 37) we find in the outside walls of the basement floor on the riverside an unusual construction. On a bottom sill are floor high standing logs, which work almost like a standing laft wall. The walls seem as tight as the usual laft wall. Whether this construction was used because it had special properties with regard to water for example, is unknown. The basements were easily flooded with flood or springtide.



On the streetside there is often a hole in the middle, covered with a shutter, leading to the basement. Through this hole the lift on the streetside could be used to hoist up goods from and to the basement. How old this hole is, is difficult to say with certainty, the shutters are generally cast iron, but that may be a later repair.

#### Floorconstruction ground floor

The floorbeams of the ground floor are always perpendicular to the direction of the ridge of the brygge. The distance between the beams is very small, for a part the beams are even positioned altogether next to each other, particularly in the oldest brygge. In the more recent brygge the younger brygge the heart to heart distance between the beams reaches 40 centimeters.

The floorbeams are supported by a set of one to three main beams, which are positioned crosswise from each other, so the ends of the beams can be next to each where they are supported by the strong walls and columns.

#### Flatbrygge

As there was no street on the riverside of the brygge, there was instead an arcade which formed a foot walk and a quay combined. The so-called flatbrygge connected all the individual brygge, sometimes covering the height difference with steps. It also served as a public passageway along the waterside and it was a popular place to stroll on Sundays. (See also the picture at the beginning of this chapter.)

The flatbrygge can with certainty be traced back to before the fire of 1681, they are probably even much older than this, since it is already mentioned in the city law of 1276. Before the fire the flatbrygge was the only connection in north-south direction between the river and the Krambugata which was 140 metres inland from the river. The flatbrygge therefore must have served as an important connection between the brygge

themselves and possibly also between the merchants properties. After the fire the new Kjøpmannsgata took over much of this function as a connection between the brygge, but the strict rules which came simultaneously made the crew of the ships in the harbour depend on the flatbrygge to warm up their meal, since the use of fire was strictly forbidden on the ships.

Maschius drawing shows the flatbrygge as we can still see it today, but the flatbrygge also continues over vacant lots, supported by stacks of wood. Whether this was maintained after the fire we do not know for sure, but one of the earliest maps (>> see picture) shows that the flatbrygge not only runs over vacant lots, but also continues over the allmenning.

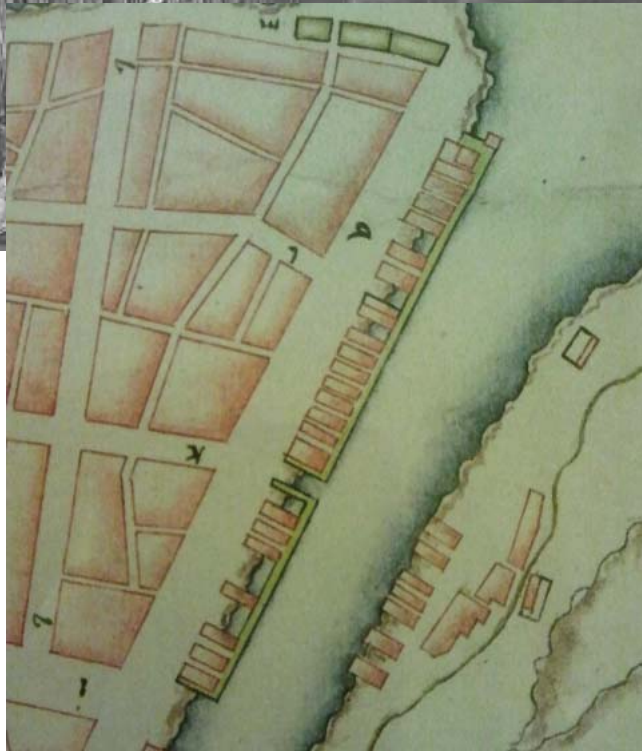
The fact that the flatbrygge was constructed as an open, covered gallery along the harbour is both logical and functional. The contact between the ship and flatbrygge is almost as good as a normal quay - the posts were possibly a little in the way - but it was certainly important that the lift of the brygge could be used to directly hoist the goods from the ship into the building. This was not the case with the brygge in Bergen for example.

Until around 1780 the southernmost building block was for a large part still undeveloped, the brygge in this block were at that time all freestanding buildings. The possibility to construct a flatbrygge in such a situation was both difficult and unnatural. Therefore, no flatbrygge was built in this block, the majority of the sources demonstrate this.

The flatbrygge was partly publicly owned and partly private. The city provided the connection between the Kjøpmannsgata and the riverside - the flatbrygge over the allmenningen - while the open, covered flatbrygge belonged to the brygge and its owner.

The flatbrygge over the allmenningen disappeared with the extension of the allmenningen. The flatbrygge along number 27 and 45 are referred to for the last time in







1797, the flatbrygge along number 51 is referred to til 1817, while the flatbrygge along number 71, 73 and 87 is referred to up to 1837.

Over time most of the flatbrygge were encased by the owners, as a result of the fact that the harbor went out of use.

#### Wall and bearing constructions

The construction of the brygge either existed of some sval walls on the outside and laft walls both in- and outside or sval and laft walls on the outside and a post- and beam construction on the inside.

#### Laft walls

A laft wall is a traditional way of constructing a solid wooden wall of stacked logs.

Essentially, the wall structure of the ground floor and higher were laft walls. In bryggen built in the 1700's, parts of the outer walls were sval walls, but the boder always had laft walls. Why the buildings were constructed in laft walls is probably because of its good qualities, high bearing capacity and high stiffness and good insulation against sudden temperature fluctuations.

In the oldest bryggen roundwood was used in the walls, from around the 1800's the round edges of the logs were trimmed. There are clear signs in many of the bryggen that the carpentry on the lower floors were of a better quality. On the top floors bark can still be found on the wood in different places and seams are less seal tight.

The transition between krysslåft and sinklåft - different ways of joining the logs - (see picture) took place around the year 1800. Kjøpmannsgata 29 can serve as an example for this transition, the building is for the most part constructed in sinklåft, but on the side of the river krysslåft is used. The

krysslåft may have been used to hold the walls together better than what sinklåft can do.

For the laft walls they preferably used straight pine logs that were rich in heartwood. The construction was built very rationally, the lengths of the boder were limited to about 5 - 6 meters. That is due not only to the fact that the logs should be light enough for two men to handle, but also that the mainbeams would sag if the span was longer. Furthermore only 90 degrees angles were used.

To prevent logs from moving away from under each other thick dowels were used about every three meters.

#### Sval wall

Bryggen built around 1760, mostly had a sval on the ground floor both on the street- as on the riverside and also on the first floor on the riverside. Moreover, the outer walls along the side aisle were constructed as sval wall. Around 1760 this pattern begins to change and at the end of the 18th century, the sval was about to get out of use, but sval walls behind the flatbrygge were still built as late as in 1838-1839. After this many sval walls were closed and the sval rooms were used as regular storage rooms.

The bearing elements of the sval walls consisted of an under sill, posts and a top sill. In sval walls cross-wise of the brygge the posts carried the main beams, while the top sill carried the beams if the sval wall was in the longitudinal direction. Often one or more logs were placed between the top sill and the under sill on the floor above.

>>> Figures of svalvegg >> show> "Svalsvegg 3etg i i i star No 53 Utsveifede tiler et bunnsvilen not i."

As the pictures show the boards are placed in a slot in the top and under sill. The boards are usually 7-8" wide and 1-2" thick. (1" = 1 Inch = 1 Norwegian tomme = 2.54 cm) From the end of the 18th century the boards are no longer used in a part of the sval walls but the more solid

tømmerskledning - a type of wood siding pattern - was used on the outside of the frame.

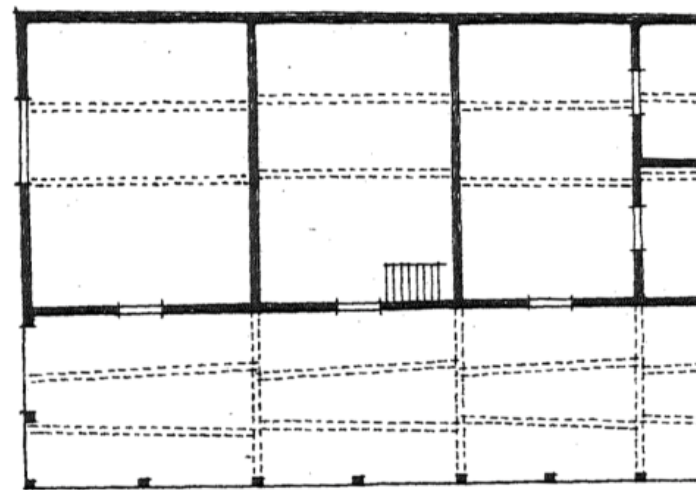
On the street- and riverside - and partly also around the corner in the so-called firebreak between the bryggen - there were holes cut out of the boards (>> see picture). The carvings were pretty intricate and a variety of motifs were used. It seems like the walls towards the street have a simpler design than what we find on the riverside. And it seems that the form of the designs also simplify after around 1770.

The holes in the boards were probably made after two considerations. They needed a certain ventilation for the bryggen and there were in great need of daylight since the use of lights was forbidden.

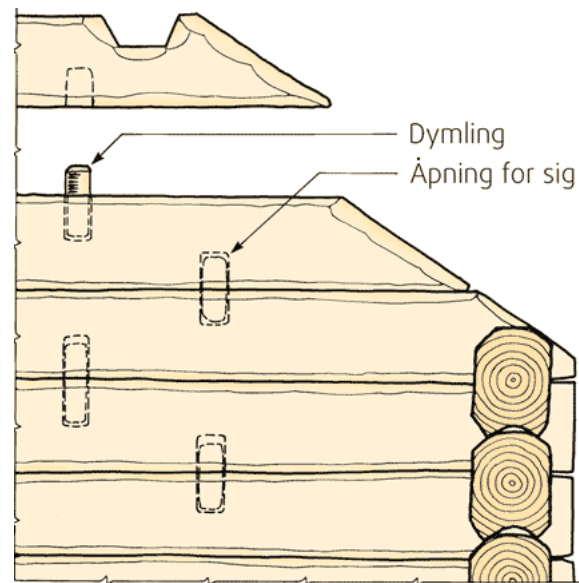
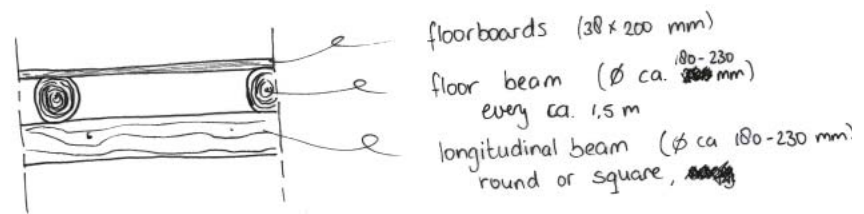
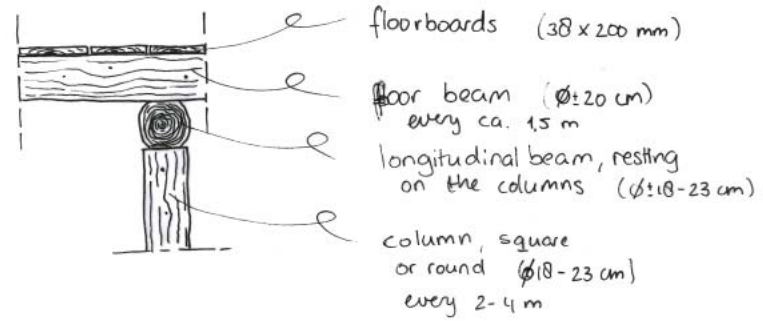
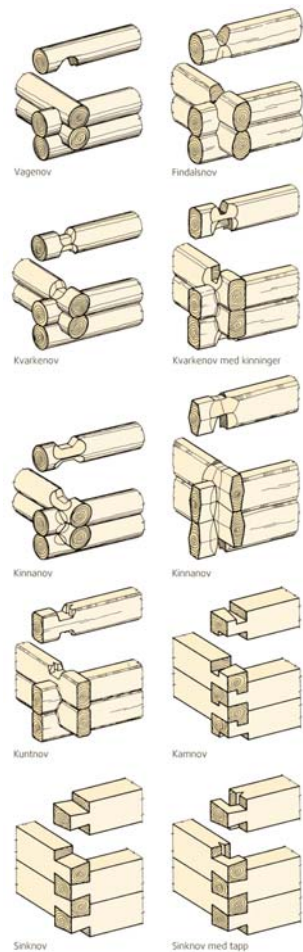
Simpler motifs on the streetside could mean that the riverside was more important back then, which make sense since the activities were twice as high on the riverside than on the streetside in those days. Later this significance seems to change to the streetside if we look at the difference in the cladding on the facades (more about this in the section 'facade'). This could be related to the fact that the brygge were used less and less from the waterfront and more from the streetside.

#### Post-beam construction

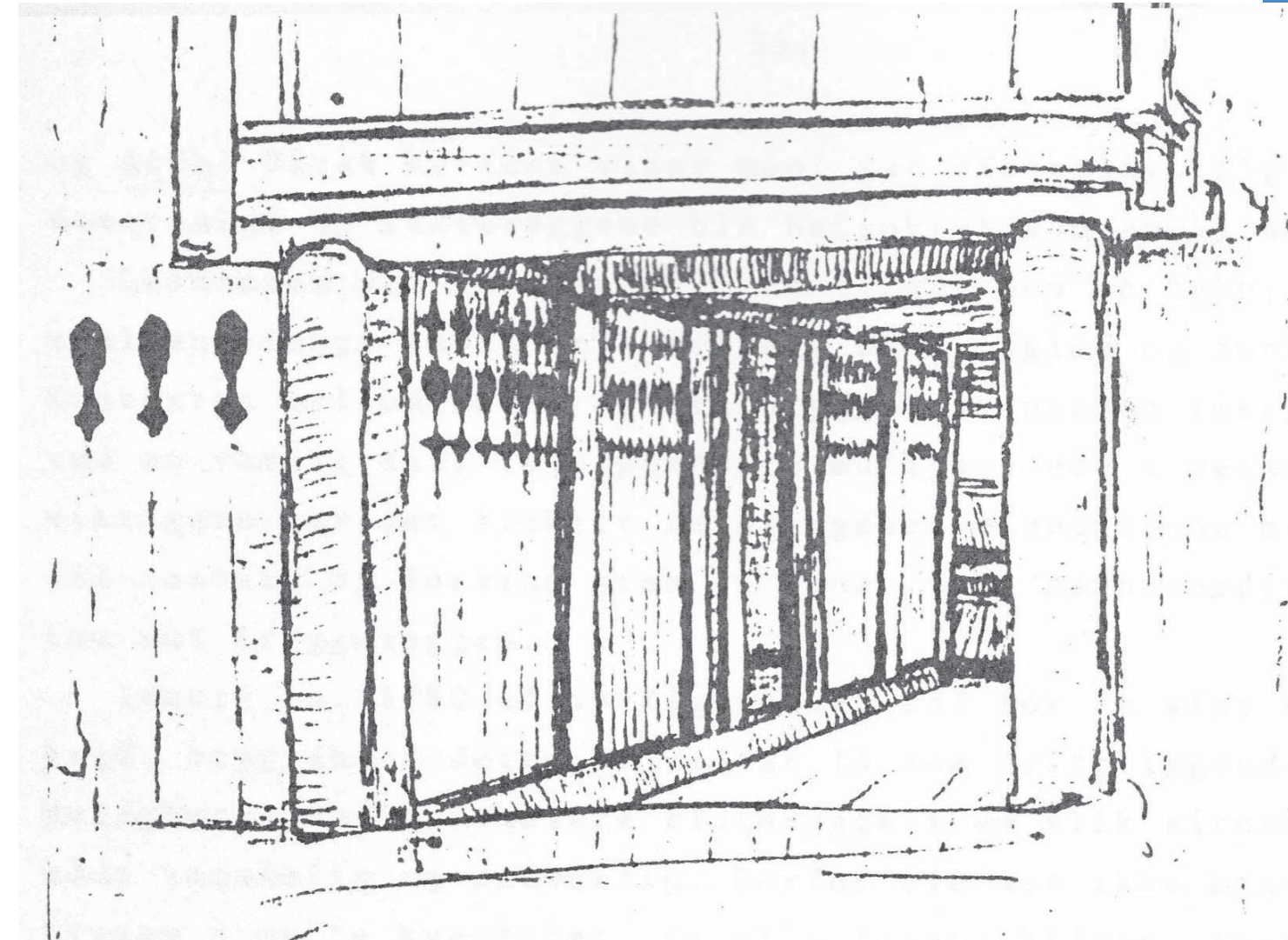
As mentioned before they stopped building storage rooms on the top floors throughout the 19th century. As an internal bearing construction posts and beams were used. The posts were placed in a grid of 2-3 metres and were either round or square with a diameter of about 18 - 30 centimeters, depending of the floors. If we look at the floorplan of Kjøpmannsgata 27 - of which the ground floor were boder with laft walls and the top floors had a original post-beam construction - you can see that posts were positioned above the laft walls and the posts in the middle of the storage rooms. The posts were not constructed on top of each other, the floorbeams or an extra block of wood plus the floorboards were placed

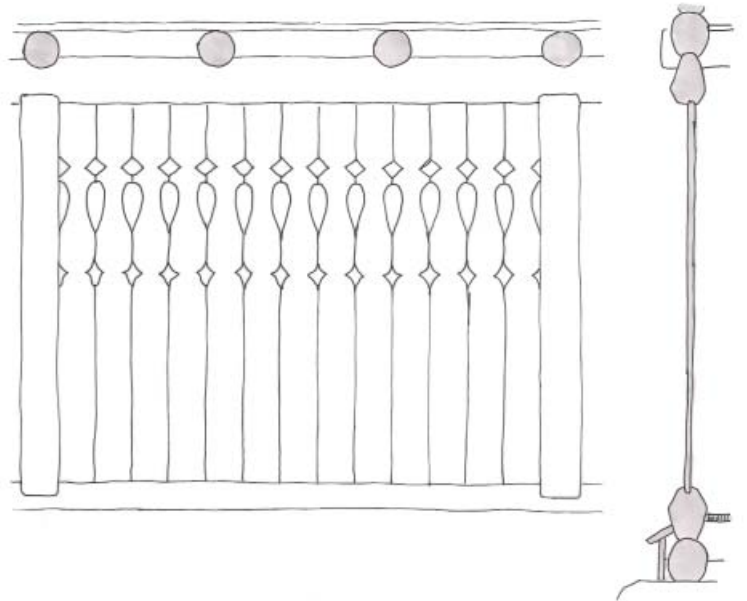
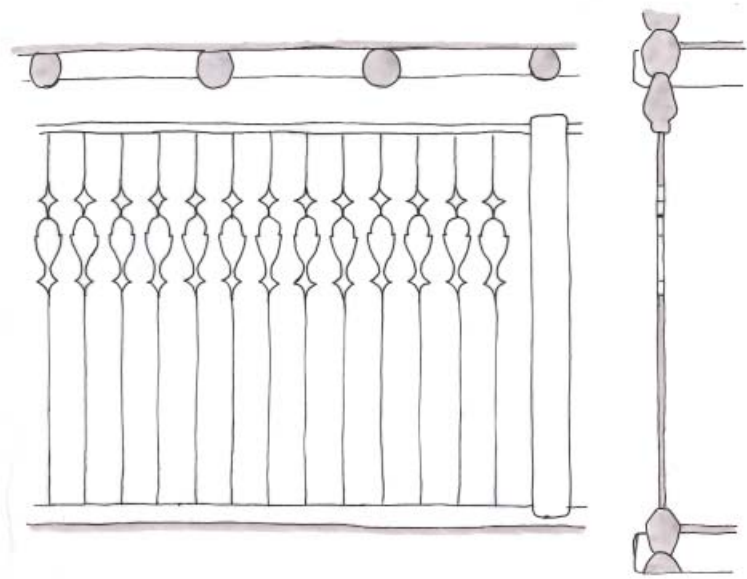
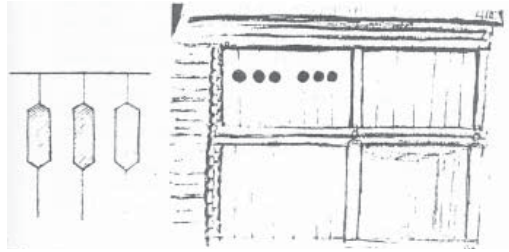
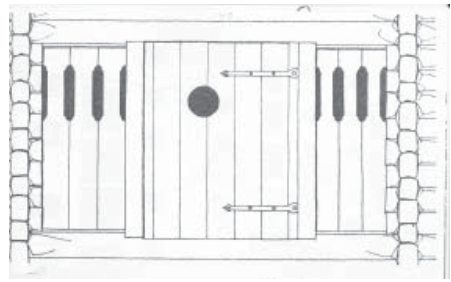






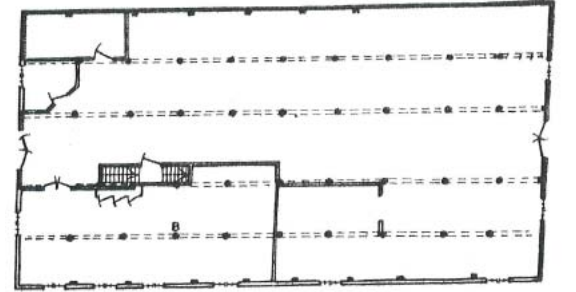
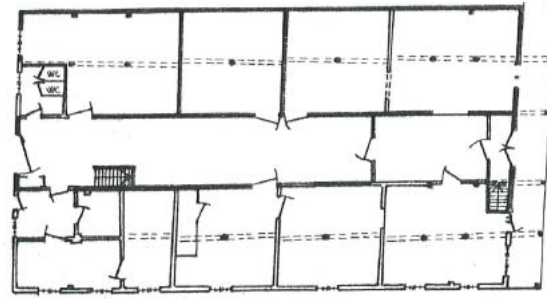
Plus nog die scan!!!!





veinger mit 1943.  
(# 37).

SVALSVEGG NR 81  
(1:20 ?)





between the two posts.

In a later stadium a lot of original laft walls have been removed and replaced by posts, but more about this in the next chapter.

During the reconstruction of the Kjøpmannsgata 37 they found a layer of 1 centimeter of salt between every connection, every post and beam. What this layer meant as protection? Maybe it was to absorb moisture to prevent it from going in the head of the post.

### Façade

As mentioned before the form and layout of the facade comes forth out of the function and plan type. The oldest bryggen were traditionally not clad, the laft wall was visible on both inside and outside, but nowadays the bryggen are covered with cladding on the outside.

### Cladding

Cladding was first mentioned in the tax reports of 1766 (>> bron erbij). From 1846 on all walls on the streetside were clad, the other walls were clad to a lesser extent, but the number grew from 1846 on. It could be either for prestigious reasons and/or climatic reasons that the bryggen were clad on the streetside before the riverside.

An important result and reason to cover the buildings with panels was that it offered a significant opportunity to follow the foreign examples. It was difficult to apply European styles on a traditional laft wall. With cladding it was easier to copy styles. Furthermore a reason to use cladding was that it was easier to paint on and thus a good way to show the name of the owner or company or to advertise the goods for sale.

The cladding used on the longitudinal walls only had a climatic purpose. The cladding - *stående supanel* - of the brygge at number 57, 61 and 63 were orientated so that it could best endure the precipitation from the west, the prevailing wind direction. The cladding can still be seen

at number 57.

The type of cladding was different from brygge to brygge, but the vertical panneling was the most common.

> zie tekening die ik nog moet scannen

On the riverside there are some buildings of which the lowest 1 - 2 meters have horizontal cladding, this is sometimes referred to as a skirt. This skirt made it easier to replace planks in case of rot, only the lowest planks had to endure water during high or spring tide. With vertical cladding you would need to replace a whole row of planks, with the skirt only the lowest planks. Furthermore the vertical cladding would absorb more water because of the direction of the fibres in the wood. These skirts are mainly found at the bryggen of the most southern block, since those were the ones without the flatbrygge.

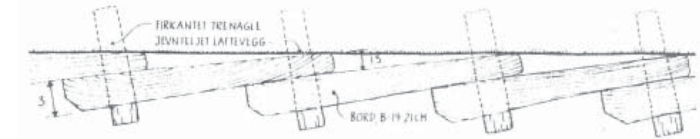
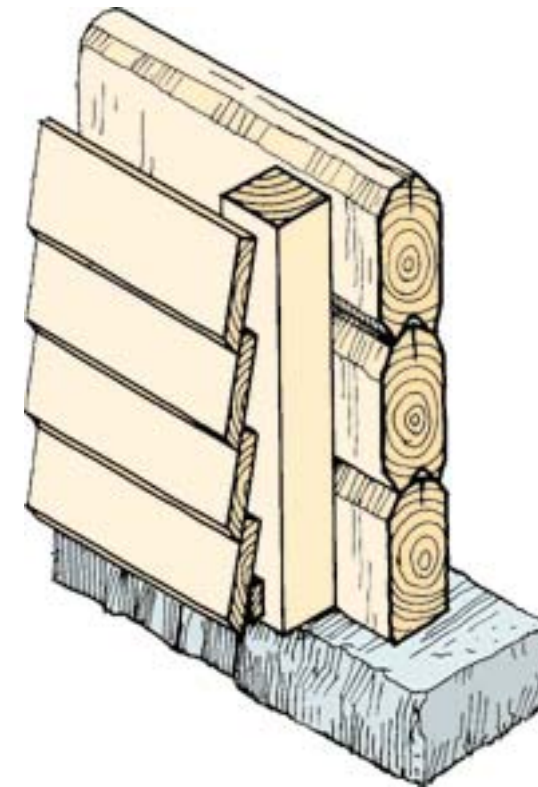
### Color

Like the type of cladding, the color were different from brygge to brygge. Red and yellow dominate the brygge today, but was it the same at the end of the 19th century?

It seems that color did not come simultaneously with the start of the use of cladding. Like the cladding, it seems that colors were used on the streetside before the riverside. If we look at Kjøpmannsgata number 13 today we see that the streetside is painted yellow, while the cladding on the riverside still has the dark brown wood.

If we take a look at the collection of old color-photos, we see the colors of cladding change every other decade, but the colors red and yellow dominate throughout the century. Since they started painting buildings in Norway in the 17th century red and yellow were the most common colors. These were natural and therefore the most cheap colors to use. Although the use of yellow as an external color dates back only since the 1850's.

If we take a look at the brygge nowadays we see that the



Plus nog die scan!!!!



windowframes and the ports are painted in the same color, most often in white and therefore contrasting with the color of the facade. If we take a look at older pictures we see that white was not used that often. But also back then the color of the windowframes was the same as the ports and different than the rest of the facade.

Did the bryggen have any colors before they started using cladding? Although the oldest pictures we have are in black and white it seems that the bryggen all had the same dark tint on the picture, thus it seems they were all the same dark wooden color. Of course this is a assumption. The brygge were also not treaded with tar, because of the risk of fire, before the big city fire of 1681 the brygge were treated with tar.

No color research has been done on the brygge of the Kjøpmannsgata (as far as I know), but intensive research has been done on the Bryggen in Bergen (bron noemen). That research showed that the old laft walls of the warehouses i Bergen were actually decorated on the outside. And a test showed that in the 1800's 14 of the 20 warehouses were painted white. Even the interiors of the bryggen were painted, but part of these bryggen were also the living spaces of the merchants. It seems that the interior of the bryggen in Trondheim were not painted in the 18th - 19th century, but these served only as storage space.

### Roof

The slope - between 5 and 45 degrees - and the shape of the roof vary greatly between the different brygge, this changed over time.

### Form

The roof with the ridge in the east-west direction was predominant in the row of bryggen but the shape of the roof changed over time. You can tell from the shape of the roof when it was built approximately. Until 1845 the pitched roof was the most common but you could find some half-hipped roofs on the streetside. The roofs were

mostly steep, the slope was between 30 and 50 degrees. From 1845 until about 1925 all the roofs that were built were half-hipped on both sides. This had to do with fire regulations, with a half/hipped roof spark were less likely to get caught under the roof.

The same building regulations from 1845 also set the maximum height of the bryggen to a maximum of 23 alen (ca. 14 metres) from the street til the ridge. Most of the bryggen from 1850-1860 have the above-mentioned height and the result was that the slope became less when the width of the building plot increased.

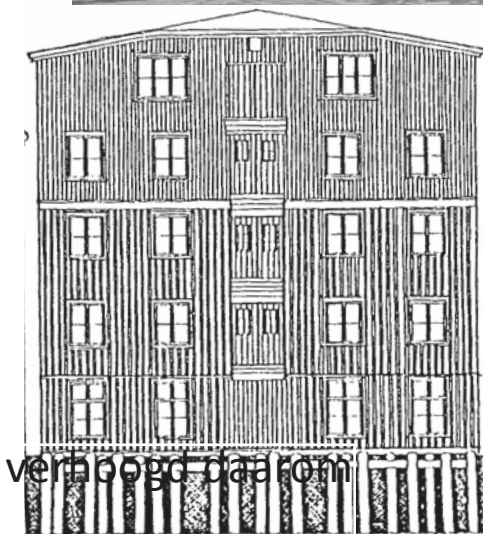
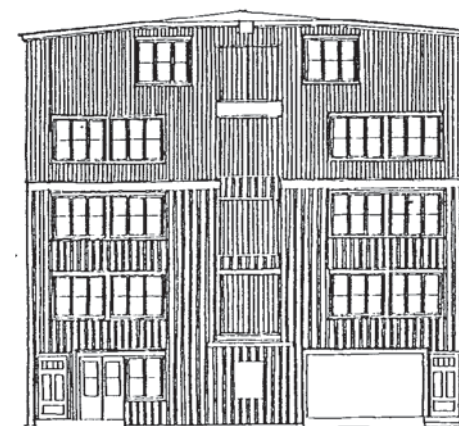
We can also find some very gently sloping, almost flat, roofs. In the guide of 1000 years Architecture Trondheim we can find the following about the brygge in the Fjordgata: *"Many had two timber-framed floors added just after 1900, when they acquired their characteristic building form with very gently sloping half-hipped roofs."* This can also be the case in the Kjøpmannsgata where some buildings have also been raised; although the building has been demolished, number 43 was a good example of this.

Still a bit of a mystery are the small extension we find on top of some of the roofs (>> see picture). Since none of these buildings still exist, it is almost impossible to check what they were made for. It is likely that these extensions were used to gain extra height for the wheel of the lift installation. The length of the extension and the position on the roof seem to correspond with the general position and diameter of the wheels. There is also an example of a brygge along the Fjordgata where the wheel is sticking through the floor below. These roof extensions could be the wheels sticking through the roof. From the pictures and drawings we have these extensions only seem to be constructed on the waterside, but since this was the side where most of the (hoisting) activities took place, a wheel with a bigger diameter was lighter to handle than a smaller one.

## Verskillende dakvormen en hellingen



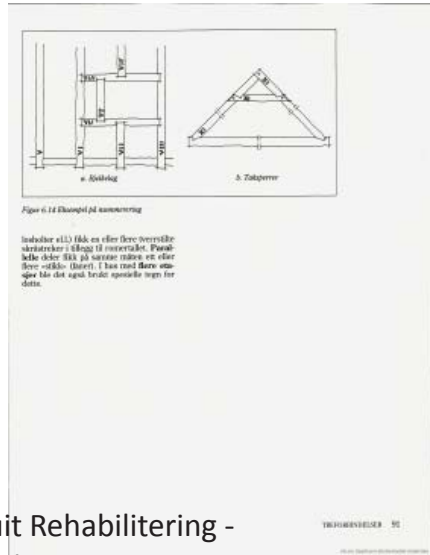
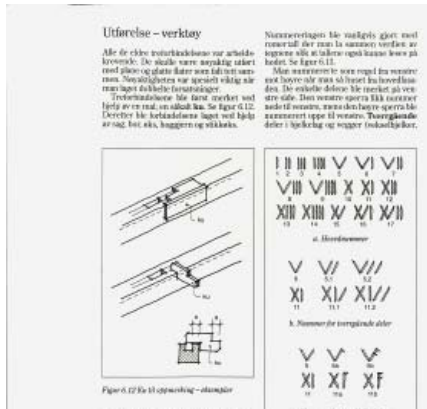
## roof extensions



Nummer 43 lijkt te zijn verhoogd daarom zo'n plat dak.



astak KG 73



Sperretak KG 29



FELMARKEN uit Rehabilitering -onstruksjoner i tre

### Construction

In the oldest bryggen the *åstak* is the most common roof type (>> see picture), the transverse walls on the top walls are built til the roof and these walls support the beams - the *åsene*.

At the beginning of the 19th century, the transition of *åstak* to *sperretak* took place, brygge number 29 represents this transition. The rafters support the beams - the *sperrene* - partly directly and partly via a roof-beam on both sides of the ridge. The distance between the *sperrene* was only 1-1 ½ meter, this distance was subsequently increased up to about 3m. The rafters in the bryggen from the years 1850 and 1860 are slightly different, but all have a collar beam and columns that rest on the row of columns on the floor underneath. All the *sperretak* have secondary purlins and roof tiles were already in 1766 the most widely used roofing material.

### Tally marks

Tally marks were found on the roofbeams in Kjøpmannsgata 37 (1865-1870), this indicates that these rafters have been prefabricated on the ground and marked. But these marks were also on a post-beam construction on the ground floor of Kjøpmannsgata 23 (1858). In which period they used this method is to be investigated further.

### Ports and windows

Until about 1900, the *labankporter* (>> nagevraagd bij Noren,wacht op antwoord) were the most common in the *bryggerekka*. Another similarity was that all ports open inwards.

### Ports on the street side

The oldest port which was documented, was measured in 1943 in the KG 87 (see figure ...), the year 1697 was marked on the backside. As the figure shows, it is a port consisting of one door, clad on the outside with profiled boards. It seems that the ports with one door were the most common on the streetside. Number 57 - which is

still standing today - has the oldest existing ports, also consisting of a single door.

It seems that most ports on the streetside in the oldest bryggen were lined with boards in a herringbone pattern. From old photos we can see that number 17, 33, 41 and 53 have had such ports. All these ports were richly decorated with wrought iron fittings.

Bryggen built at the end of the 18th century and later, had simpler ports, only clad on the outside with narrow cornices that were often simply profiled. At the same time ports consisting of two doors became more common and from 1850 on these were the most common.

Ports from 1850's and 1860's are for the most part clad on the outside with a frame filled with horizontal boards with a profile on the bottom. As with the ports from the 1700's, the cladding also works as a stabilizer, the door is in principle constructed cross wise.

### Ports on the riverside

Of the ports on the riverside in the oldest bryggen there are no signs of cladding on the outside, not even simple cornices. Often the pattern of the holes in the planks of the sval wall is used in the port aswell. The ports along the flatbrygga were removed, in most cases, when the flatbrygga was closed.

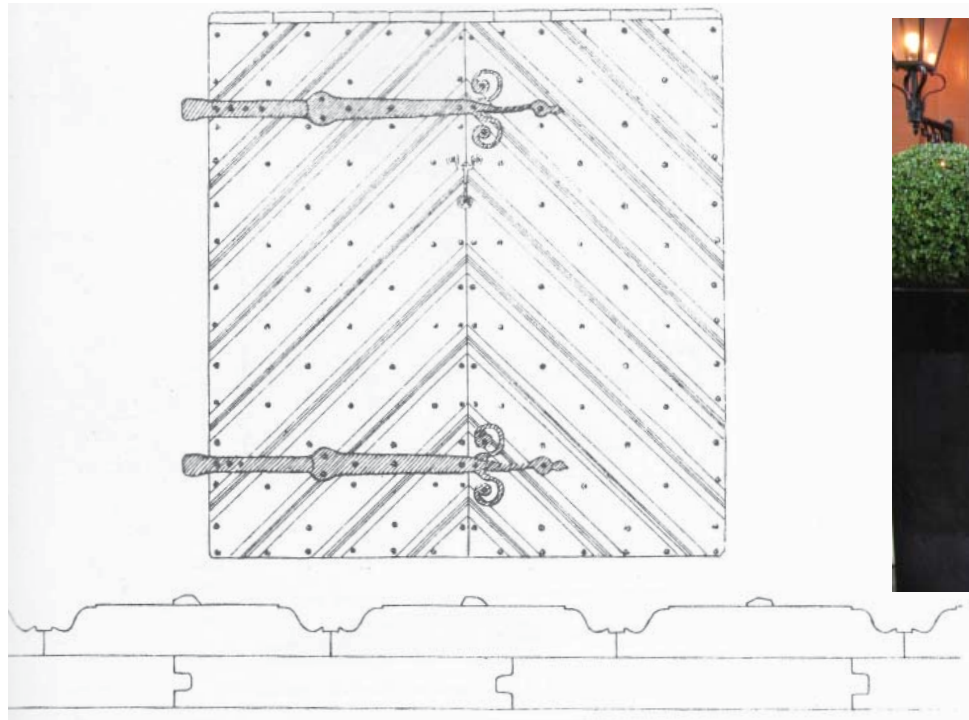
Later in the 18th century and further on into the 19th century, there is no essential difference between the ports on the street side and the ports on the riverside.

### Interior ports

A few interior doors from different time periods are still preserved. There is little difference between them in execution, they are all fairly simple *labankporter* (>> wacht op vertaling), only one exception is a door consisting of two parts.

The oldest bryggen had high threshold in front of the





KG 23

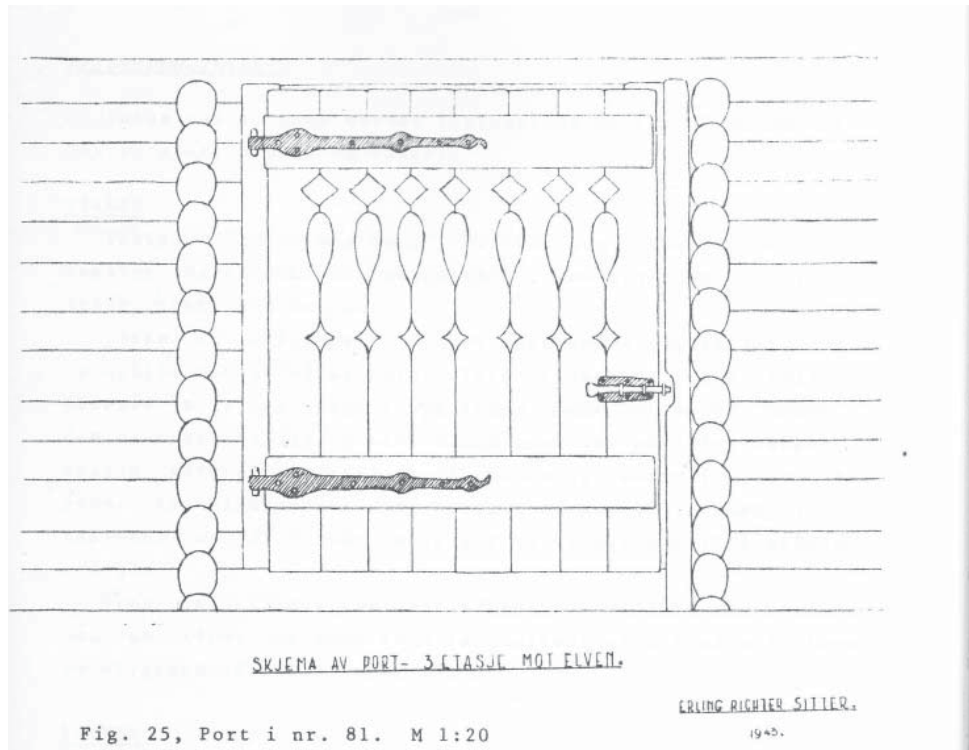
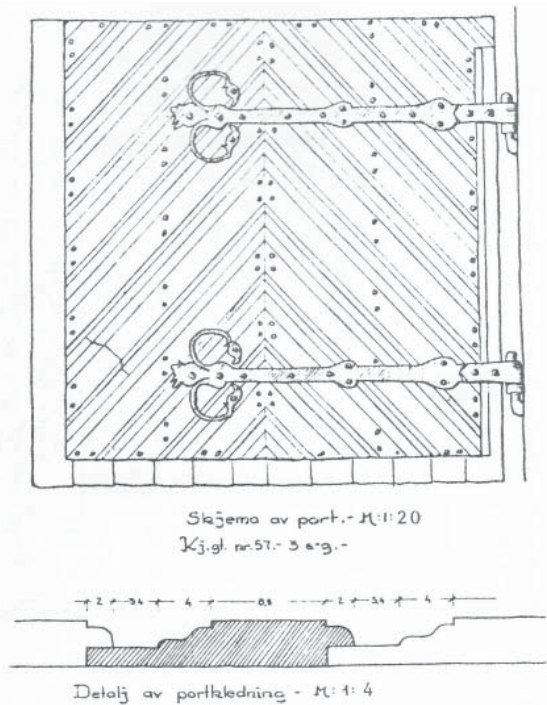
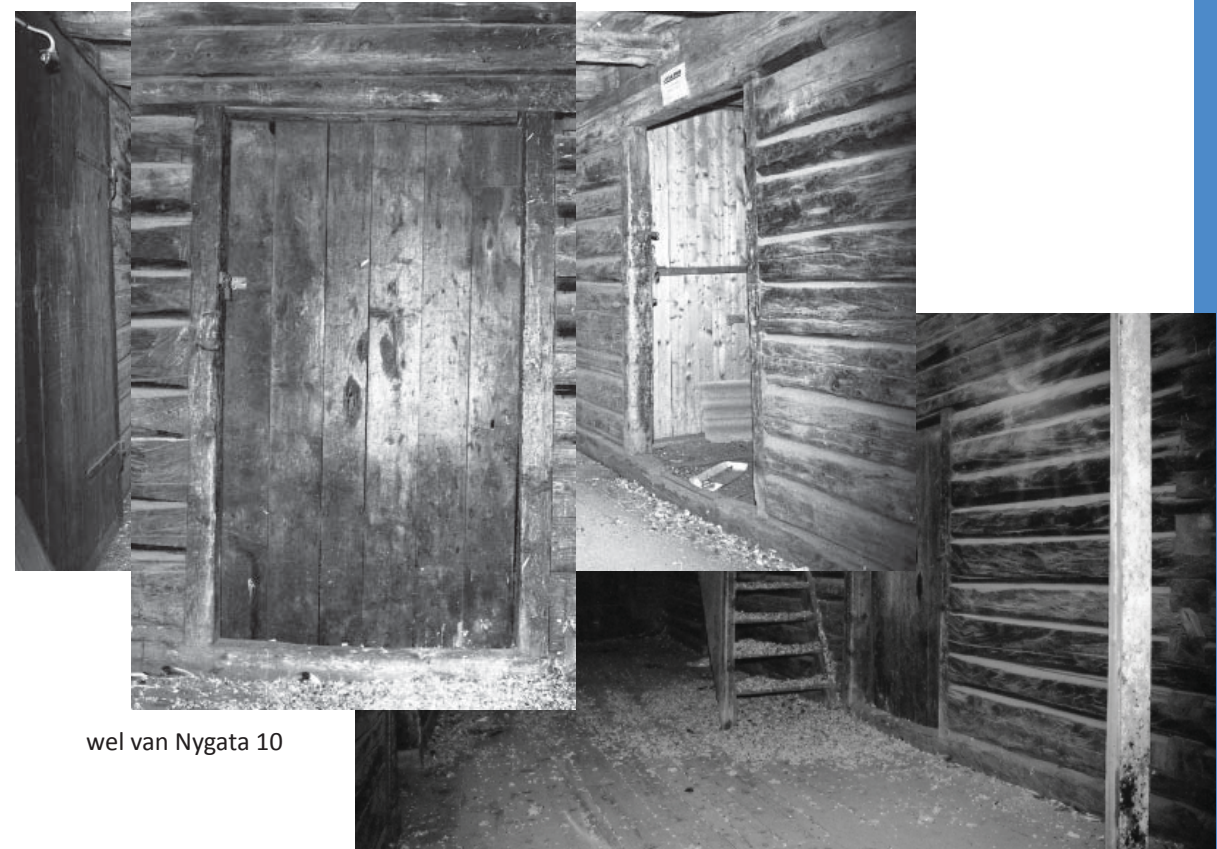


Fig. 25, Port i nr. 81. M 1:20

ERLING RICHTEH SITTER.  
1945.



wel van Nygata 10



Let op openingen >> erg klein  
En sommige al grotere ramen met kozijnen

Check verschil eerste 2 panden!!!!  
KG 63 en 65



boder - the storage rooms - which now for the most part have been removed. Of all time periods, we find narrow stolpebeitskier - the vertical part of the door frame.

In some brygge we can still find numbers which were painted above the boder. Furthermore we find wrought iron hooks.

#### Windows

There is not a lot of information to be found about the windows. But two old photos of Kjøpmannsgata 63 and 65 can tell us about the development of the windows. The oldest photo is from around 1880-1890 on which you see that KG 63 and 65 only had some holes in the facade probably serving as ventilation for the stored goods. On the more recent photo - date unknown - you can see that these holes have been extended and a windowframe has been inserted. This transition probably started taking place from the 1850's, on the oldest photo you can see that KG 67 already had windowframes.

On the streetside some windowsills are even decorated.

#### Lifting installation

That the riverside was used more intensively is also illustrated by the fact that many of the bryggen had more primitive lifting installations on the streetside until the latter half of the 19th century. The lifting installation was first mentioned in the tax reports of 1766, there were two different types, *takkel* - the tackle - and *vinner* - the wheel.

#### Tackle

The *takkel* - the tackle - was the most common lifting system on the streetside, there was only one case where it was used on the river side. The tackle preferably had several pulleys, fixed in the building or where the load hung.

How long the tackle has been in use we are not sure, but the wheel was not installed on the streetside in many of the bryggen as late as in 1867.

#### Wheel

The *vinner* - the wheels - we find in Trondheim are of a unique kind, completely different from those we find in Bergen and those which are common along the coast.

Probably the oldest wheel we can find in the Kjøpmannsgata 13 (see picture). The wheel is placed in the center aisle on the attic, under the ridge towards the river. A 30 centimeter thick shaft is mounted in a standard. In the middle this shaft had a bigger diameter where the chain was wrapped around. The chain runs along the upper side of a slanting jib, through the external wall and over a small wheel at the end of the jib. On the other end the jib is fastened to the roof beams so it will not tilt when the chain is loaded.

The wheel has a diameter of 3 meter and has a construction of four spokes fastened in the shaft. The wheel consists of three layers of curved planks so it has sufficient rigidity. Around the wheel forks are mounted through which the rope runs with what the workmen hoist up the load. The forks have a V-shape so that the rope will not slip out. Wheels of this type and size could be found in more bryggen, of which some are still preserved.

The first thing that seemed to have changed in time was the design of the spokes. The spokes now come in pairs, as seen in brygge number 63 (see picture).

Also the jib seem to have changed over time, the oldest bryggen had a relatively short, slanting jib. Later, in brygge number 29 for example, we find a longer boom, but it is still slanted and the chain runs along the side of the jib. Bryggen built after 1830 all had horizontal booms that were on the side of the shaft.

In the tax reports from 1867 a hydraulic lift is mentioned for the first time in number 69 and 71. After this the machine-driven lifts completely took over, but til as late as after the war, people can remember seeing the manually operated



hoist still be in use at number 63. The machine-driven lifts partly use the old jibs, but in many cases new a new jib was constructed. These are often sticking through the half-hipped roof in an angle and are covered with metal plates such as the Building Act of 1845 and 1869 required.

Some brygge with pitched roofs had an extension of the ridge, probably to protect the jib against the weather, as we find on many warehouses in Trøndelag. But these extensions were forbidden and removal was demanded according to the building regulations of 1845, probably for the same reason as the change to half-hipped roofs, it decreased the change of sparks getting caught under the roof. We can still see such an extension at number 11, which is probably a more recent version. The other

bryggen show a wide variety of ways to protect the jib, which is sticking through the gable one time or through the half-hipped roof the other time. A special case is brygge number 81, which is unfortunately not existing anymore, since this brygge was a *sidegangsbrygge* - the plan type with the aisle on the side on each floor - the lifting installation had to be positioned above this aisle and thus the ports. Since the ridge of the roof was in the center of the building an extension was needed for the jib which gives a different facade. At the present day none of these can still be found on the Kjøpmannsgata.

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>>> Zelfs gevels met 2 rijen poorten > zie oude foto KG 77



KG 63

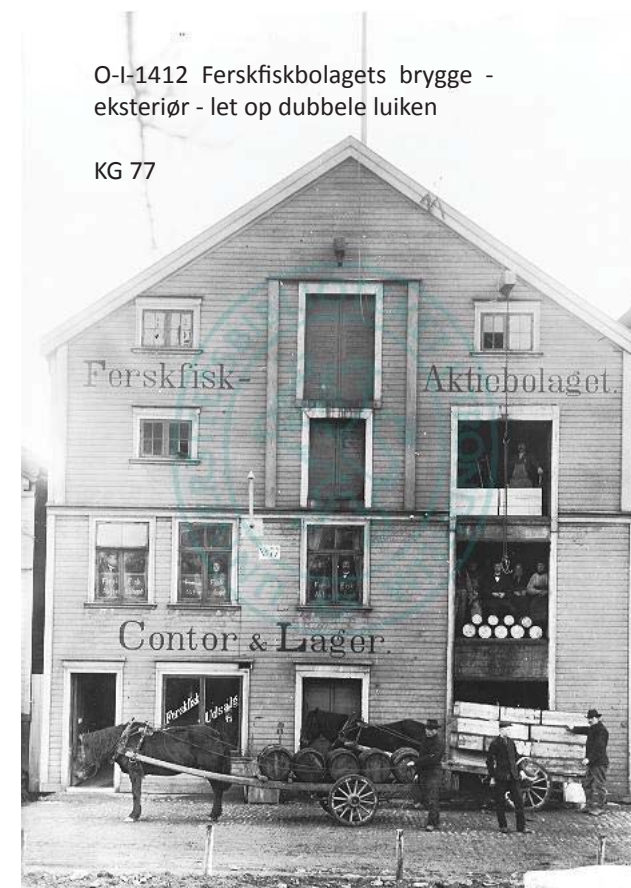
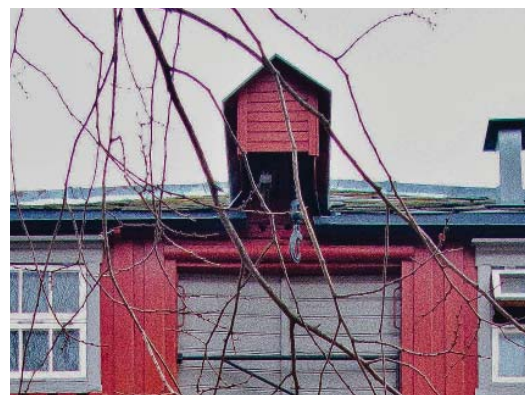


KG73



KG13





O-I-1412 Ferskfiskbolagets brygge -  
eksteriør - let op dubbele luiken

KG 77





## PRESENT (Past 50 years till now)

Brygger were buildings that belonged to a time when all transportation of goods of importance took place by sea. With the transition to transport over land many brygger became ?\*cultural.

Wat komt er in dit gedeelte?  
Hoe is het opgedeeld in welke delen??

-----  
>> Wat is logisch...

> Eerst uitleggen waarom de panden zo belangrijk zijn  
> Dan uitleggen dat er zoveel vacancy is en deterioration ook op straat

Dan meer inzoomen  
> Hoe straat nu > Wat zijn de problemen  
> Hoe gebouwen nu > wat zijn de problemen?

> Debat. En dan afgelopen 50 jaar, wat doet de gemeente... wat is hun mening. Enz.

>>>> moet het debate stuk niet juist achteraan in dit hoofdstuk? Eerst de situatie uitleggen en daarna debate?  
<<<<<





## FUTURE

Wat komt er in dit gedeelte?  
Hoe is het opgedeeld in welke delen??

..  
..  
..

DESIGN?!?!?



## SUMMARY & CONCLUSION

RECOMMENDATIONS



## REFLECTION

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Zie sowieso Endnote voor alle overige bronnen!

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[14 maart] > noors

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## APPENDIX

- kaarten?
- tekeningen?
- overzicht huidige gebouwen KG, plattegronden (oude, huidige?), fotos, ...
- > panorama van gevels
- > grote overzichts - uitvouw kaart??
- oude foto's?

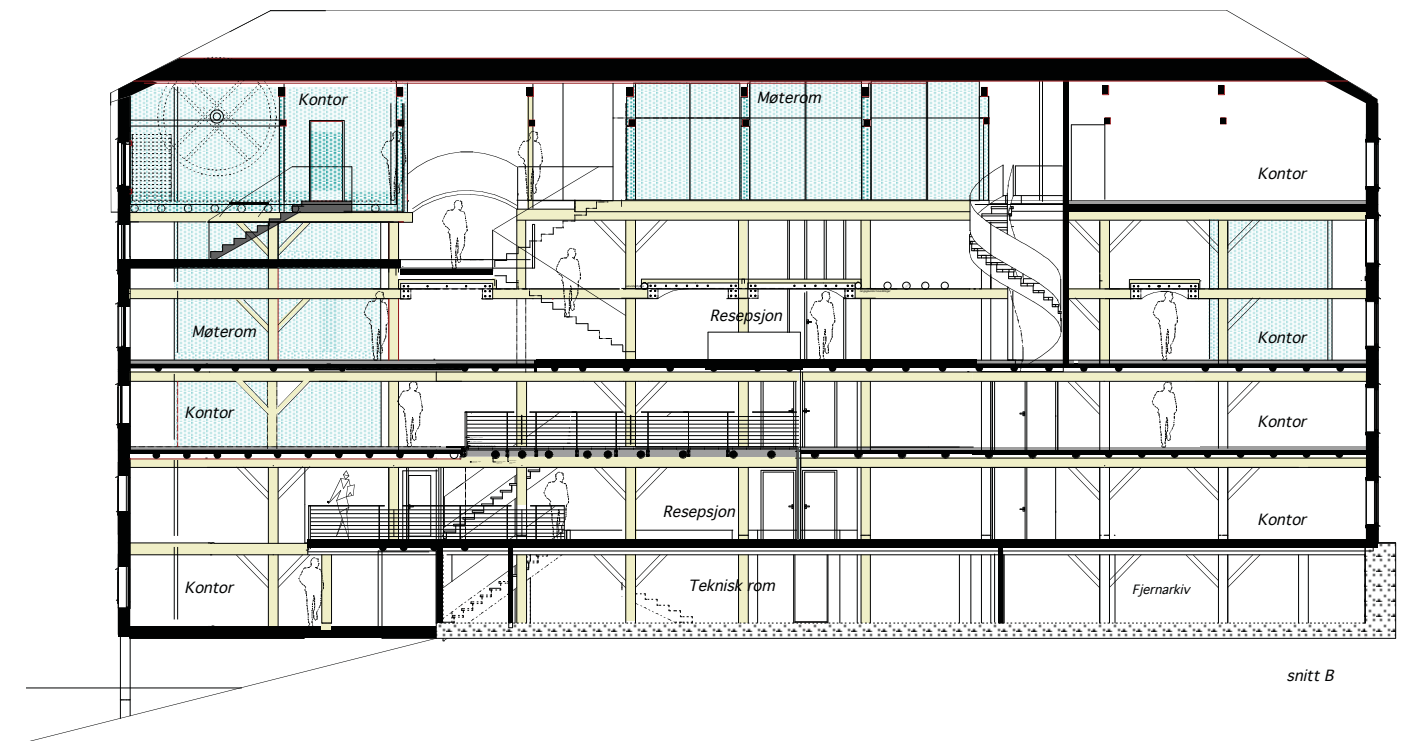
- masterplan?

>>> Alle gevelaanzichten

Alle plattegronden???

- ...

Gedetailleerd kaart van de straten rondom de bryggen of heel Midtbyen?



snitt B



TRONDHEIM, EN SOMMERDAG 1859