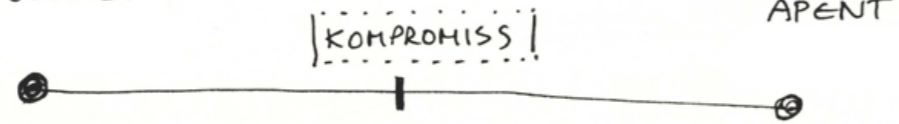


prosess

NYTT POLITIHUS BERGEN

*Prosess for masteroppgave
Vår 2015, NTNU
Student: Cecilie Grundt
Veileder: Per Monsen*

LUKKET



KOMPROMISS

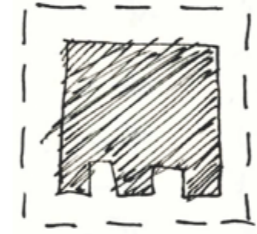
ÅPENT

Hva er
balansegangen
mellom sikring,
åpenhet og
tilgjengelighet?

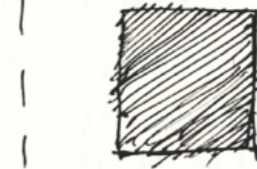
1)

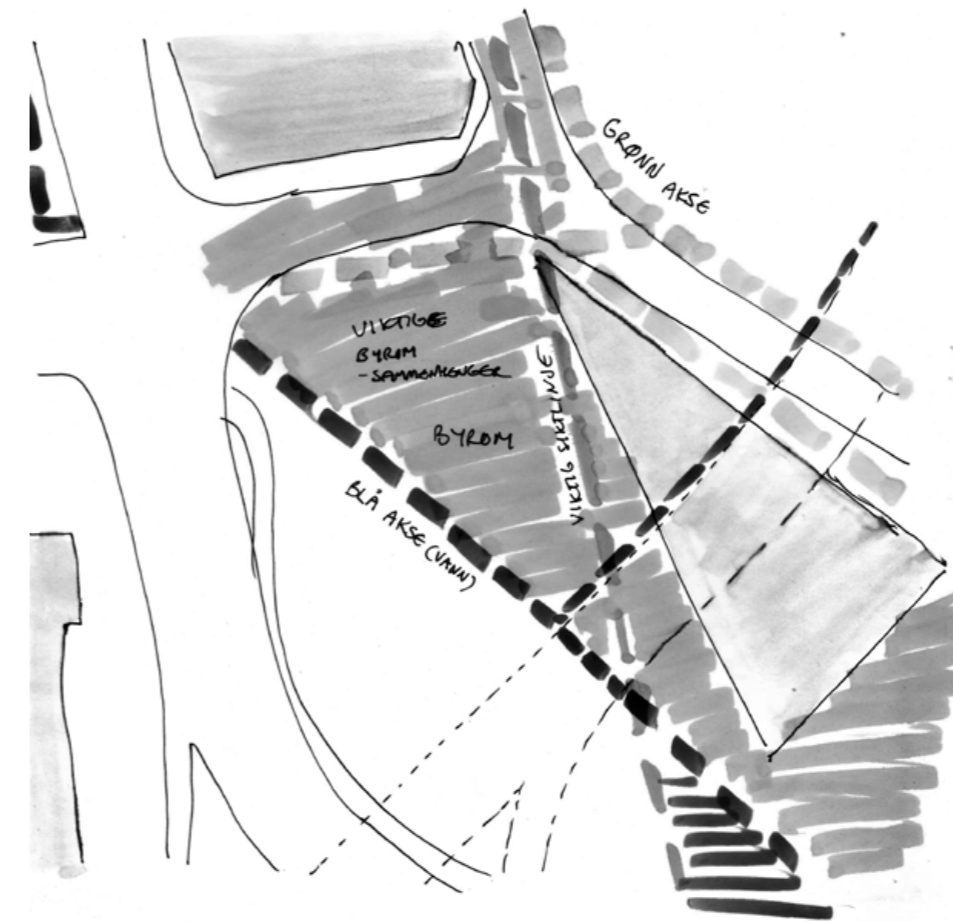
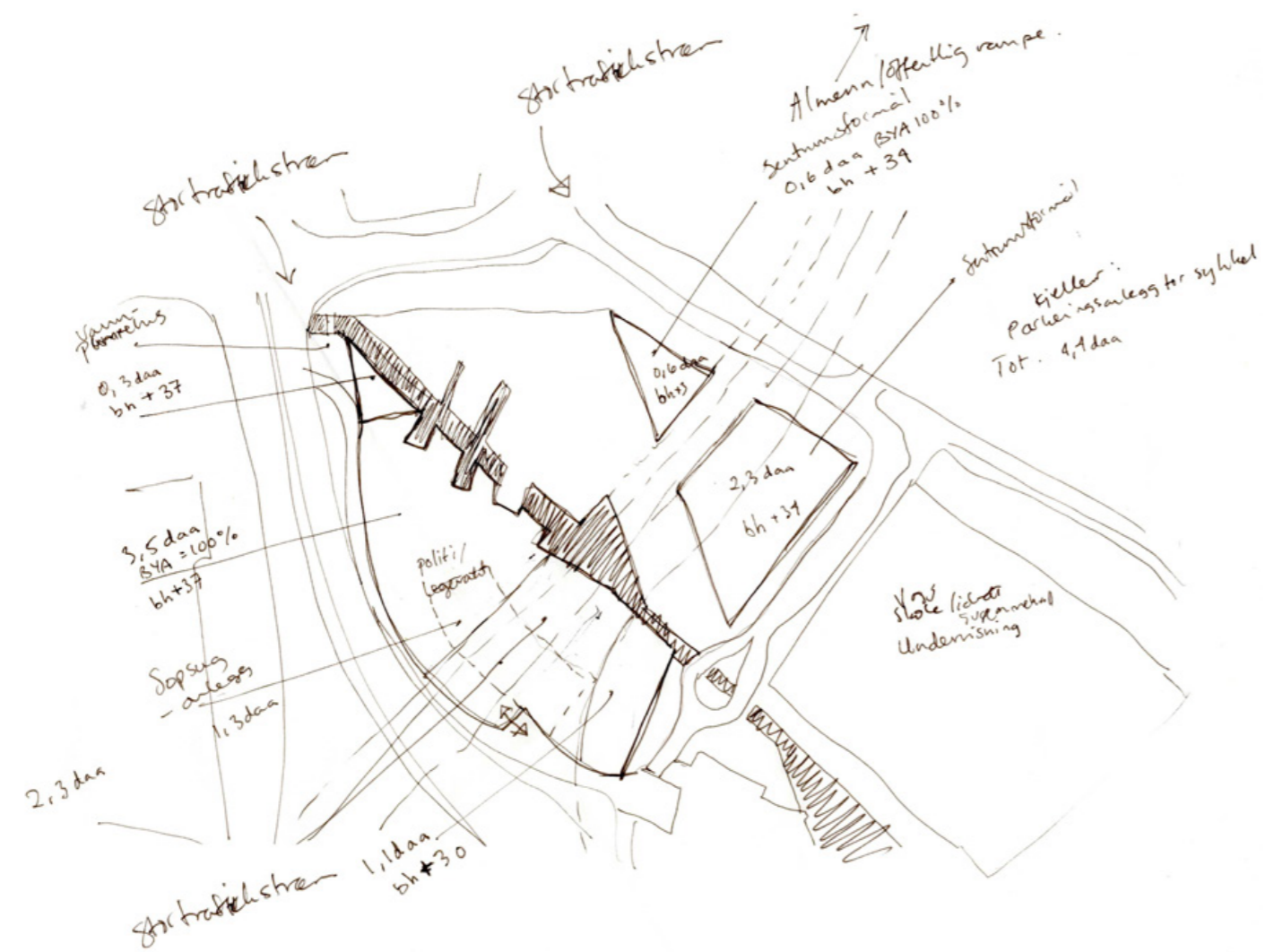


2)



3)

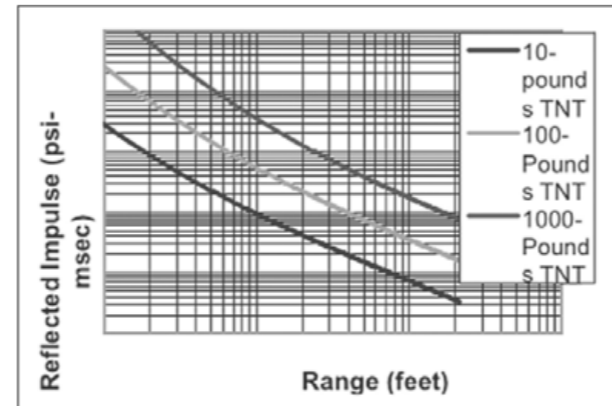
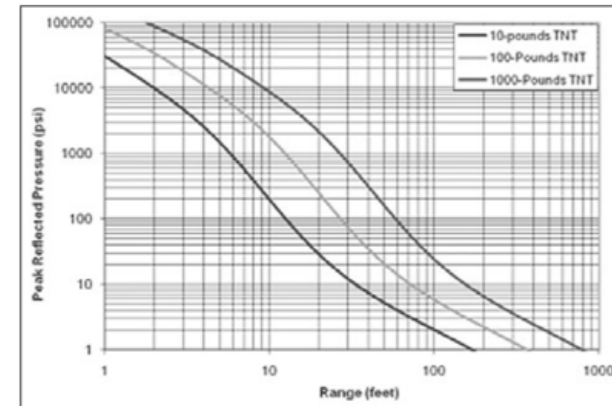




Eksisterende reguleringsplan:
Fordeler/ulempes

- + Tydelig henvendelse til skjermet plass
- + Viktige siktlinjer og romforløp
- + Forlengelse av grønstruktur og vann
- + Mulighet for bruk av vann som sikringsbarriere
- + Eksisterende utrykningsvei for brannstasjon
- Nordvendt plass med skygge
- Plassering nær hovedveier gir unødvendig risiko og kan føre til lukkede fasader

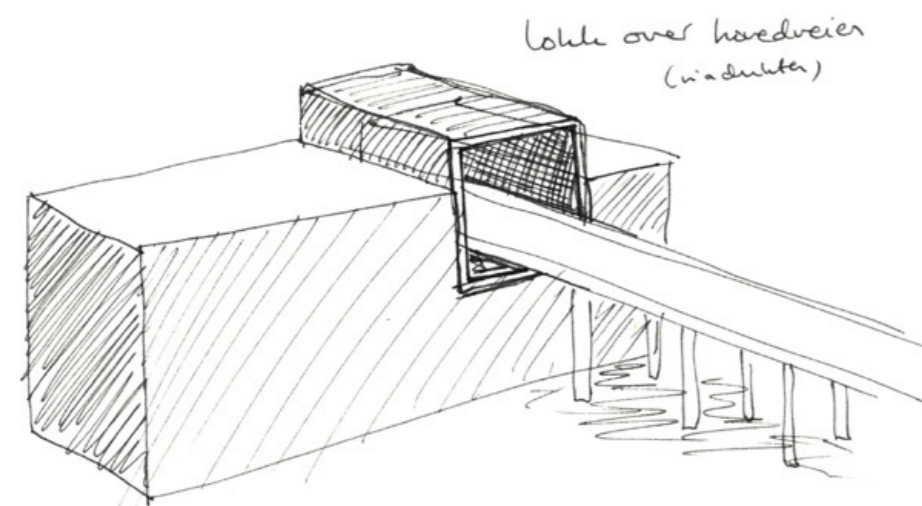
$$Z = R / \sqrt[3]{W}$$



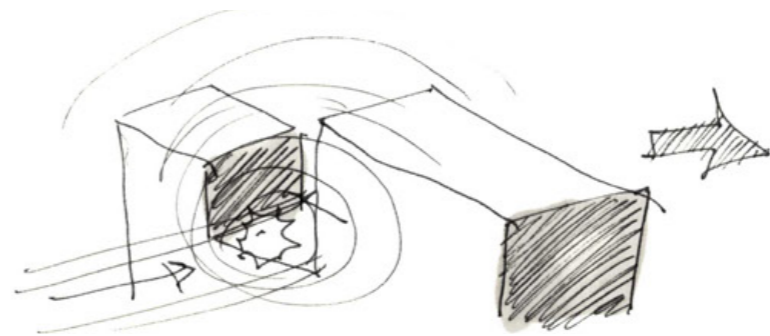
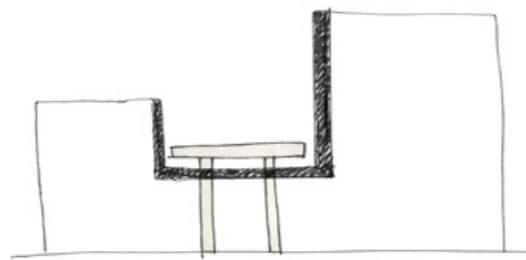
Amplituden av trykkbølgen fra en eksplosjon synker som 1/R³, der R er avstanden fra detonasjonspunktet.
Kilde: FEMA

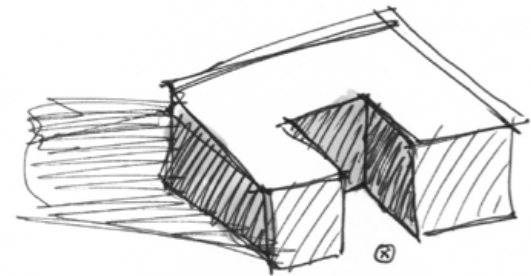
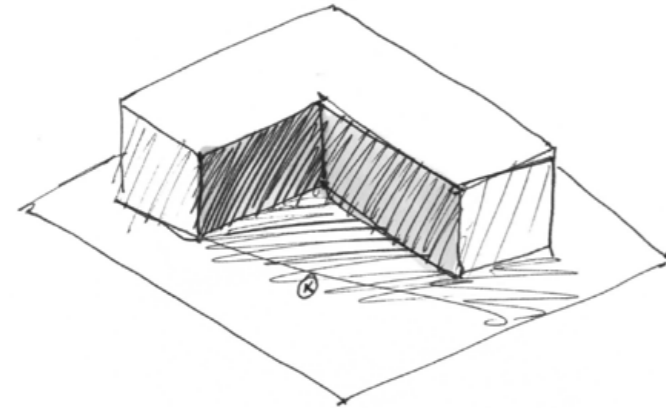
Trusselbeskrivelse	Eksplosivladning (TNT, kg)	Nødvendig sikringsavstand (m)	Utendørs evakueringsavstand (m)
Rørbombe	2.3 kg	21 m	259 m
Selvmordsbelte	4.5 kg	27 m	330 m
Selvmordsvest	9 kg	34 m	415 m
Koffertbombe	23 kg	46 m	564 m
Kompakt Sedan	227 kg	98 m	457 m
Sedan	454 kg	122 m	534 m
Passasjer/lastebil	1,814 kg	195 m	838 m
Liten flyttebil/varebil	4,536 kg	263 m	1,143 m
Flyttebil/Vann- lastebil	13,608 kg	375 m	1,982 m
Semitrailer	27,216 kg	475 m	475 m

Erfaringstall basert på sivil bygning uten ekstra sikringstiltak. Kilde: FEMA



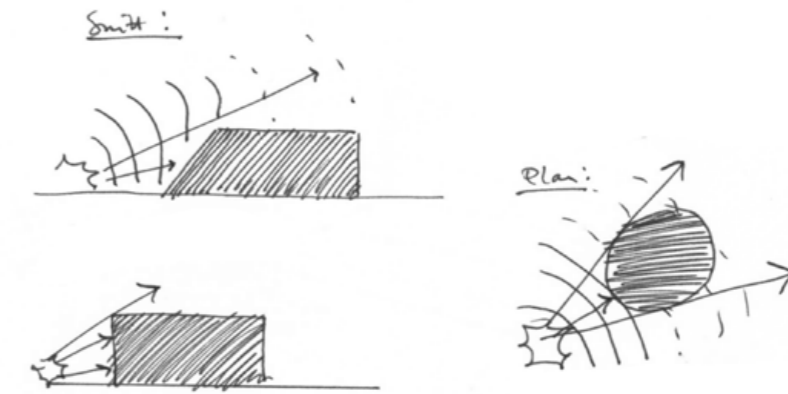
↳ Hovedbilvei oppå politihuset
er en ugunstig plassering i scenarieret
"Kjøretøy med eksplosiver!"





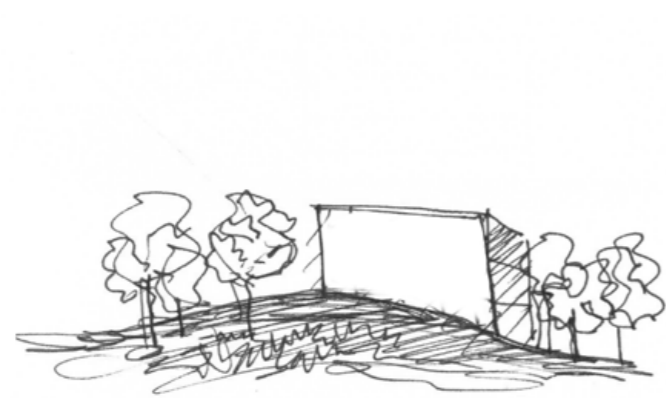
Bygninger med "L-form", "U-form", "T-form" og andre irregulære former, kan forsterke effekten fra kjøretøybaserte eksplosiver og bør unngås

BYGNINGSFORMER SOM REDUSERER SKADEN/EFFEKTEN FRA EN BILBOMBE:



BYGNINGSFORMER SOM FORSTERKER SKADEN/EFFEKTEN FRA EN BILBOMBE:

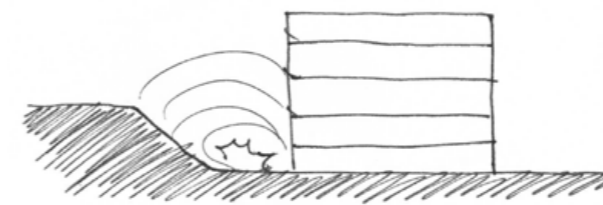




- Bruk av vann og / eller terreng til å redusere effekter av / absorbere energi fra en bilbane på bakken.

⇒ Park

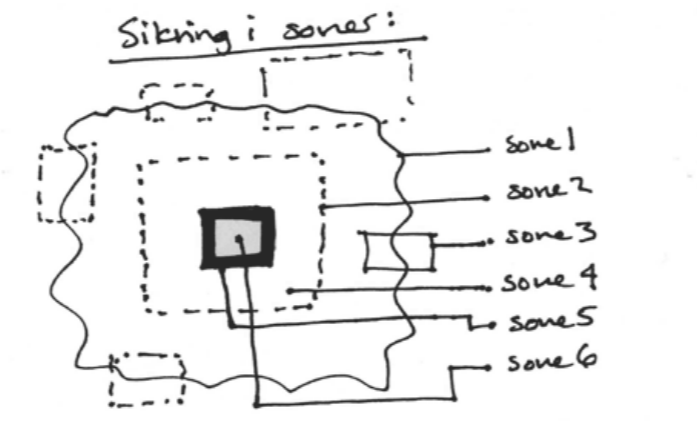
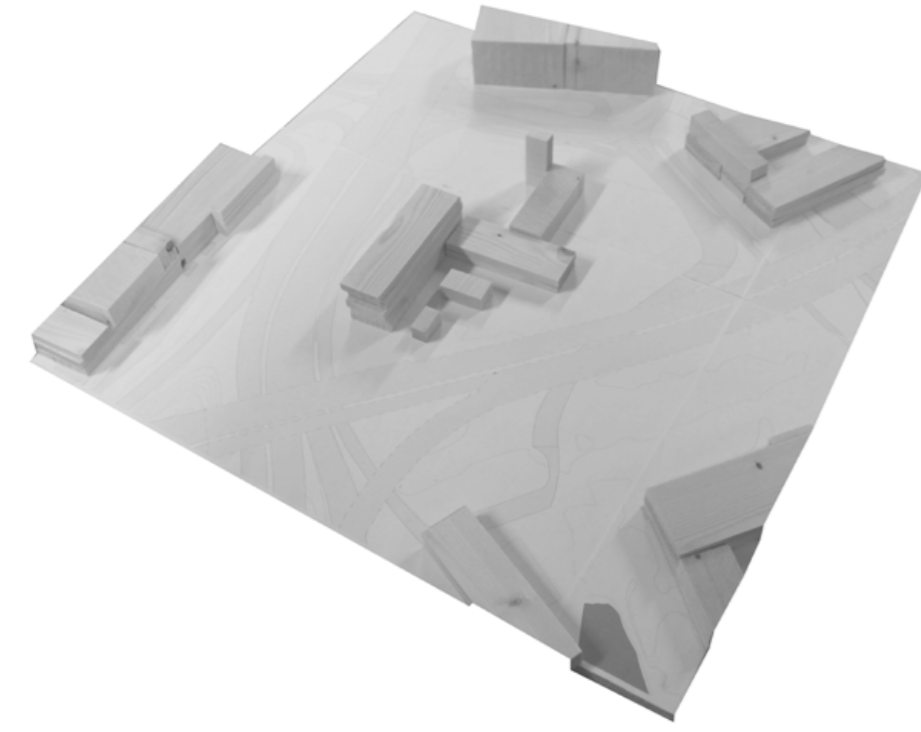
Terreng må være stigende, ikke sønkende



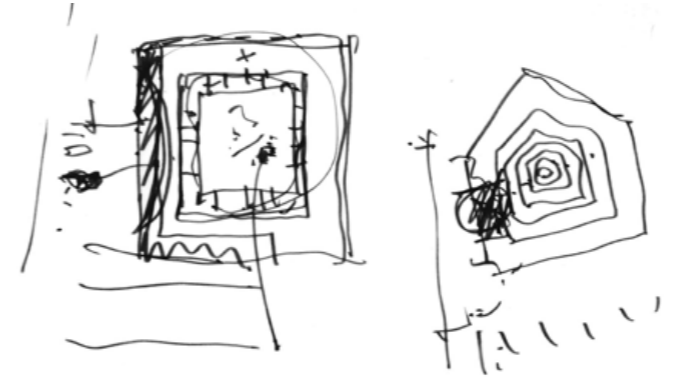
⇒ Bygning plassert i
lavt terreng: er
ungunstig ved at
trykket fra eksplosjoner
reflekteres og forsterkes
shaden på bygningen

LAVT BYGG MED SPREDNING AV ROM OG FUNKSJONER

- ↳ Stort grunnareal → lavt bygg
- ↳ Sprer folk og verdier ut over et større areal
- ↳ Reduserer risiko for bomber
- ↳ Mer krevende å sikre ↔ flere tiltak



- ↳ 1) NABOLAG 4) TOMTEN
- 2) STAND OFF PERIMETER 5) SKALLET/FASADEN
- 3) ADGANG/PARKERING 6) BYGNING-INNHOLD

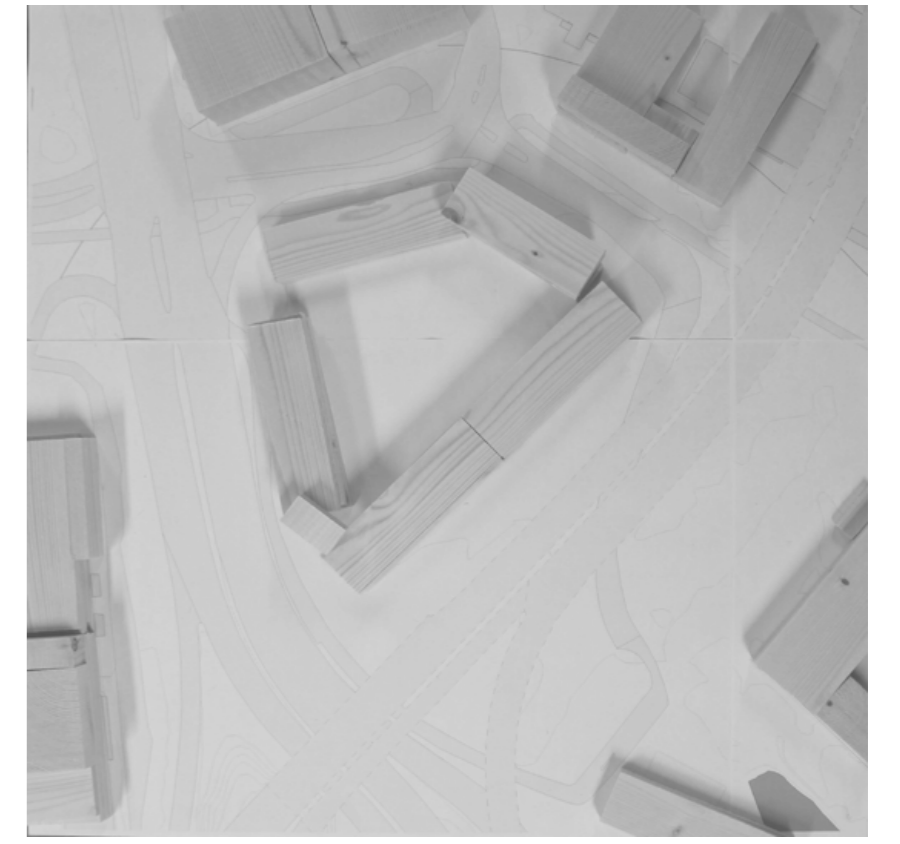


Fordeler og ulemper med konsept 1

- + Sikring i soner skaper en sikrere bygning
- + Regulær geometriske form på utsiden har en positiv virkning på evt. eksplosjonstrykk
- Dårlig tilgjengelighet og åpenhet
- Plassen har et privat og lukket preg
- Mer bruk av grunnflate gir mindre parkareal
- Mister siktlinjene i reguleringsplanen
- Plassering nær hovedvei på alle sider
- Kan ha funksjonelle utfordringer

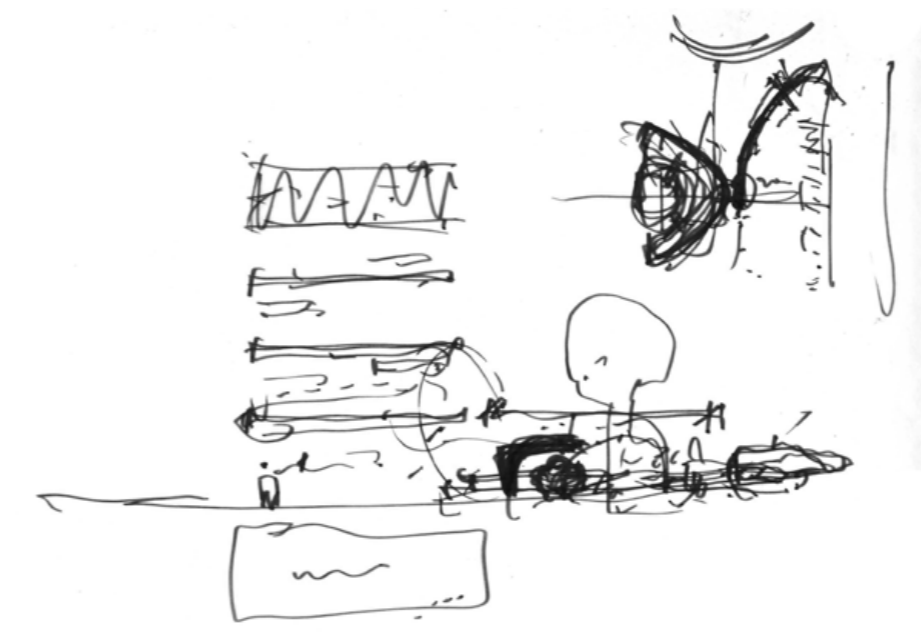
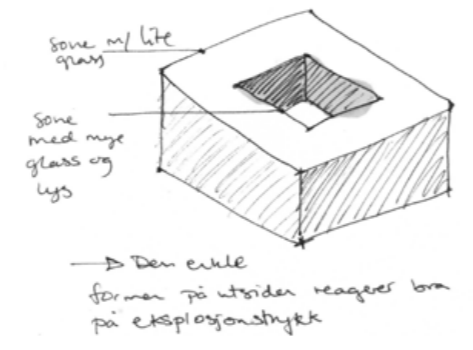
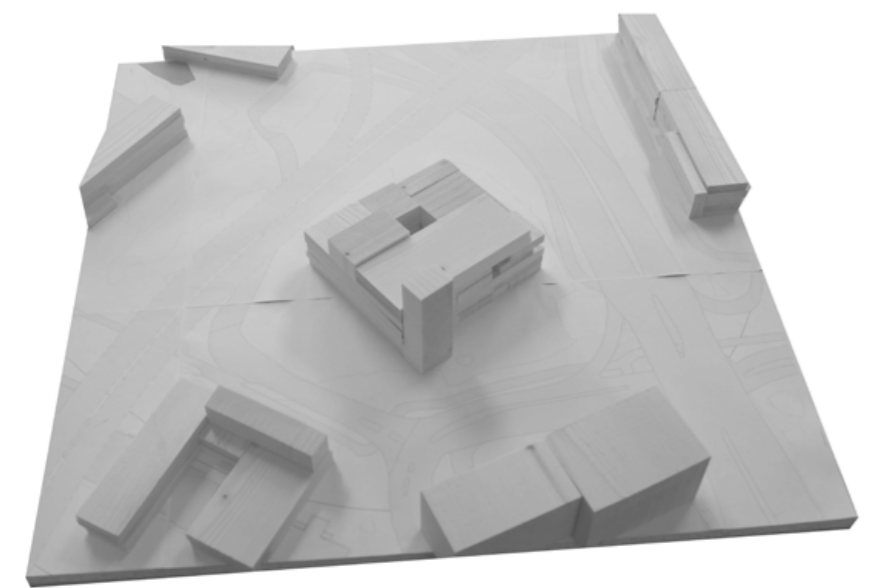
Fordeler og ulemper med konsept 1

- + Fin henvendelse og tilgjengelighet
- + Stor, åpen og nordvestvendt plass
- Mer bruk av grunnflate gir mindre park
- Mister siktlinjene i reguleringsplanen
- Plassering nær hovedvei gir lukket fasade
- Irregulær geometrisk form har en negativ virkning på evt. eksplosjonstrykk



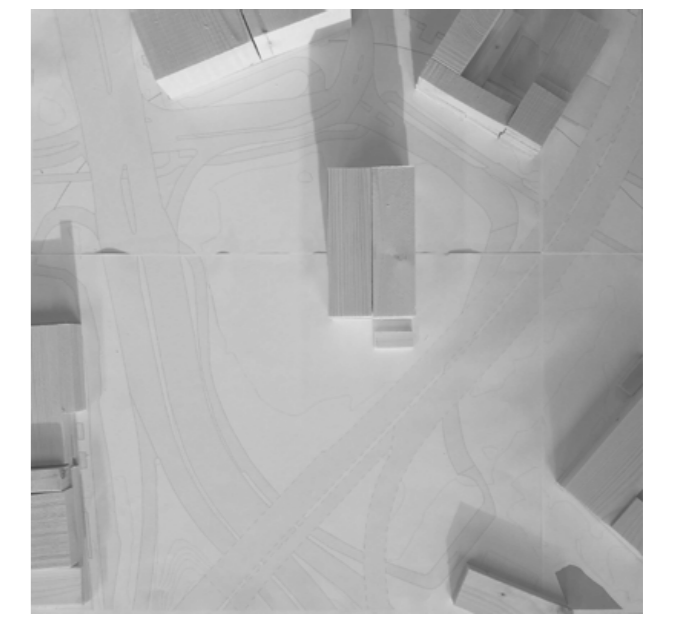
HØYT BYGG MED SAMLING
AV ROM OG FUNKSJONER

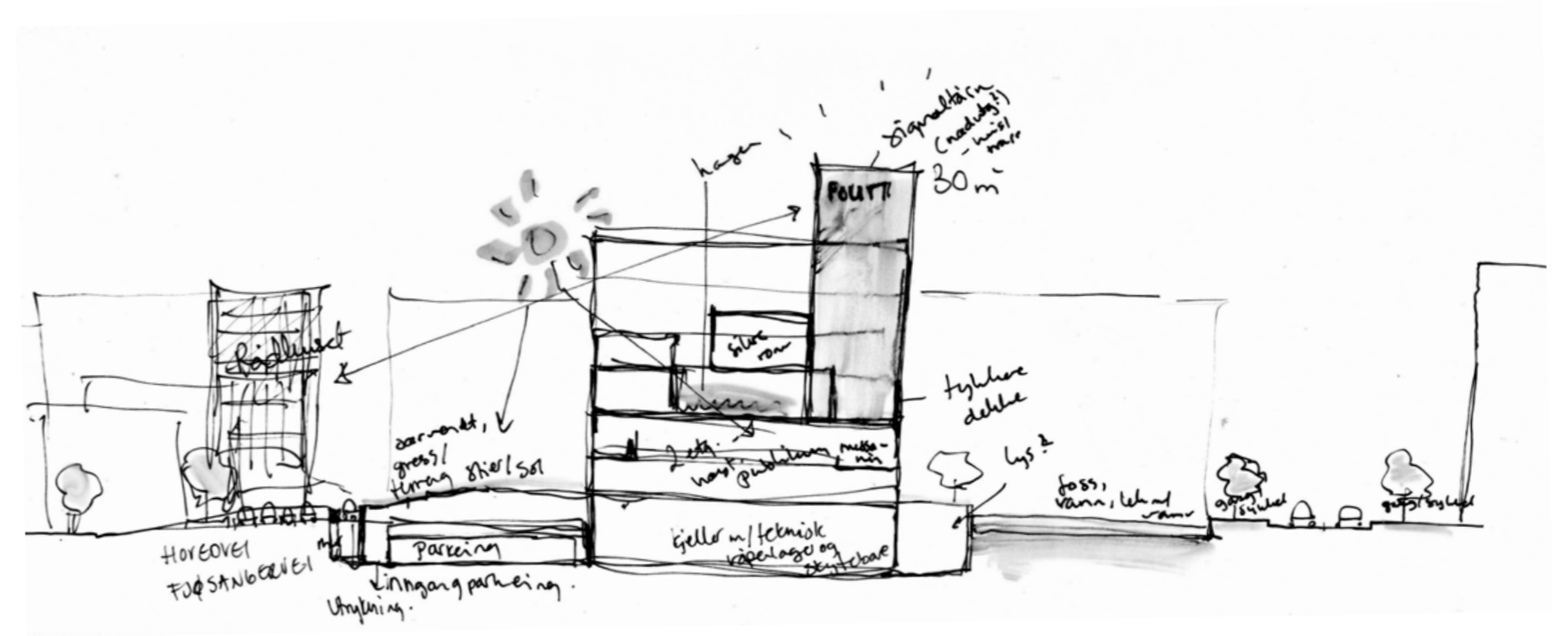
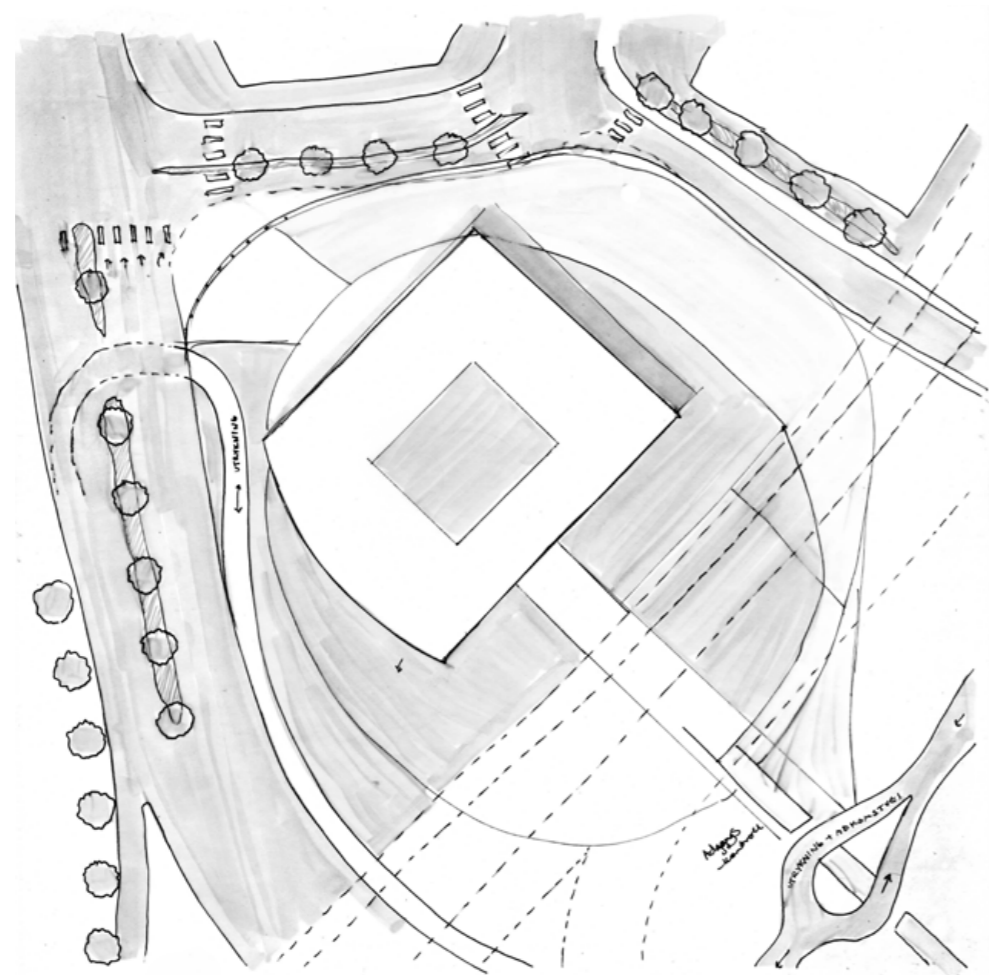
- ↳ Lite grunnareal → høyere bygg
- ↳ Samler folk og verdier i et så lite areal som mulig
- ↳ Reduserer risiko
- ↳ Enklere å sikre ↔ færre tiltak



Fordeler og ulemper med konsept 2

- + Fin henvendelse og tilgjengelighet
- + Stor, åpen og sørvestvendt plass
- + Mindre bruk av grunnareal gir mer park
- + Bevarer siktlinjer/romforløp i regulering
- + Plassering nær hovedvei kan gi lukkede fasader på noen sider av bygget
- + Sikring i soner skaper en sikrere bygning
- + Regulær geometriske form på utsiden har en positiv virkning på evt.eksplosjonstrykk
- + Sikring i soner skaper en sikrere bygning





Sikringsbelysning
i pulleter

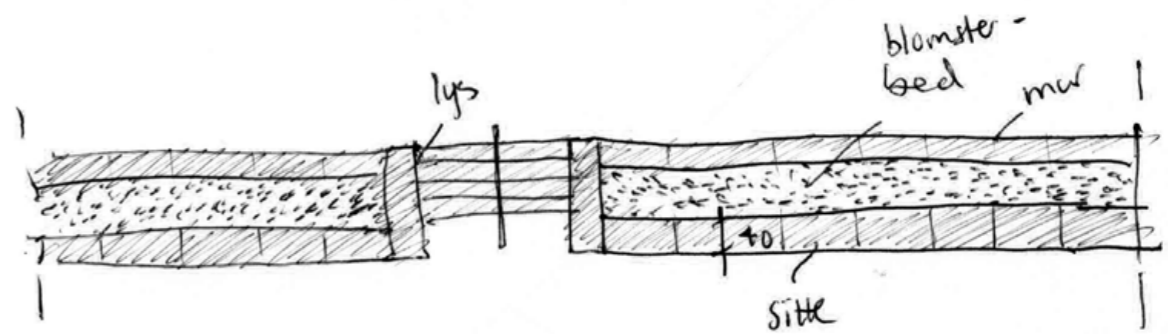
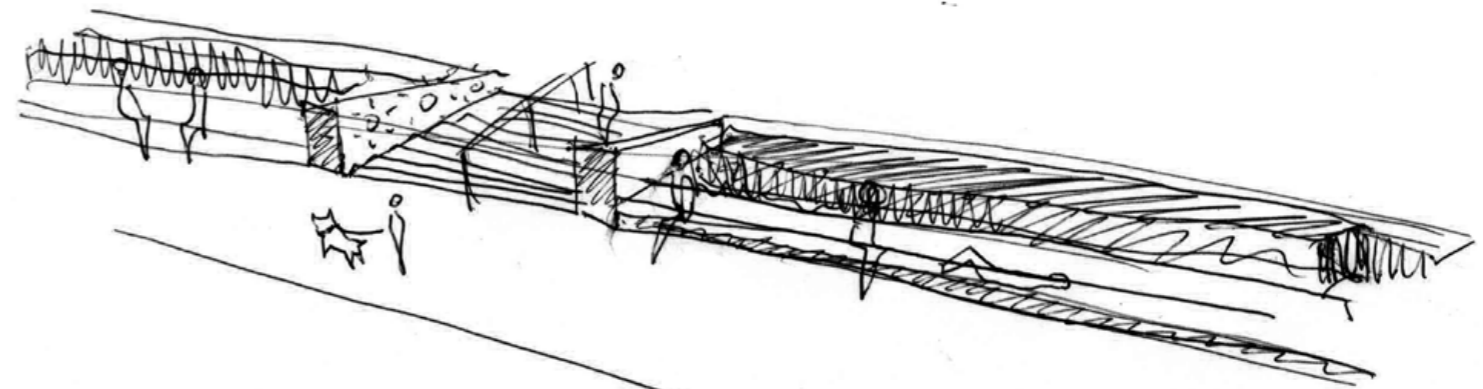
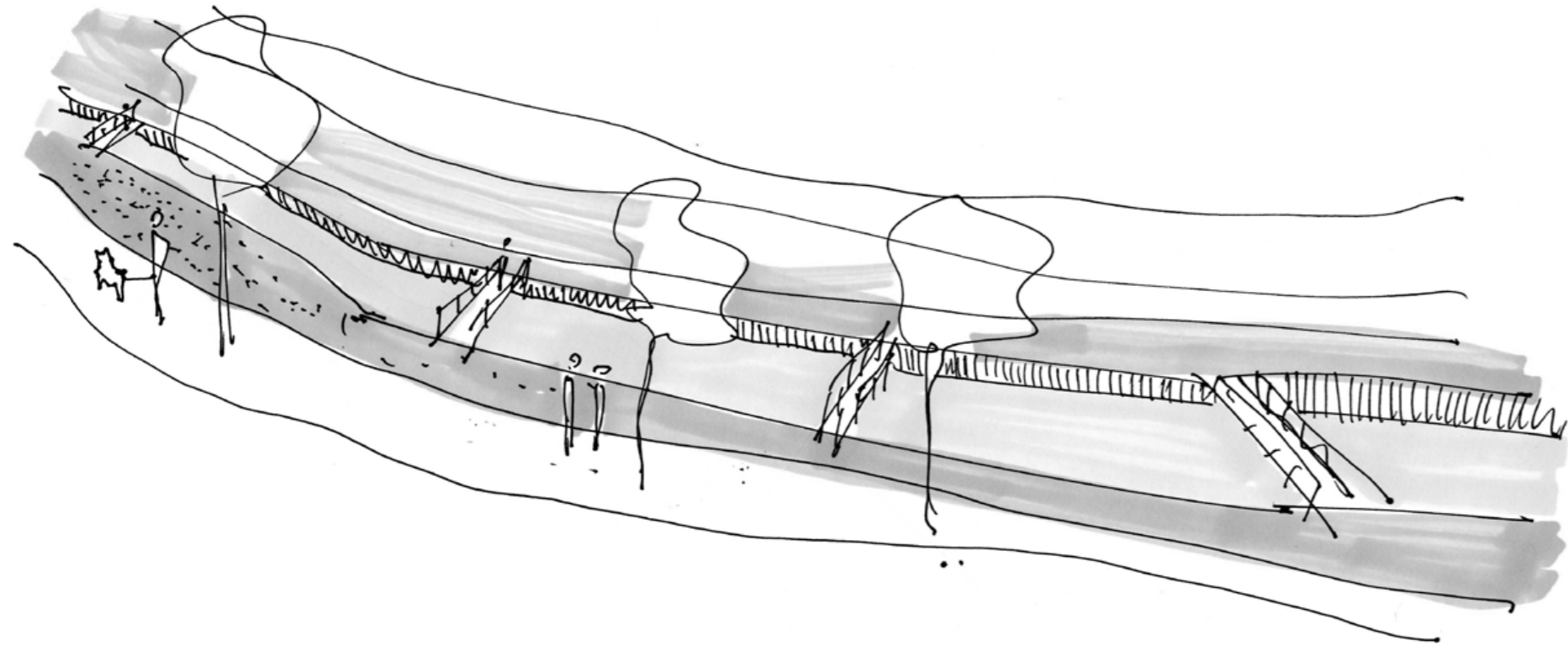


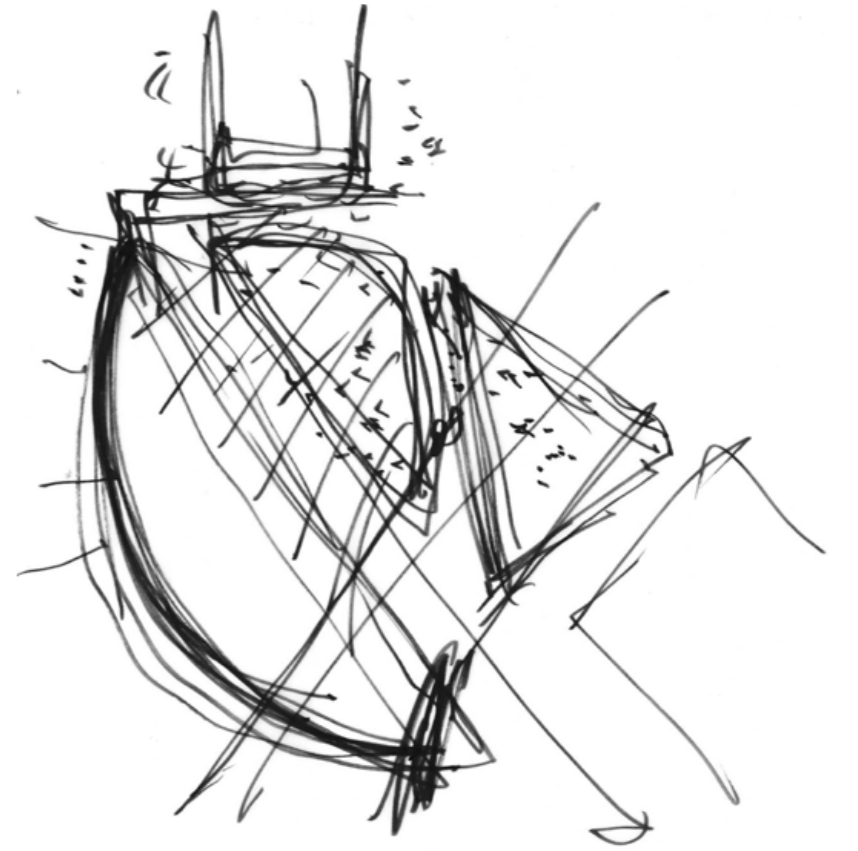
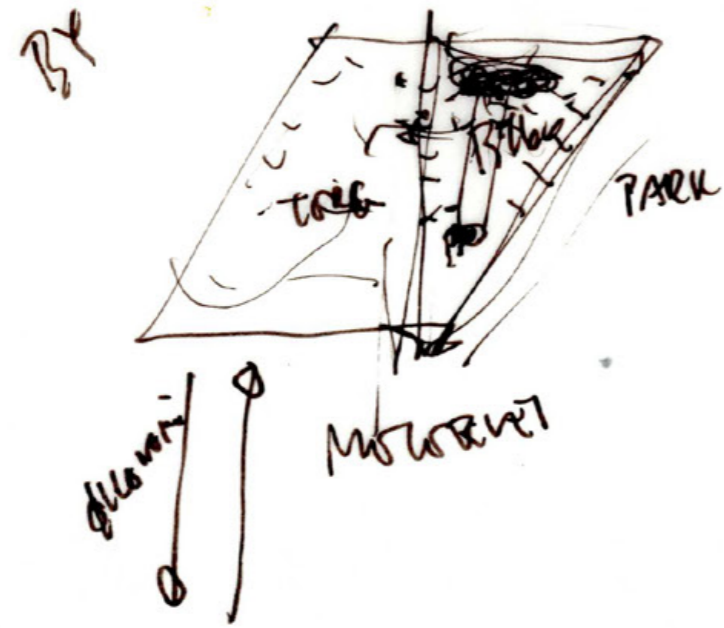
Sittplasser

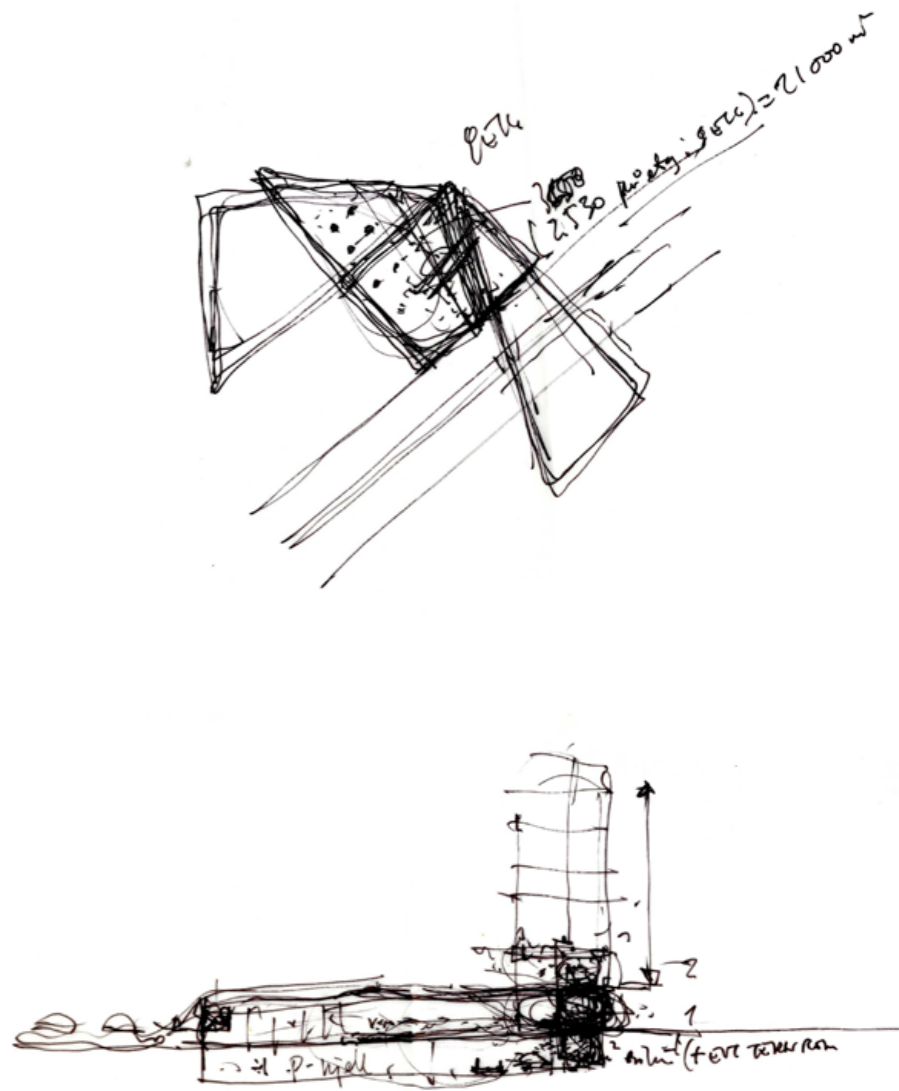
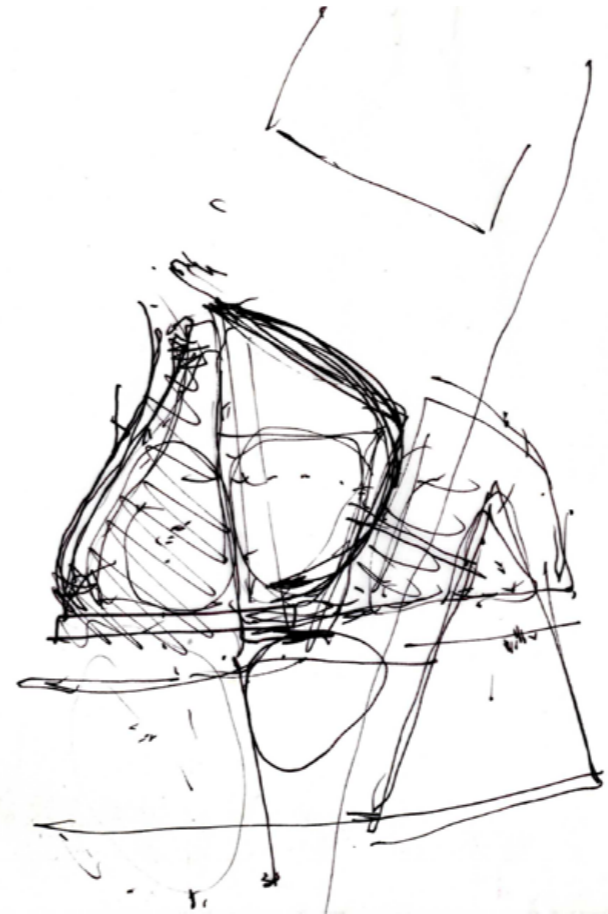
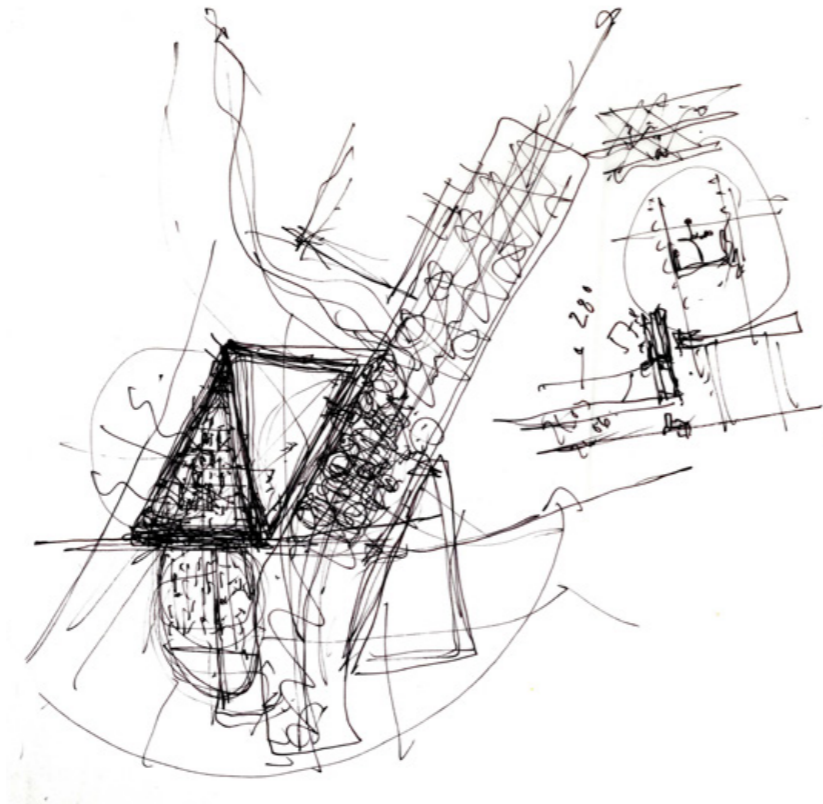
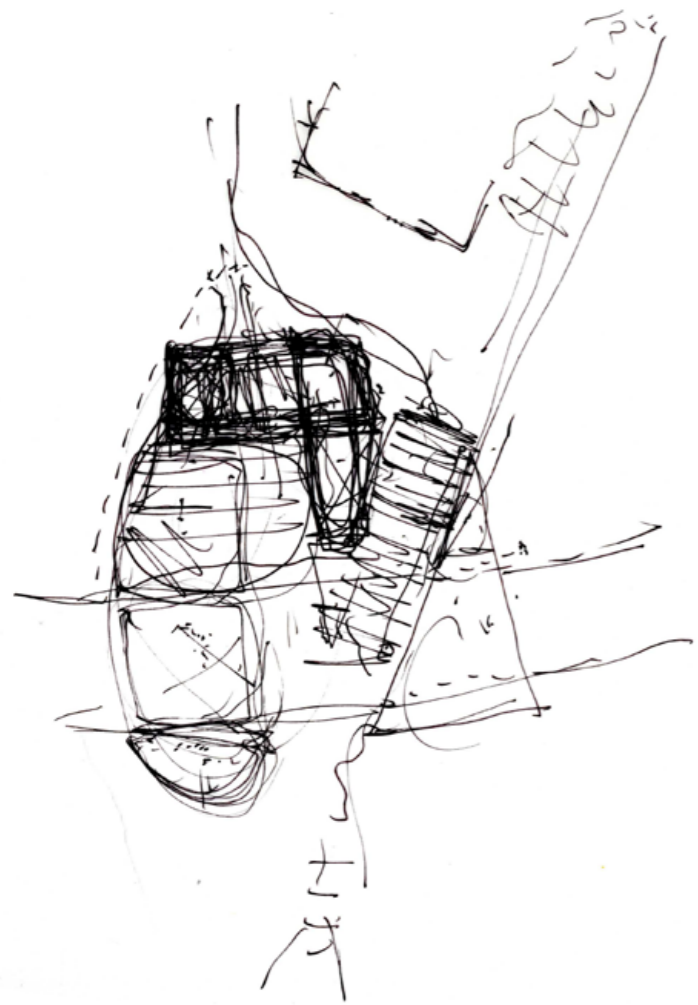
Trinnvise
nivåer i betong
med blomster, planter
og vann:



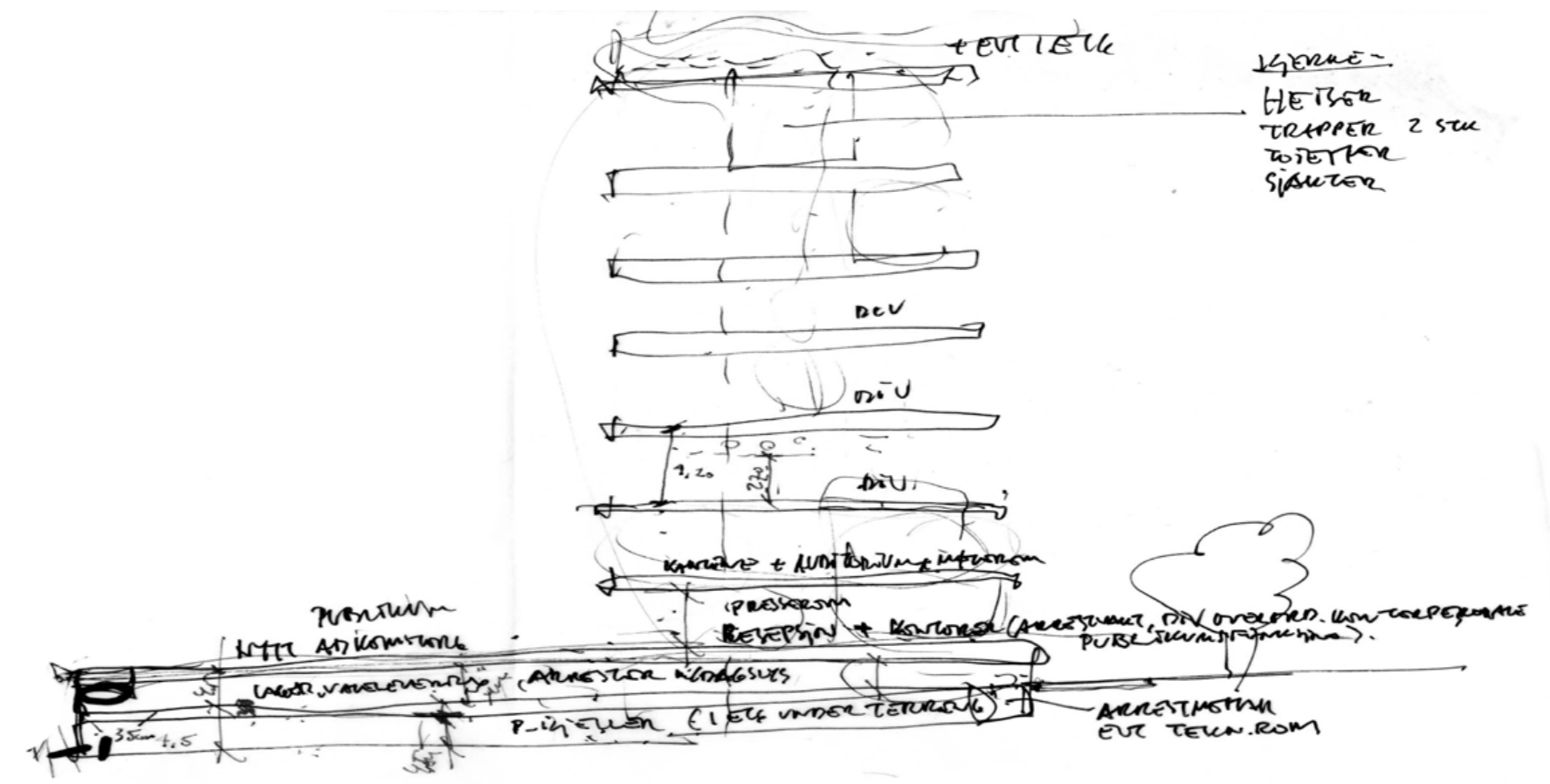
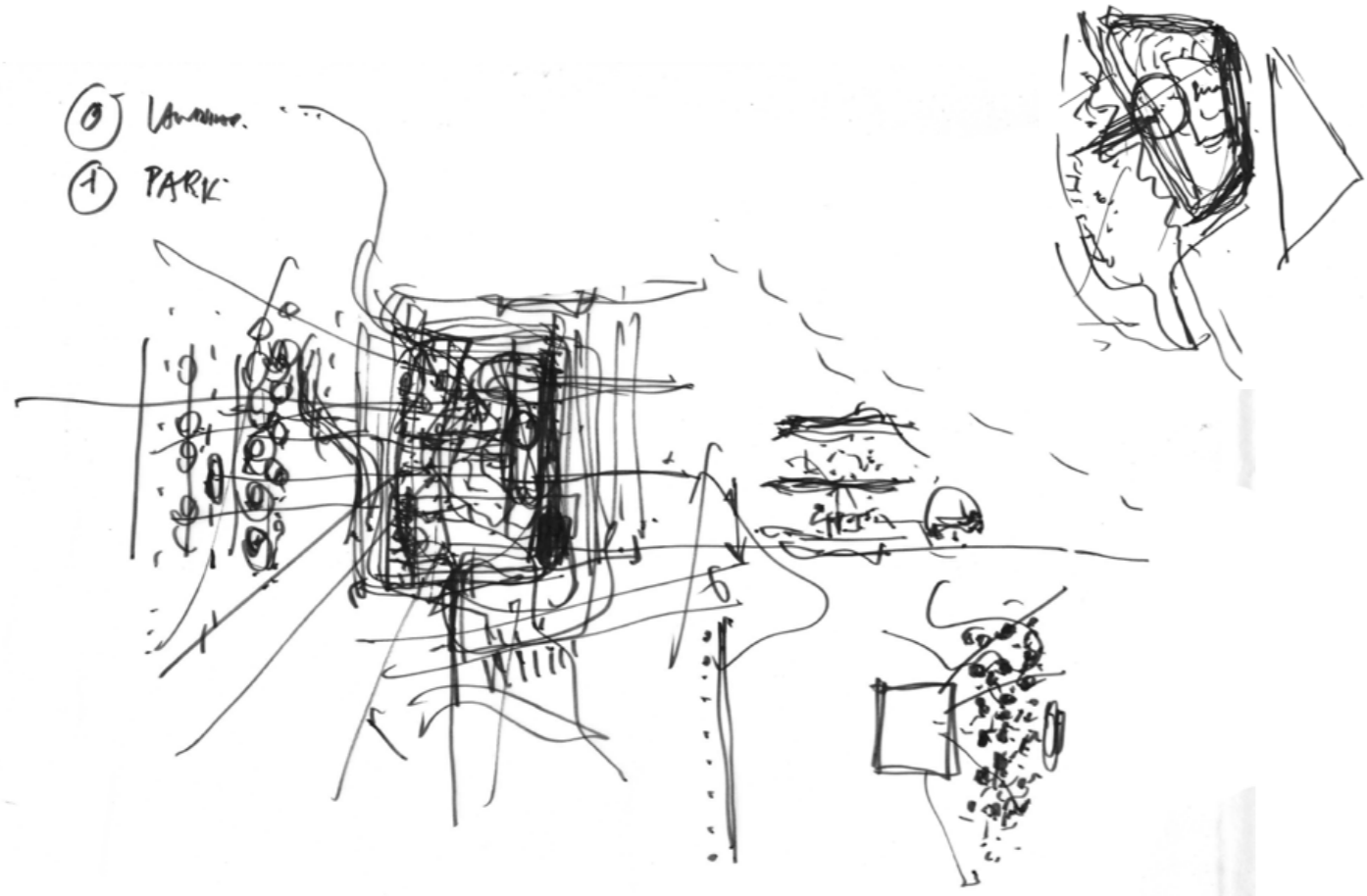
ranpe

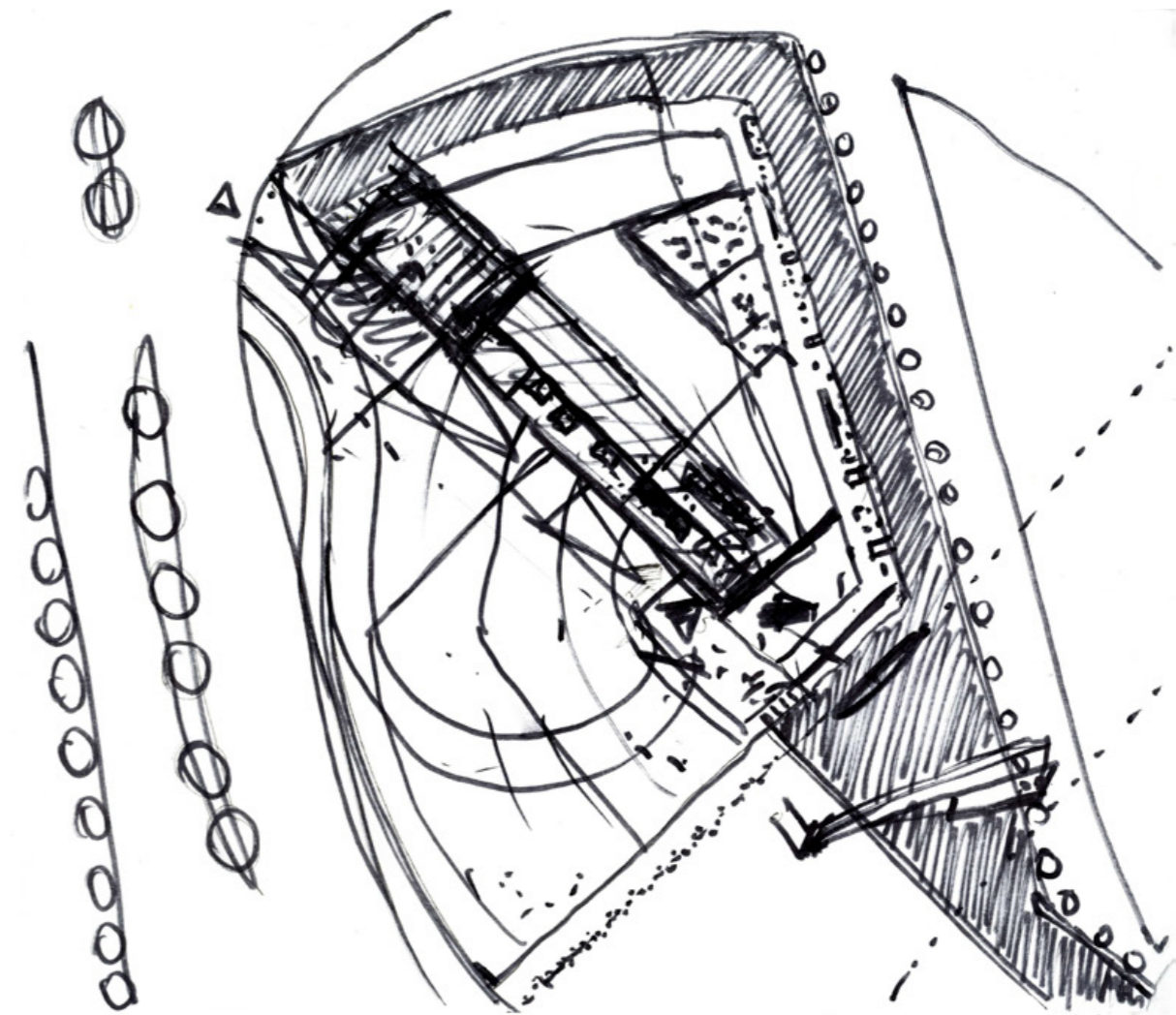
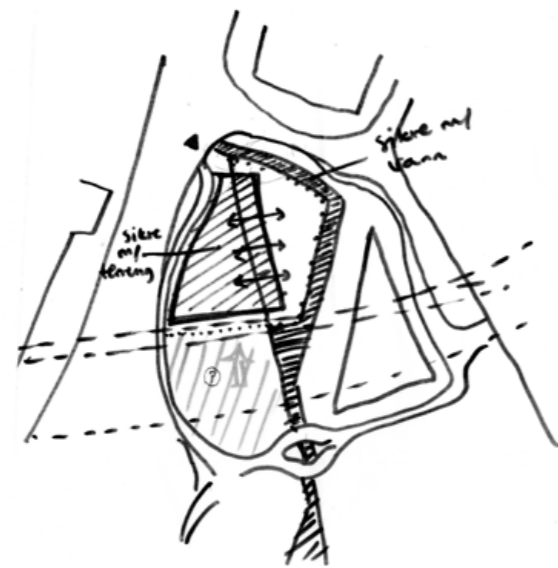
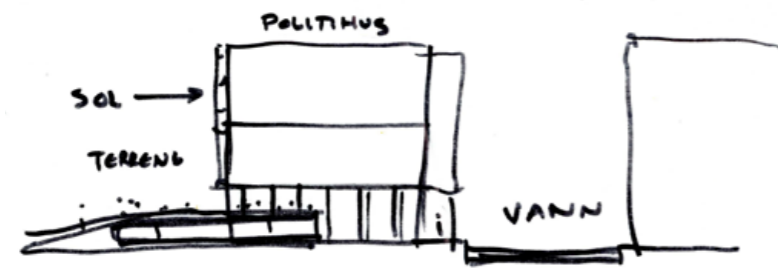


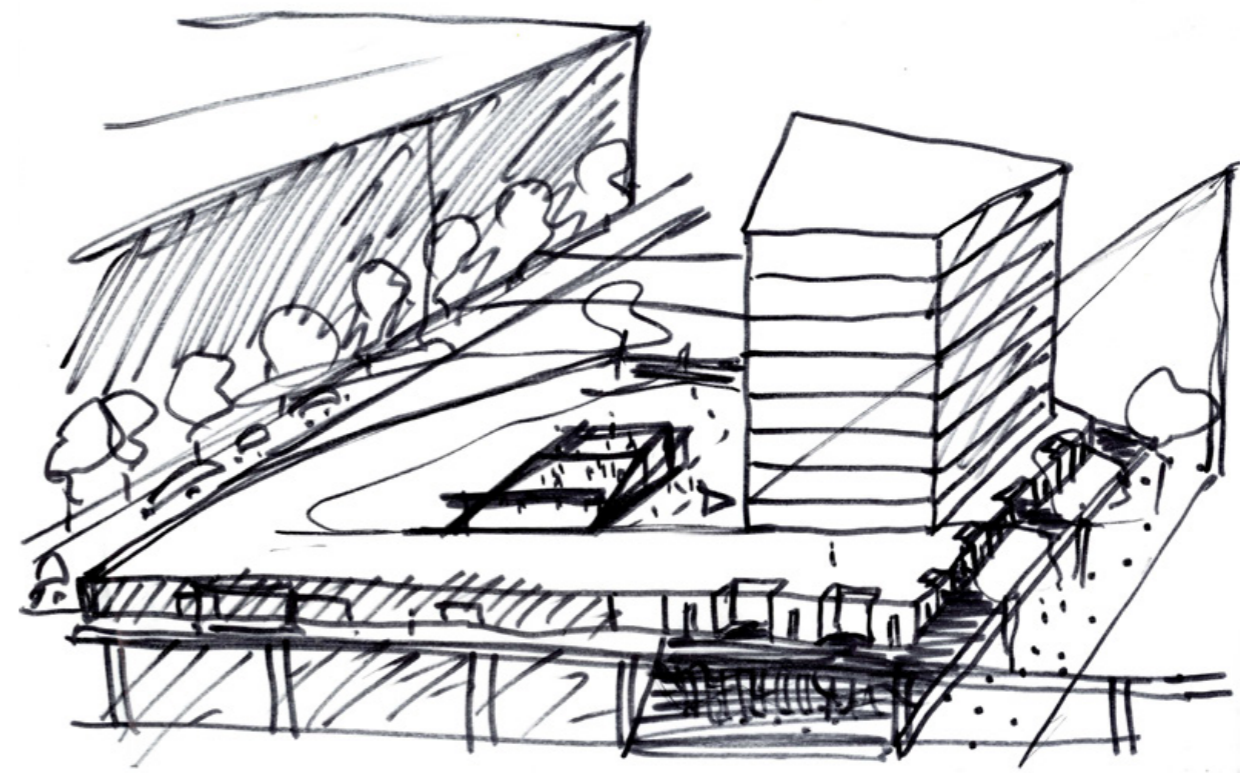
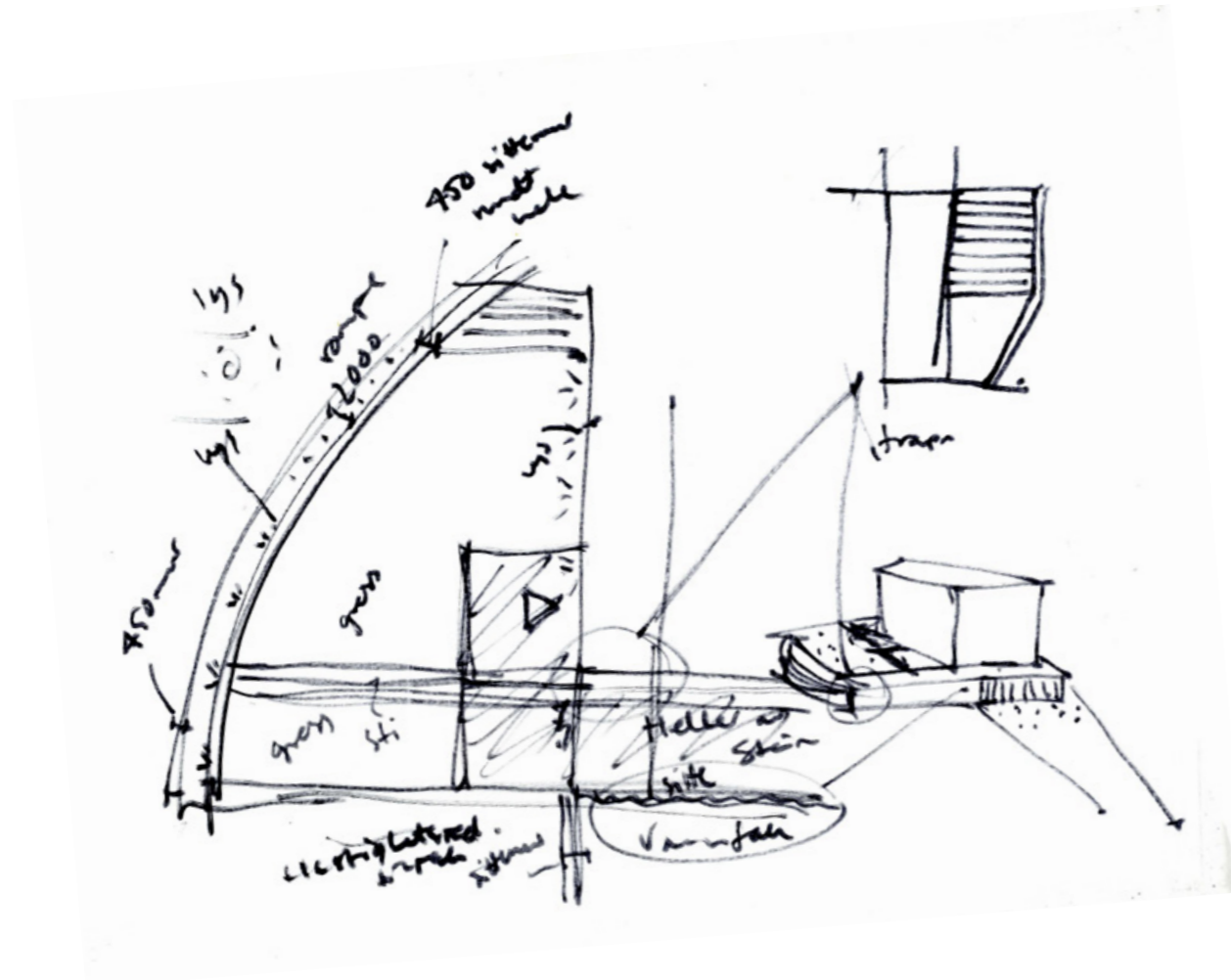


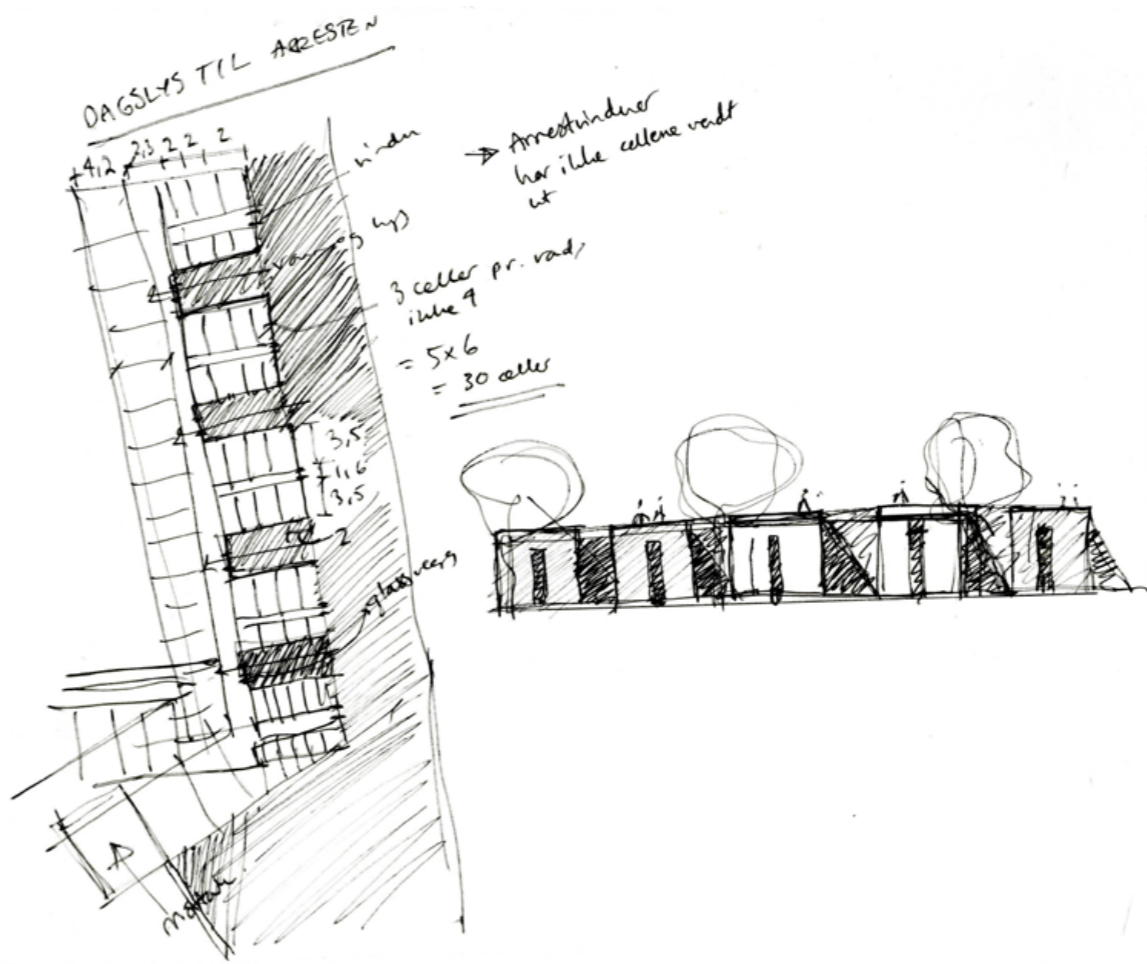
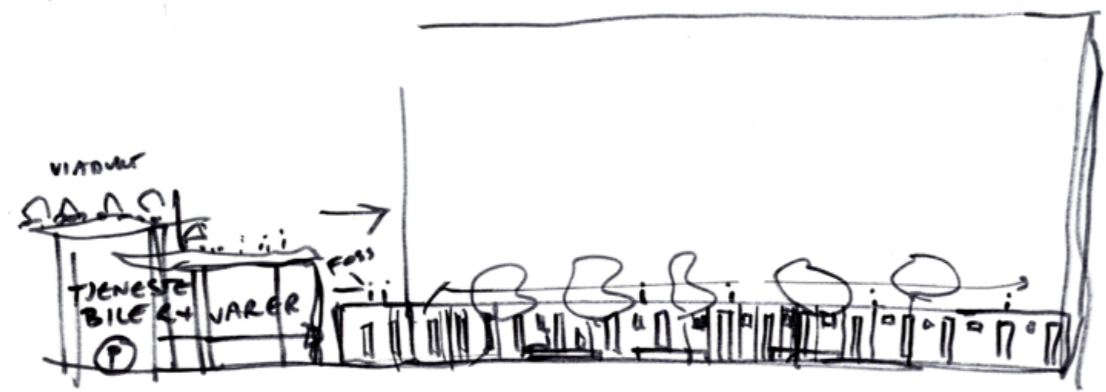


- ③ Vorraum
- ④ PARK

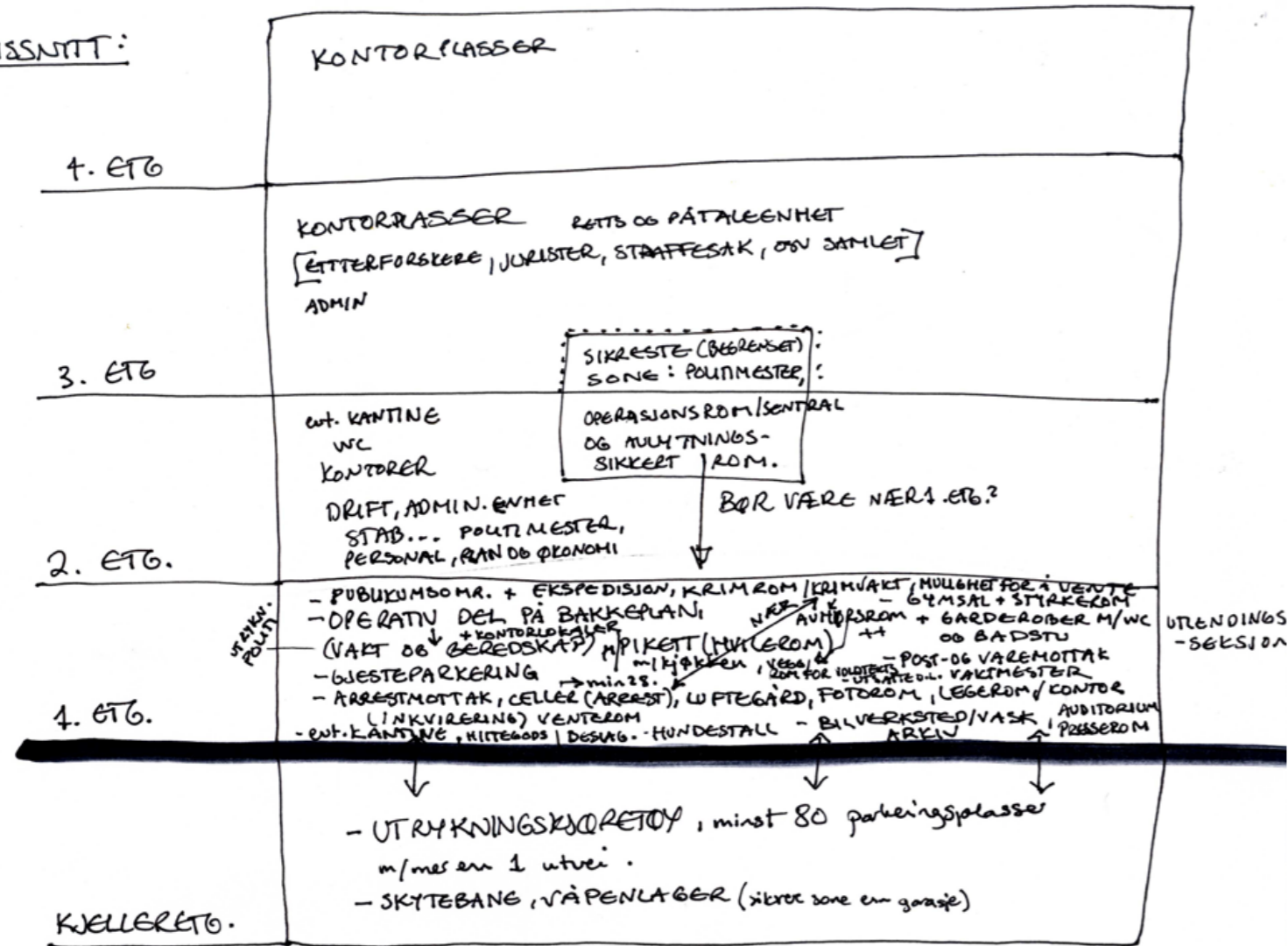




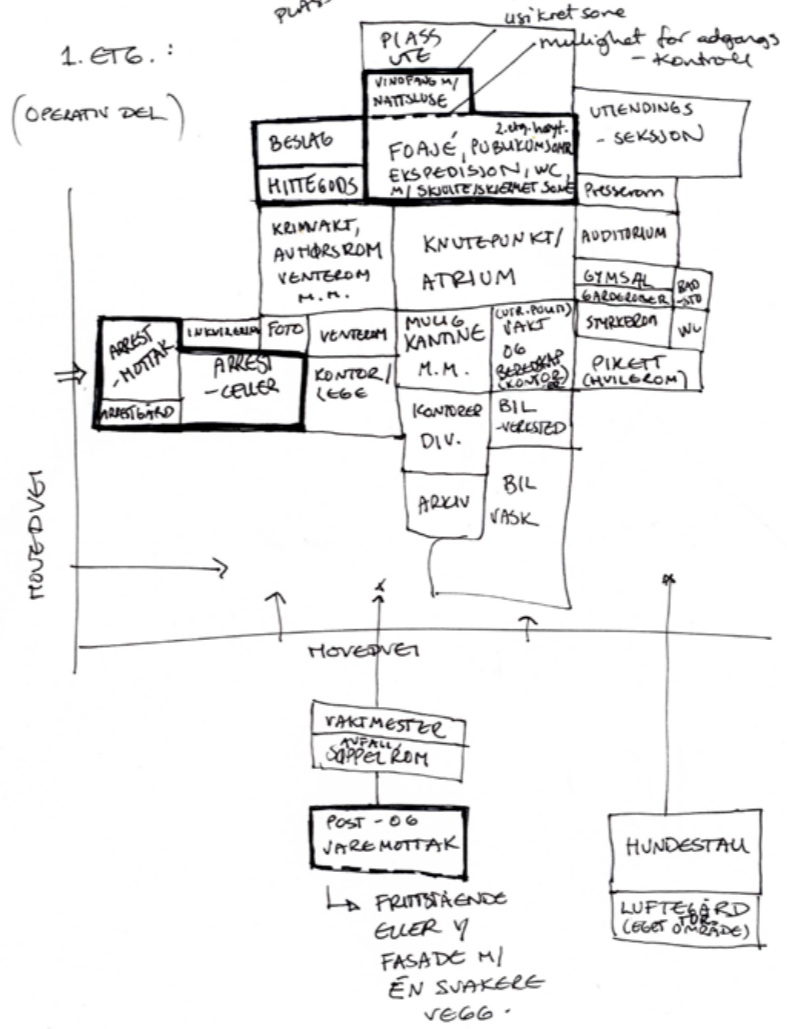




FUNKSJONSSNITT:



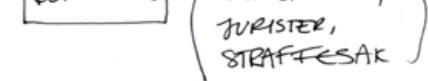
FUNKSJONSPLAN: (15 000 m² + senere 5 000 m²)



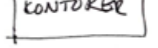
2. ETG.:



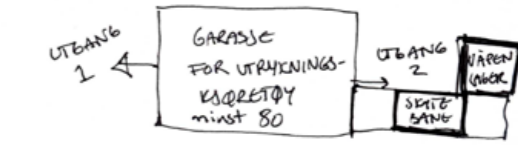
3. ETG.:




1. ETG.:

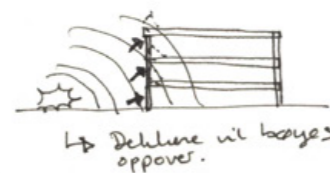


KJELLER:



STRUKTUR:

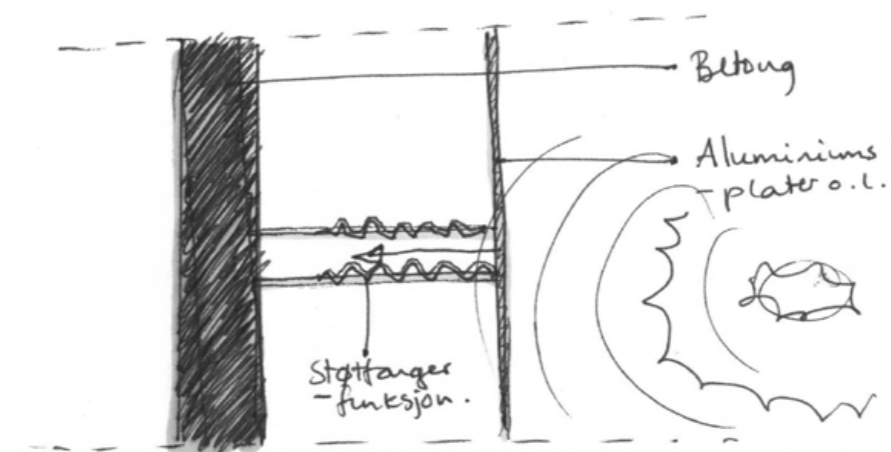
 $d = 0,5\text{m}$ \Rightarrow



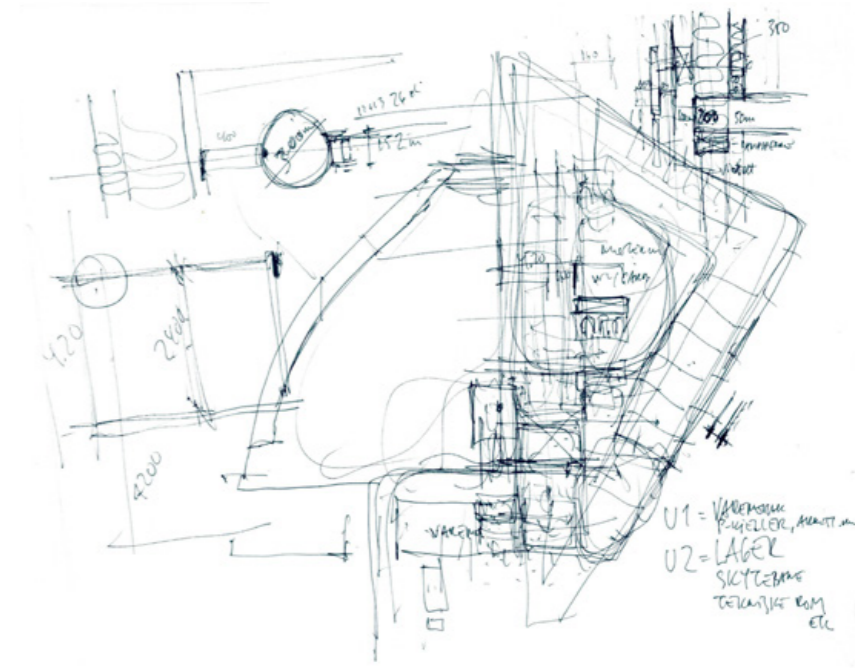
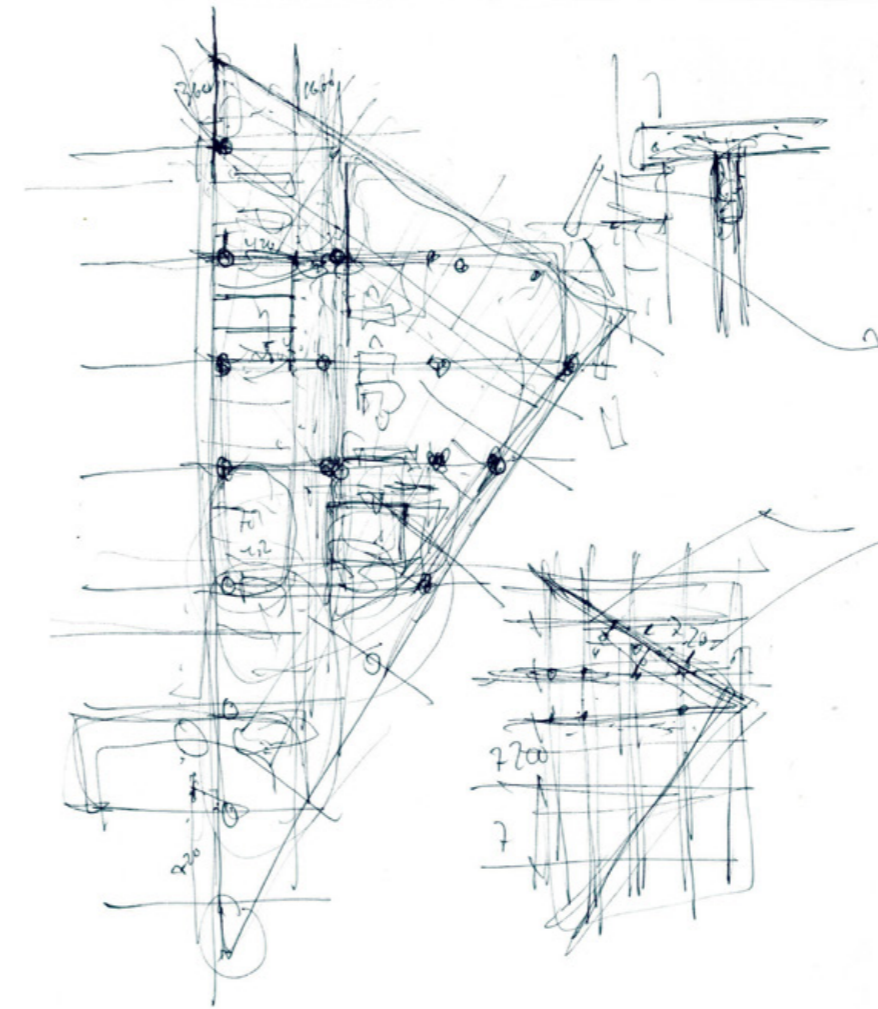
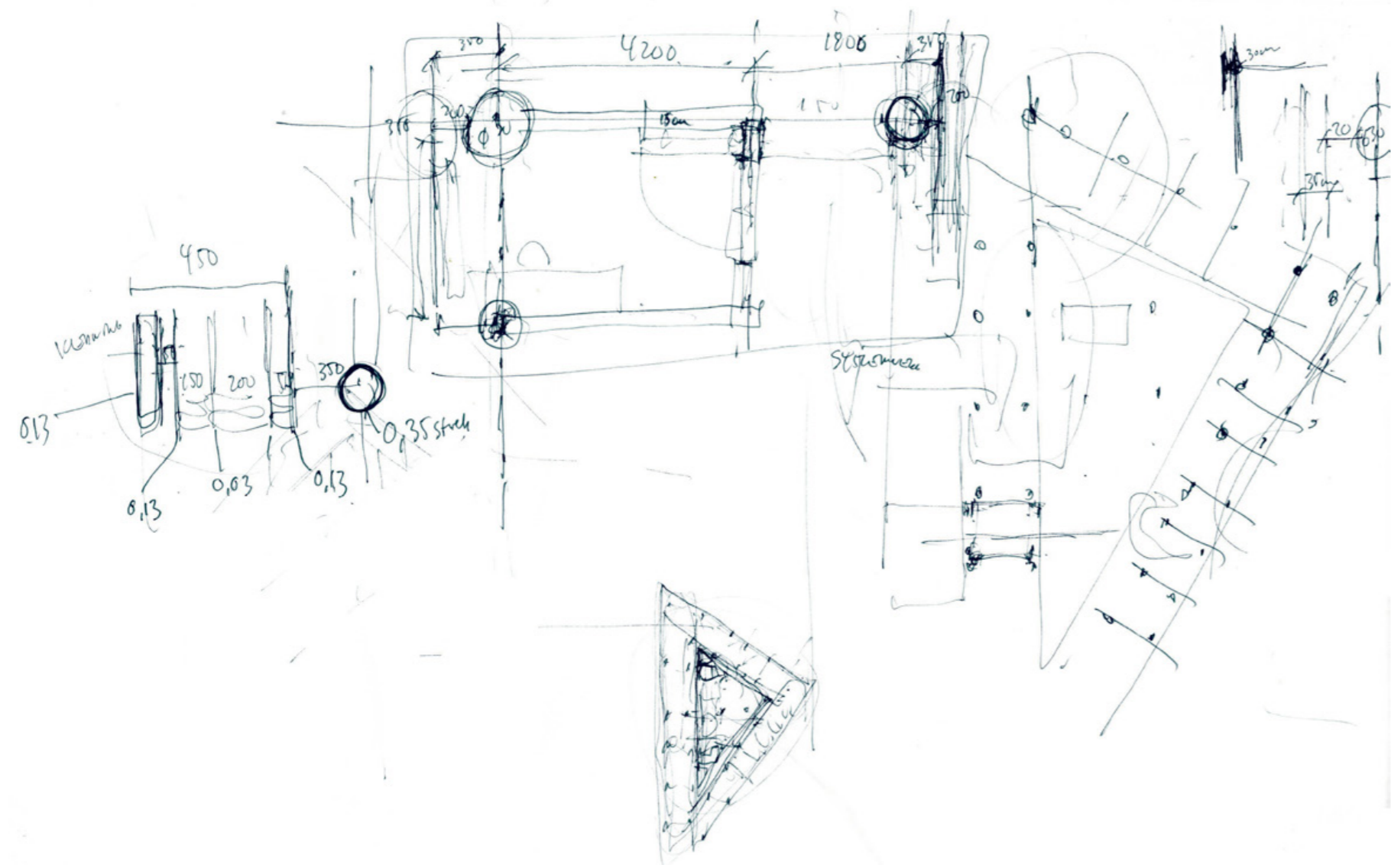
Plasstøpt armert betong er mye bedre enn prefabrikkerte elementer.
 \hookrightarrow tykkbølger gjør at elementene løftes fra hverandre, og bygningene faller sammen som et korthus.

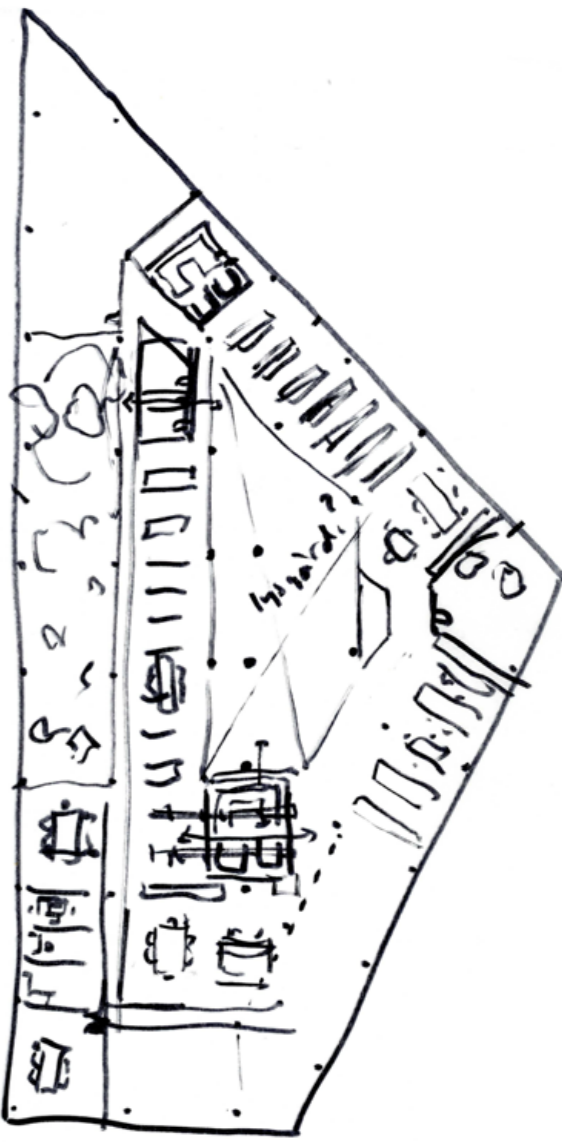
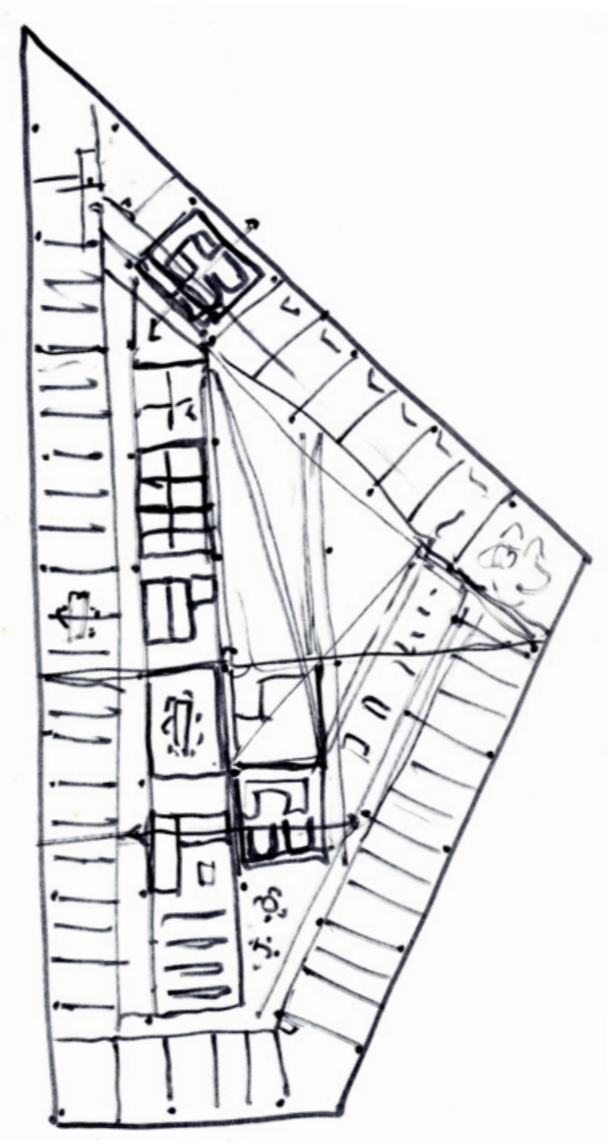
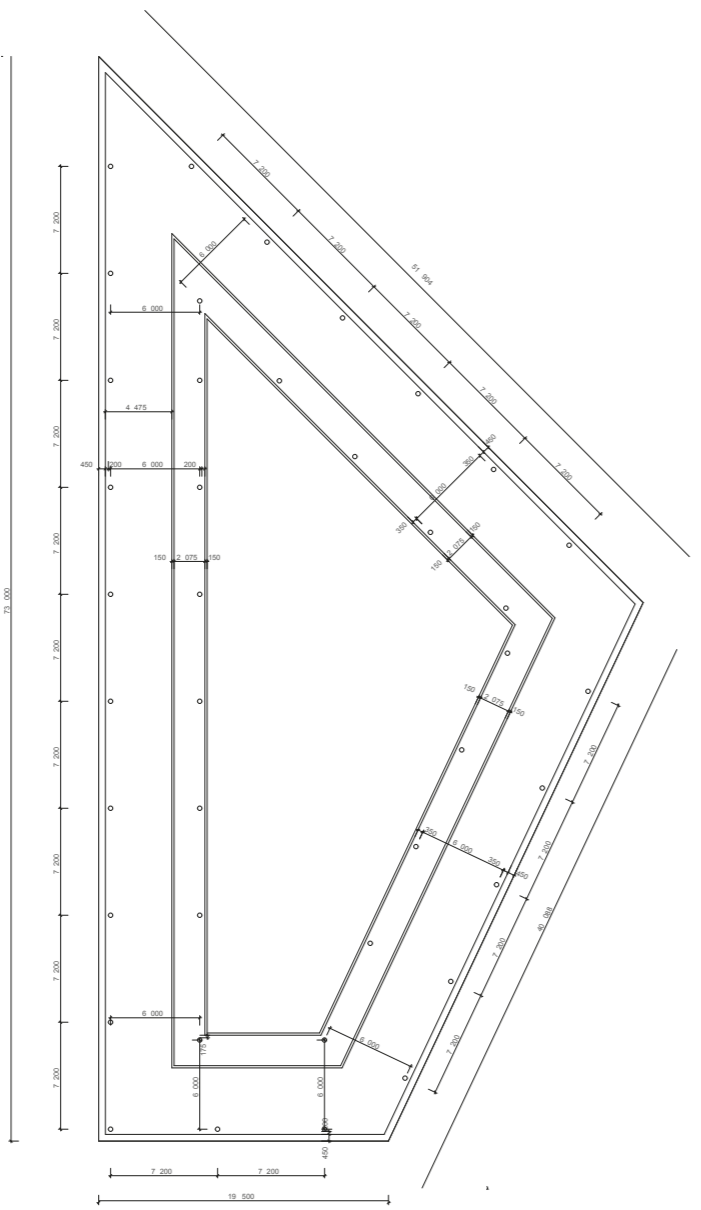
KONSTRUKSJON OG FASADE:

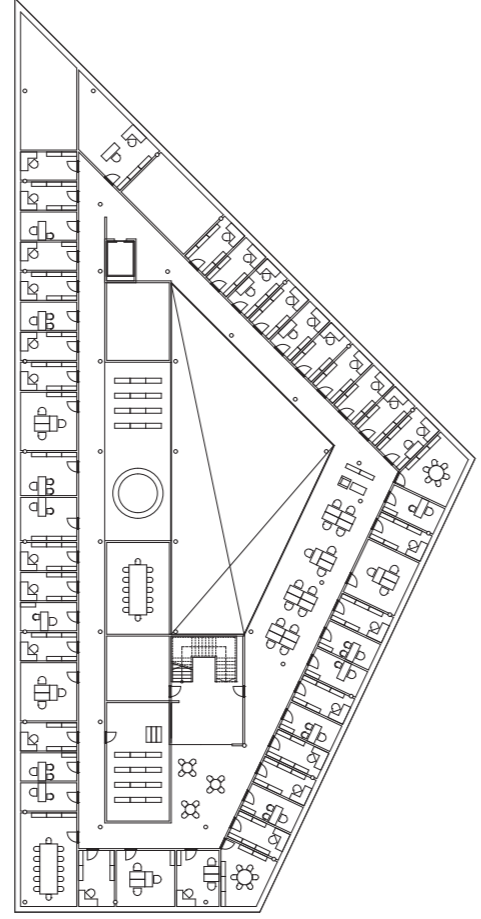
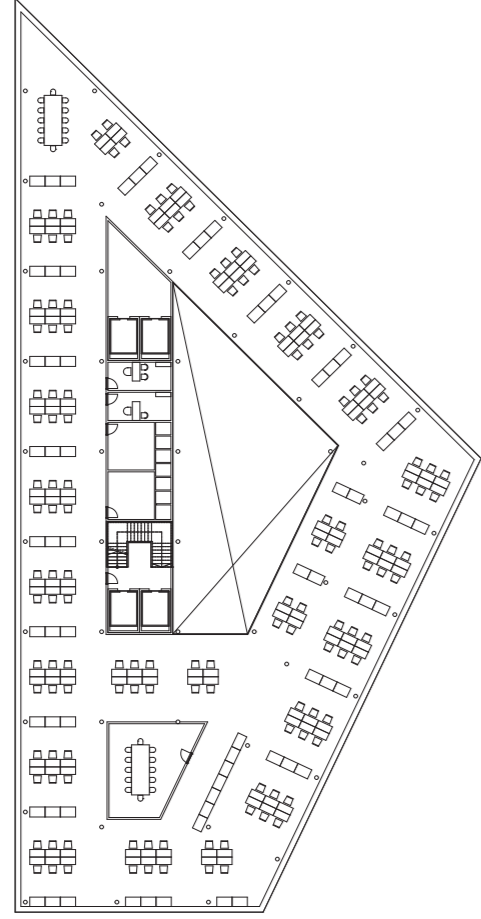
- Må tåle/ta opp i seg energien.
- Hindre at løse deler/fragmenter kastes rundt
 \hookrightarrow sterkt forankrede løsninger \rightarrow Detaljer.
- Plasstøpt armert betong er det beste.

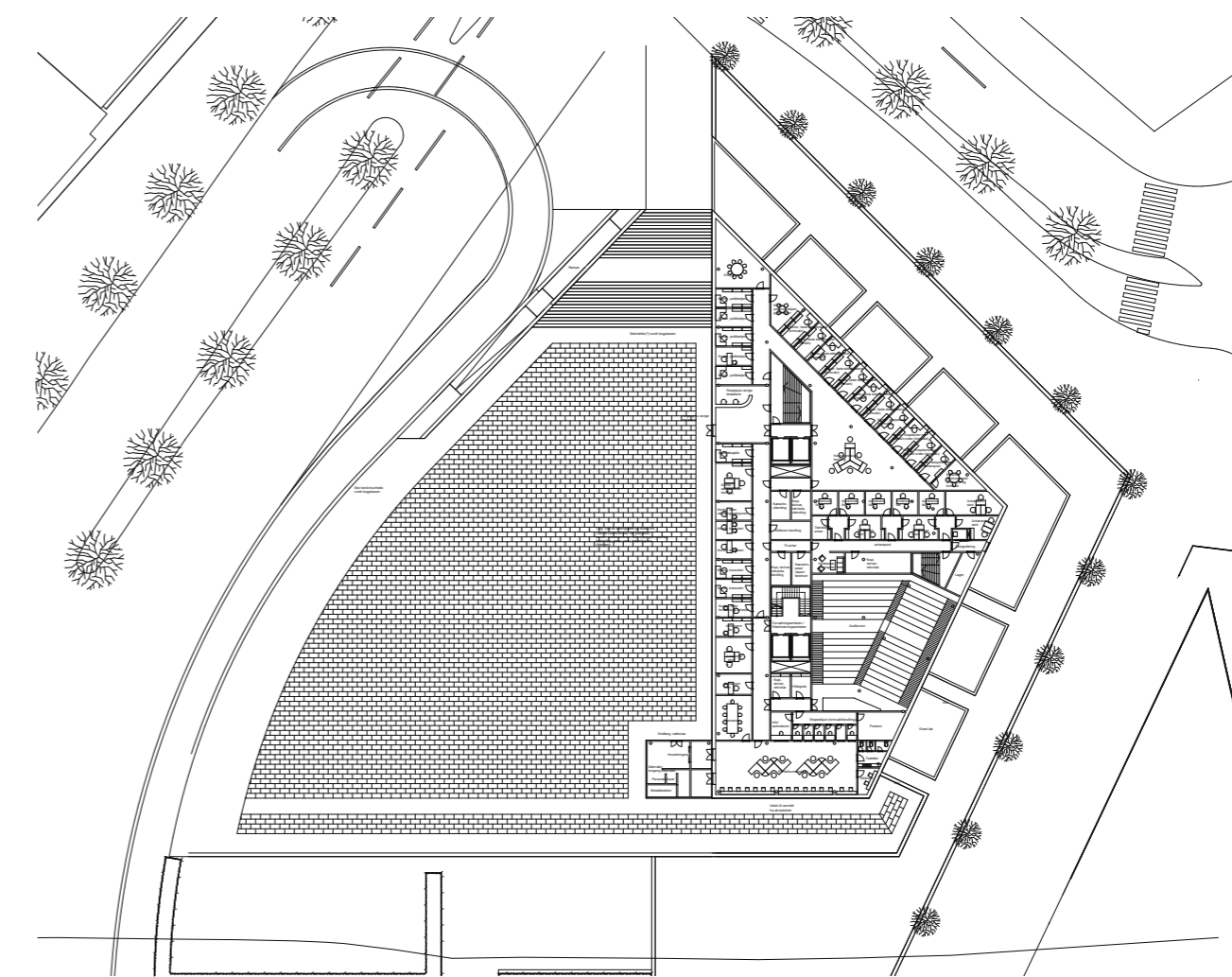
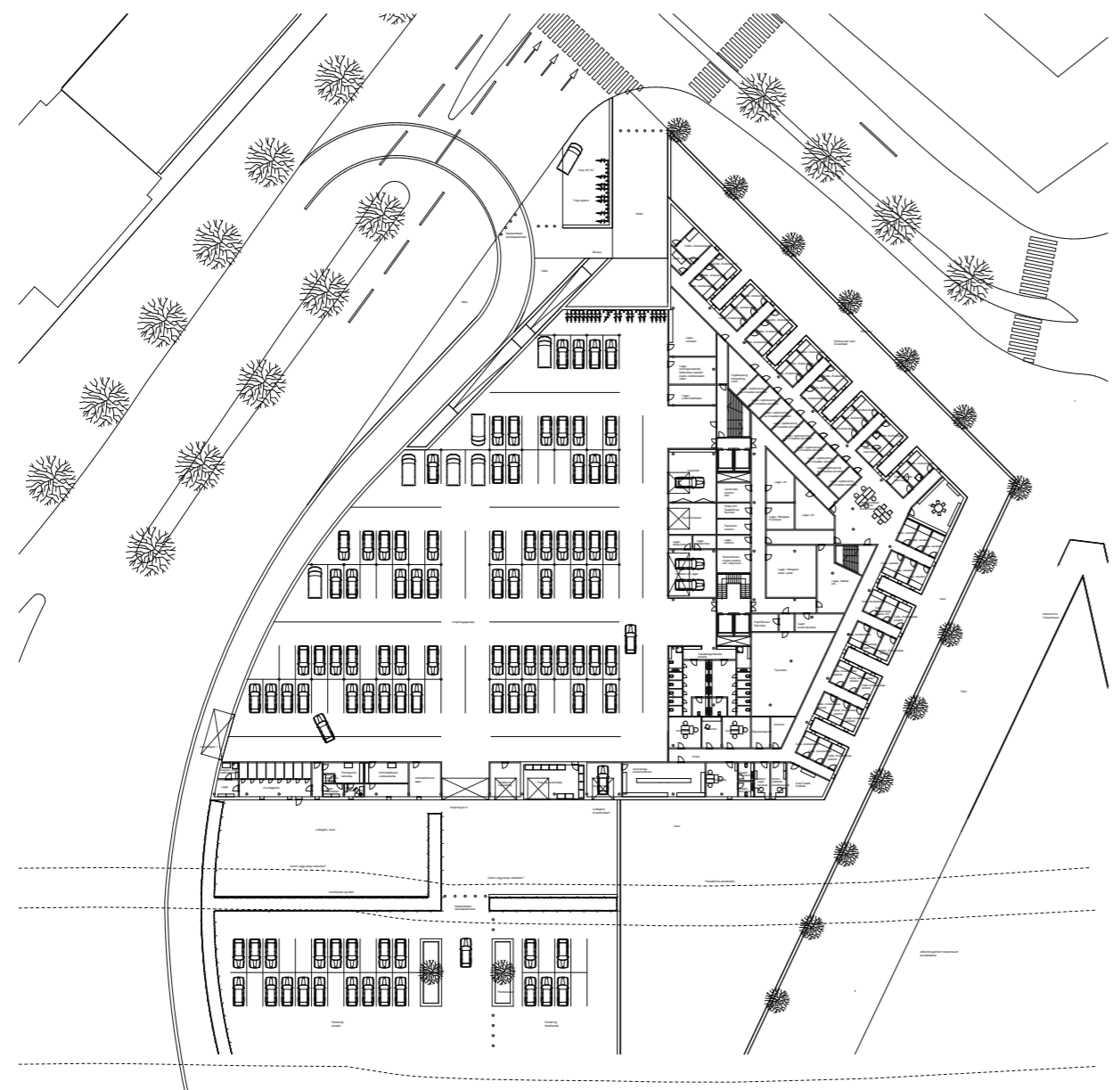


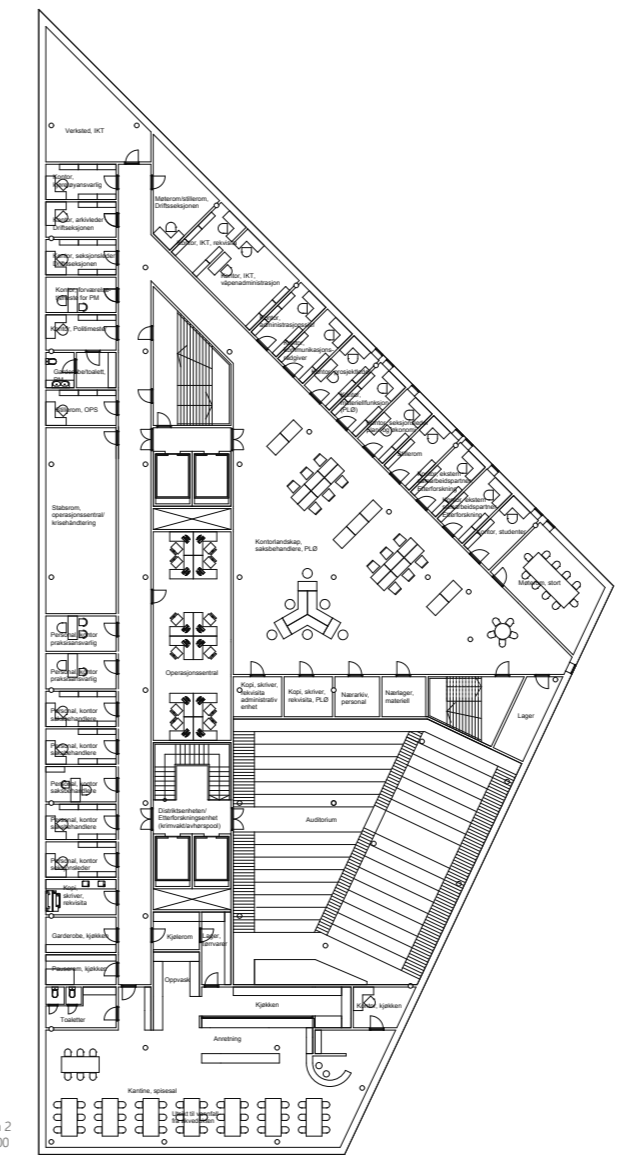
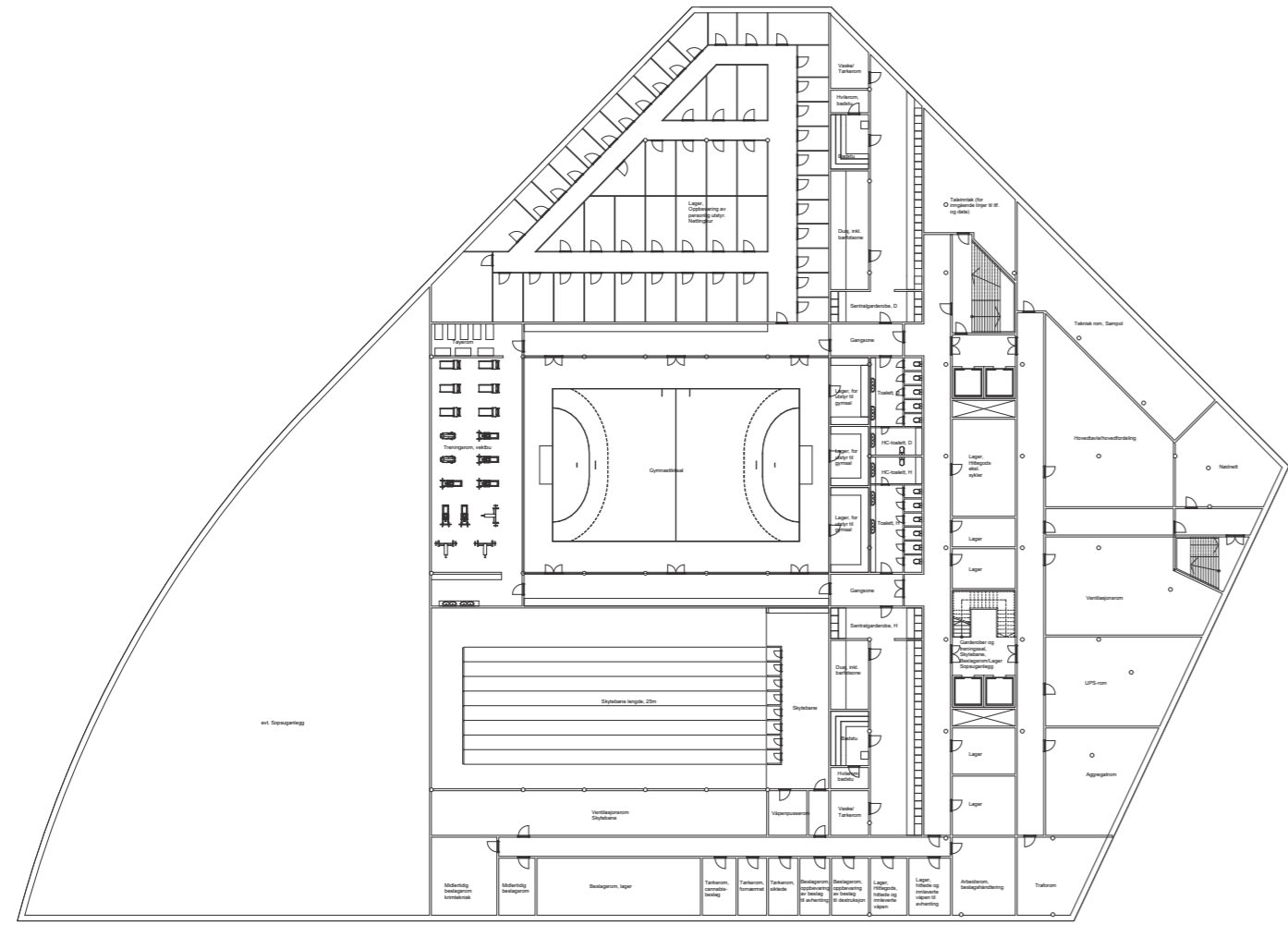
\hookrightarrow Fasaden må kunne ta opp i seg energien fra bomben.







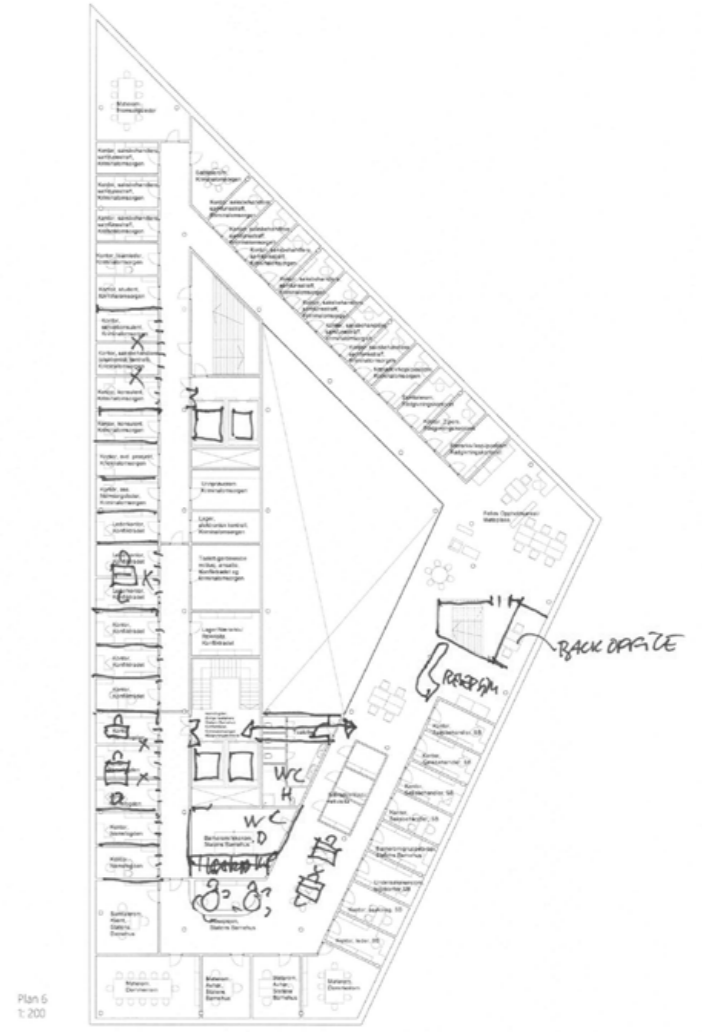
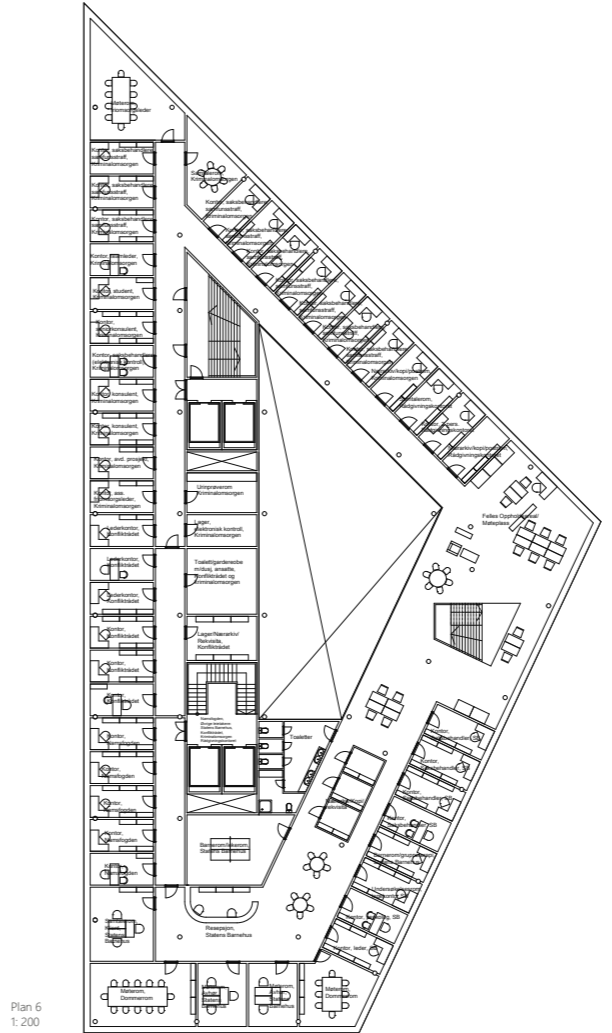
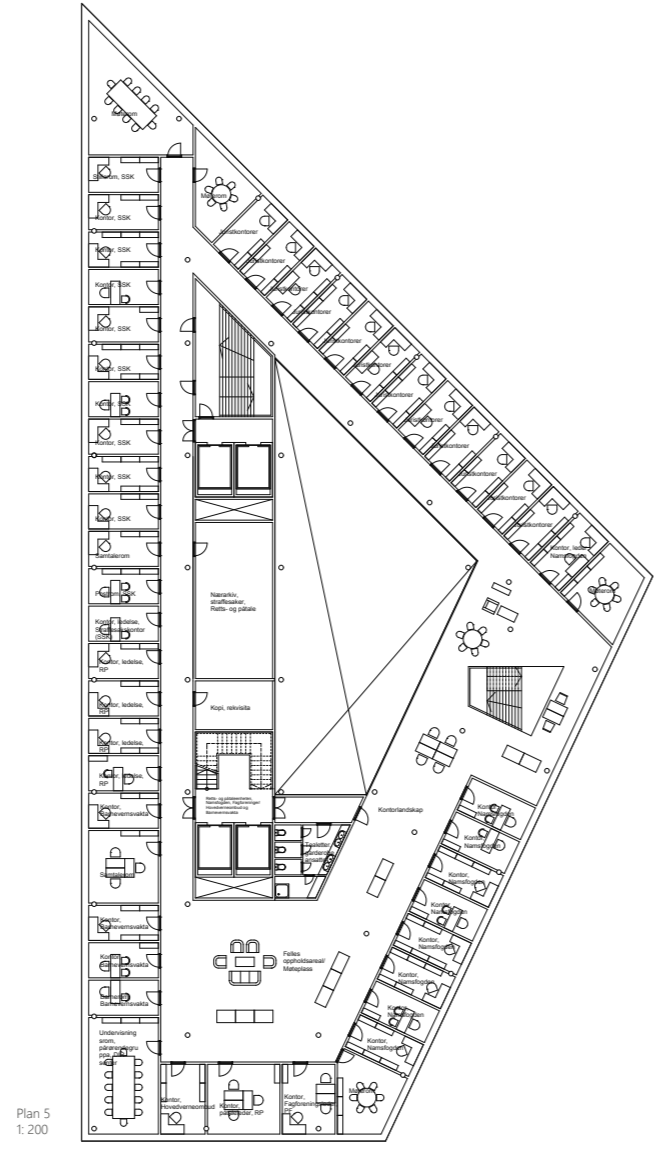
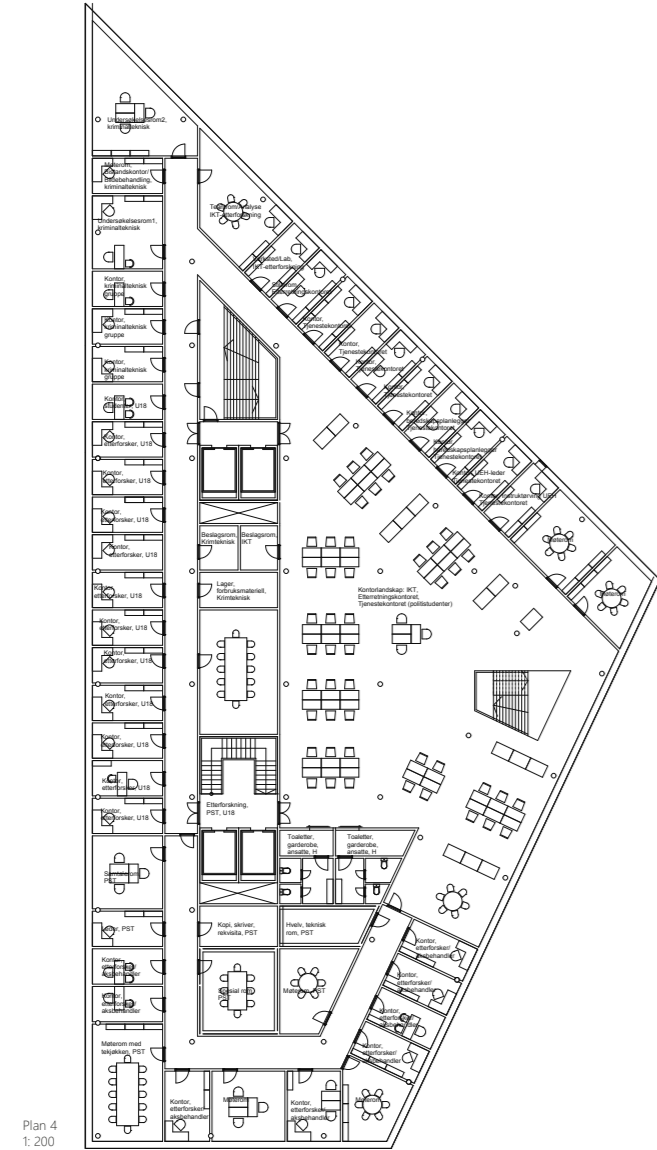


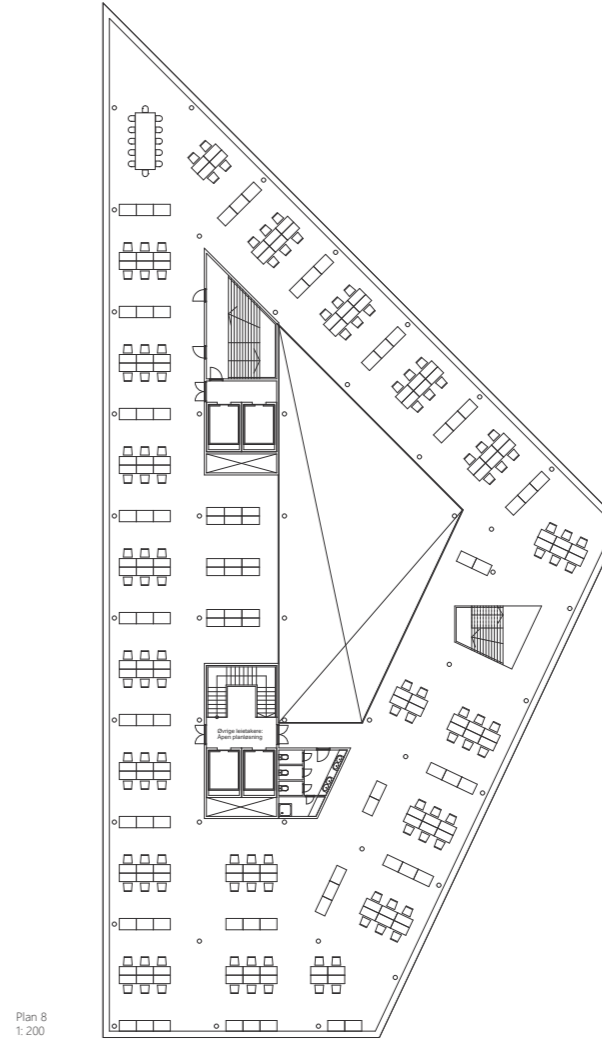
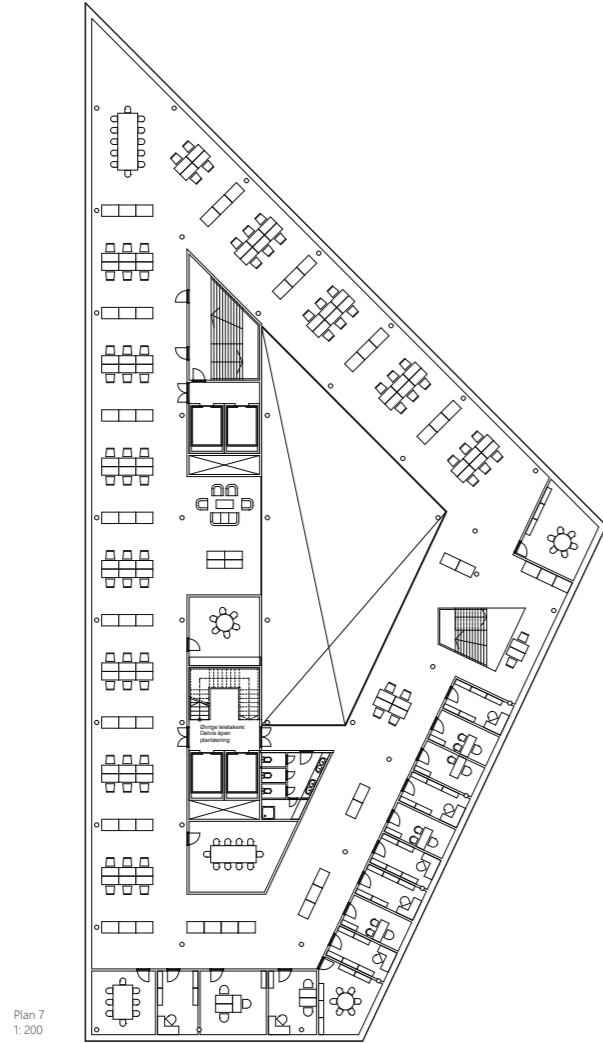


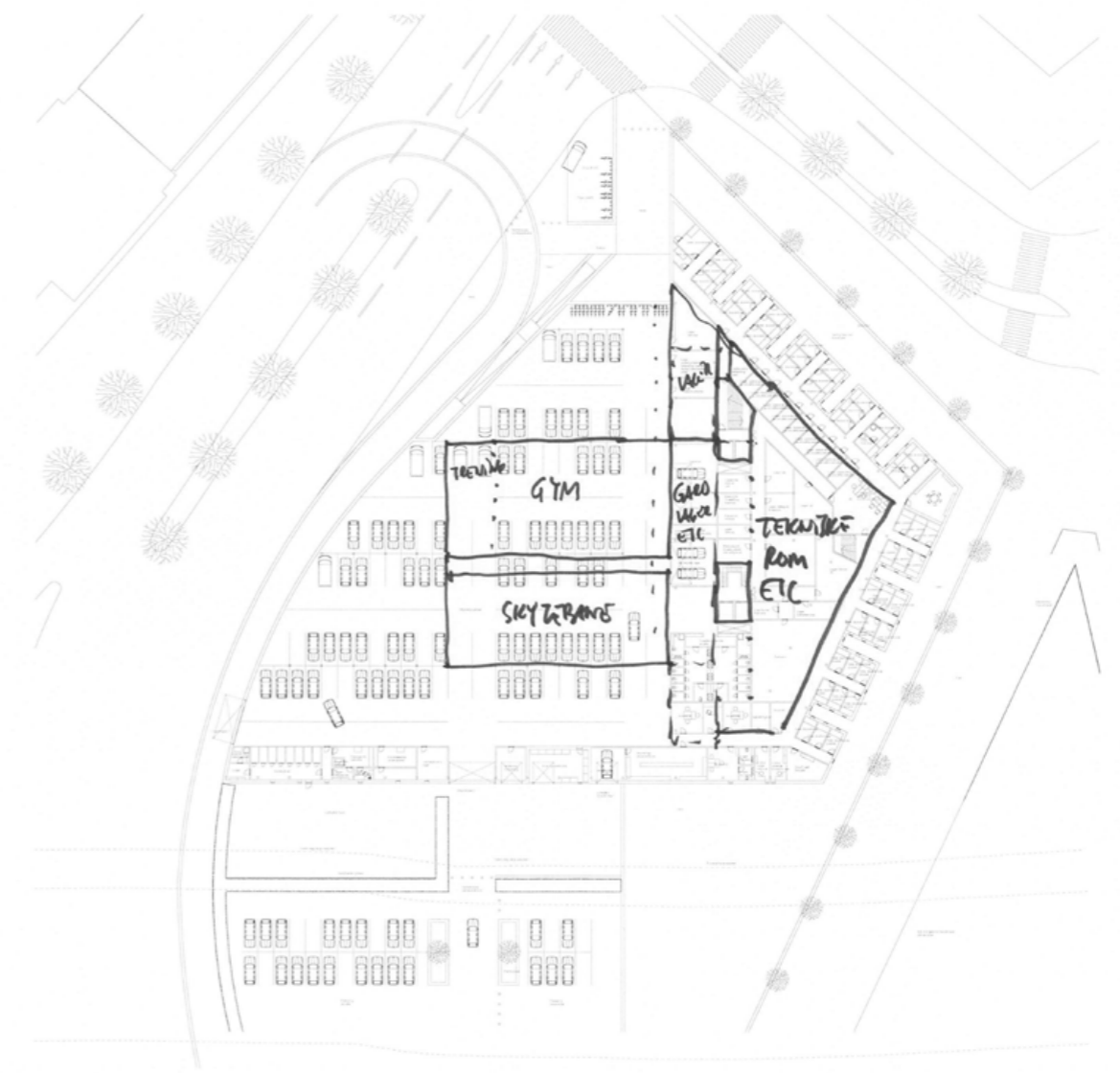
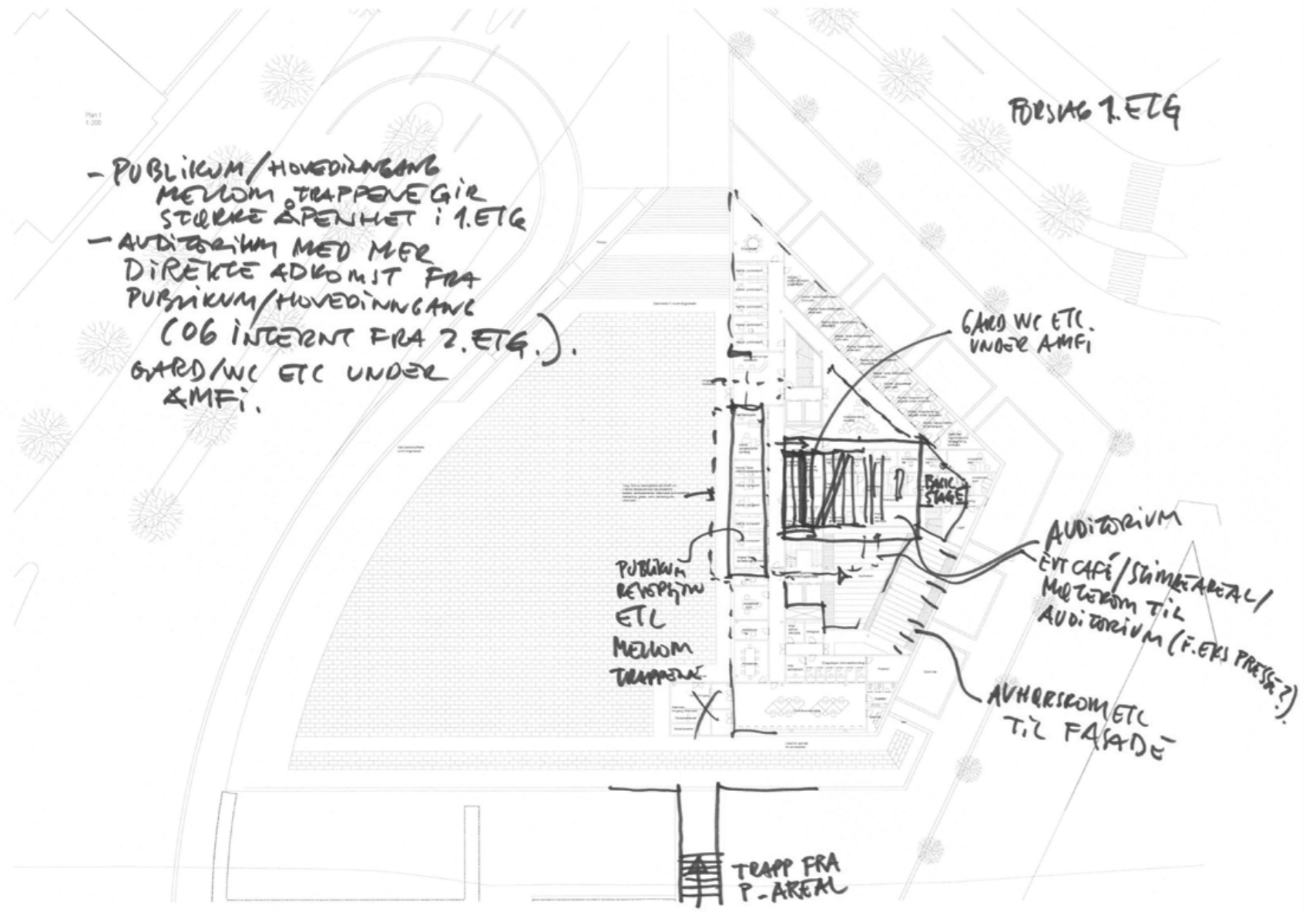
Plan 2
1:200

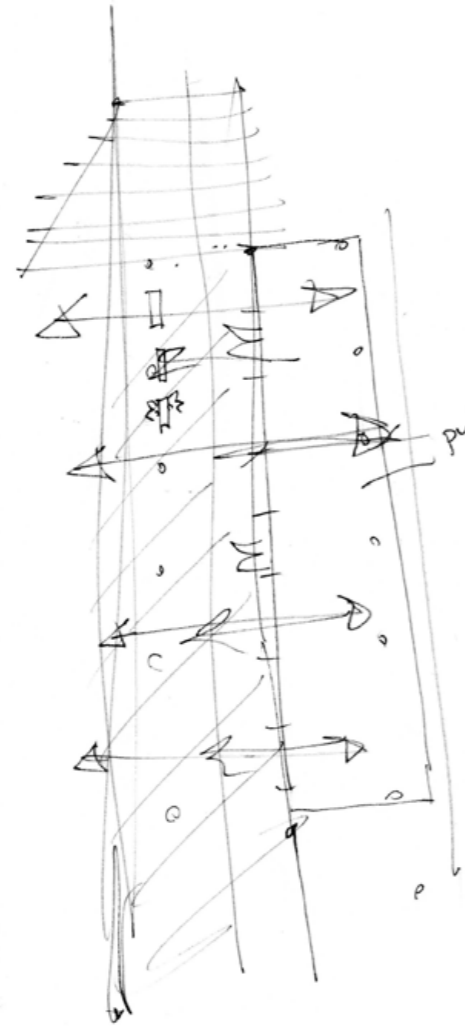


Plan 3
1:200

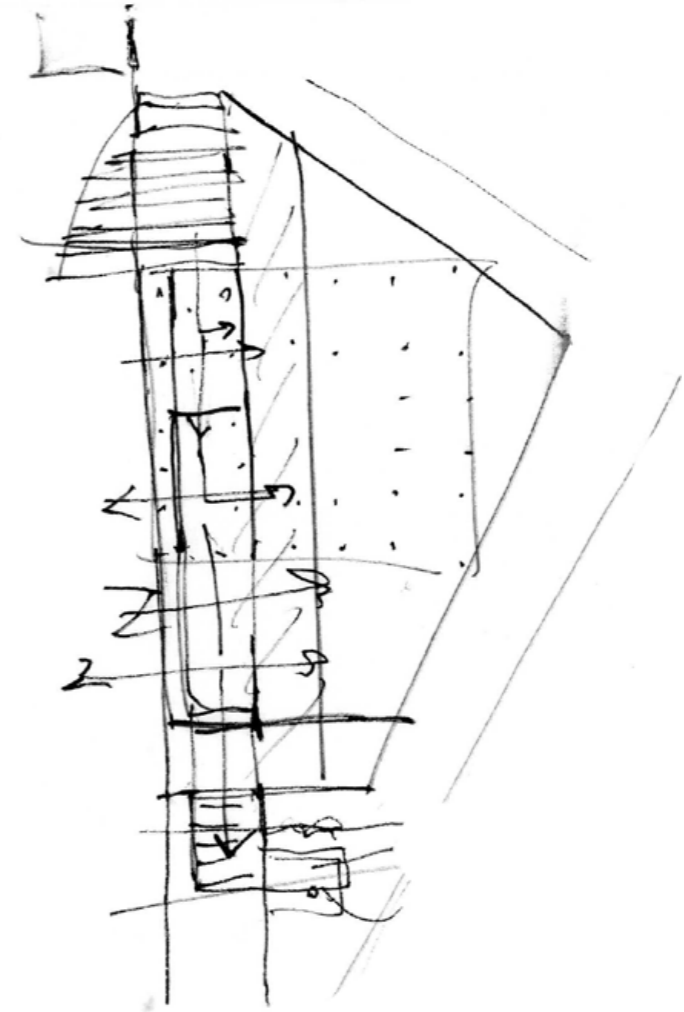


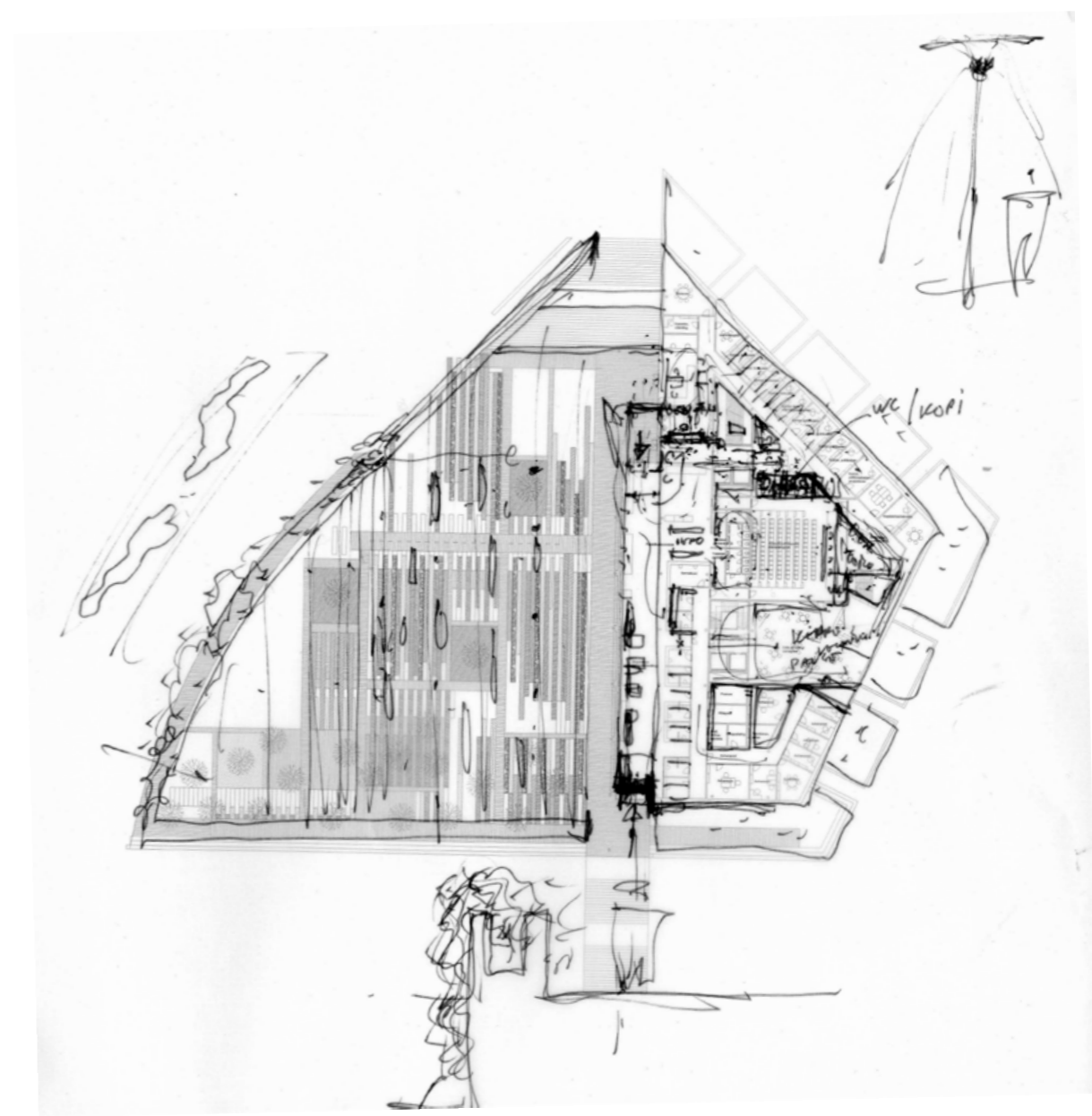
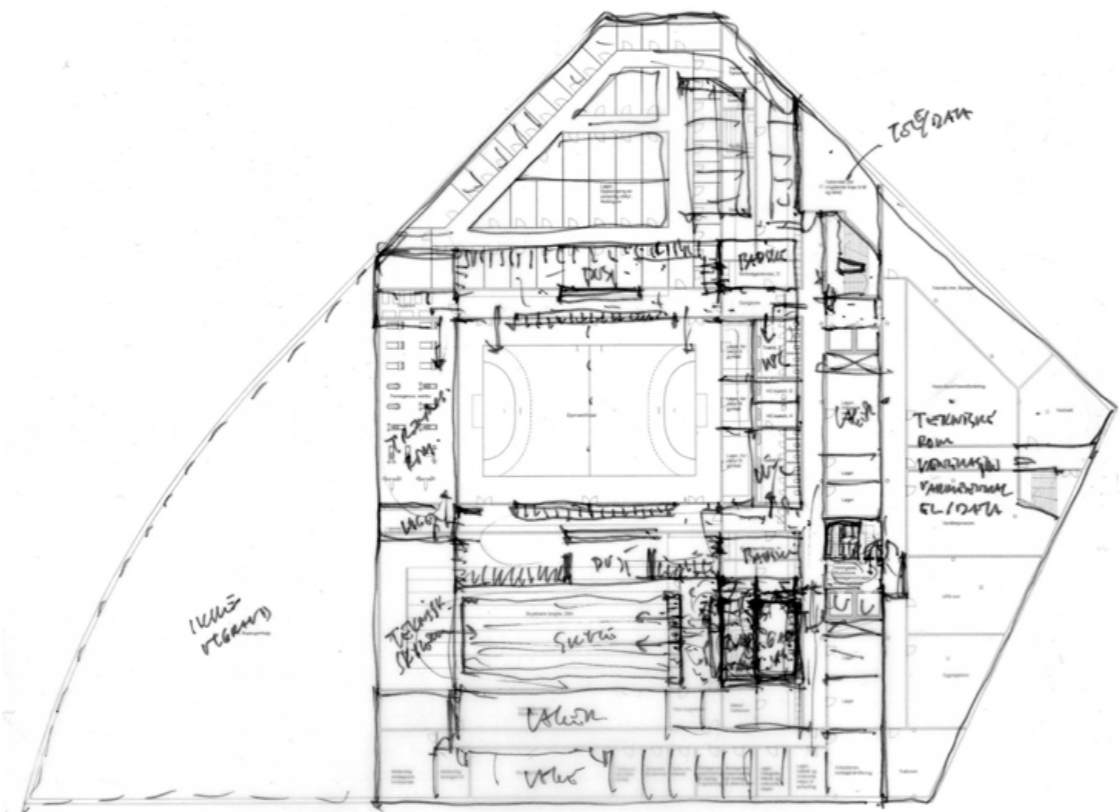


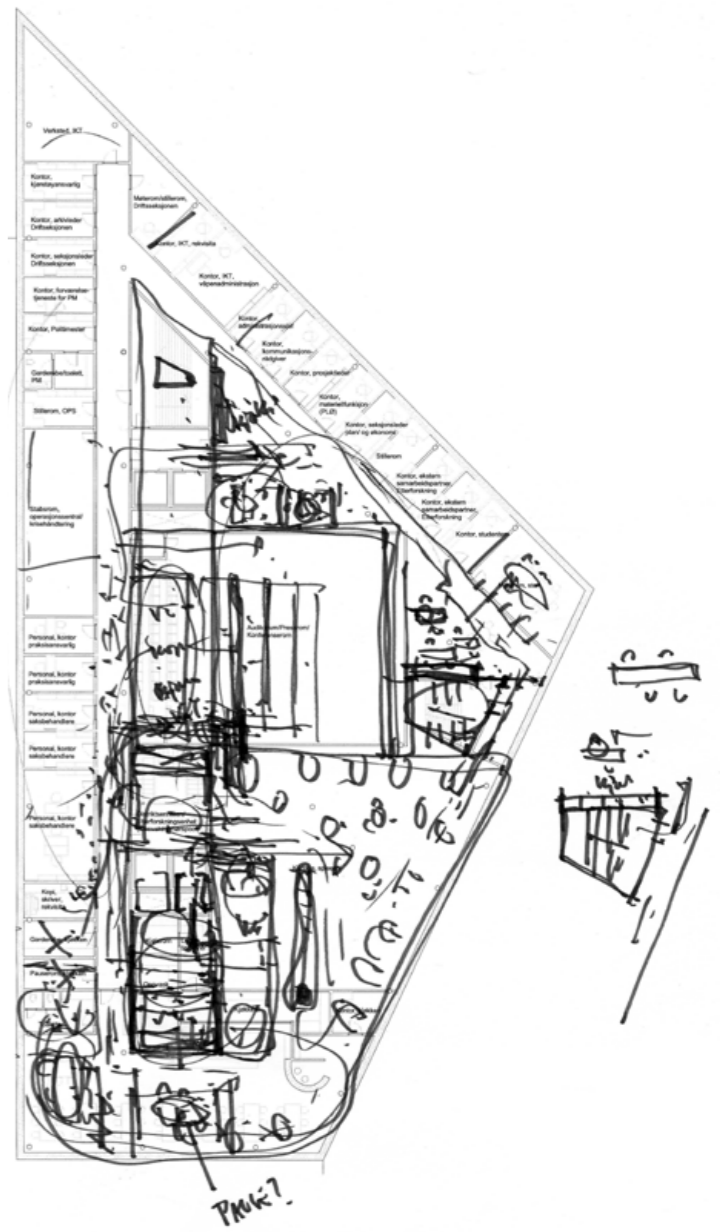
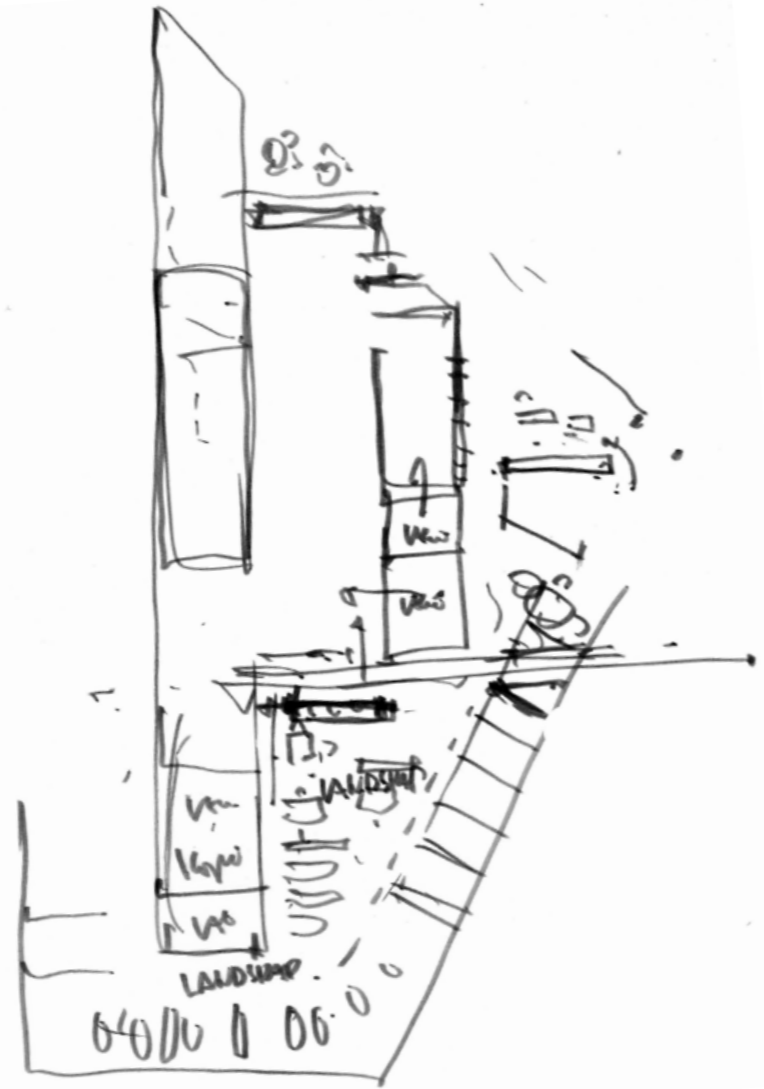
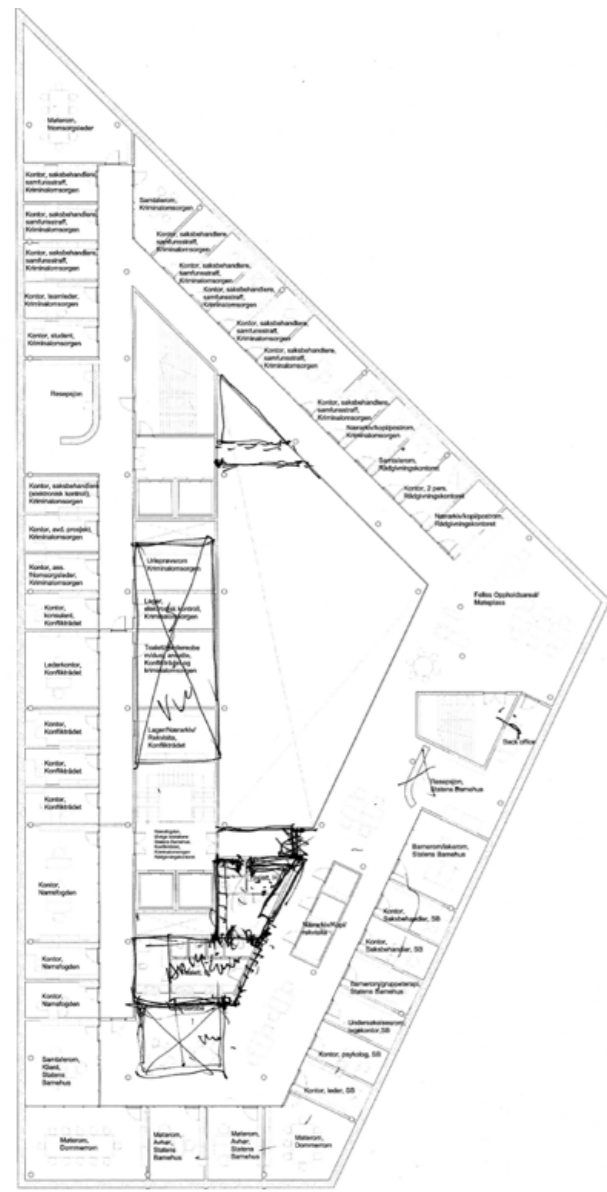


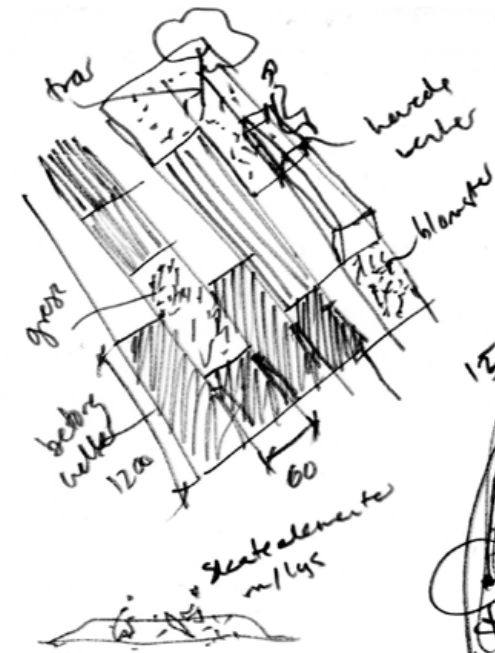


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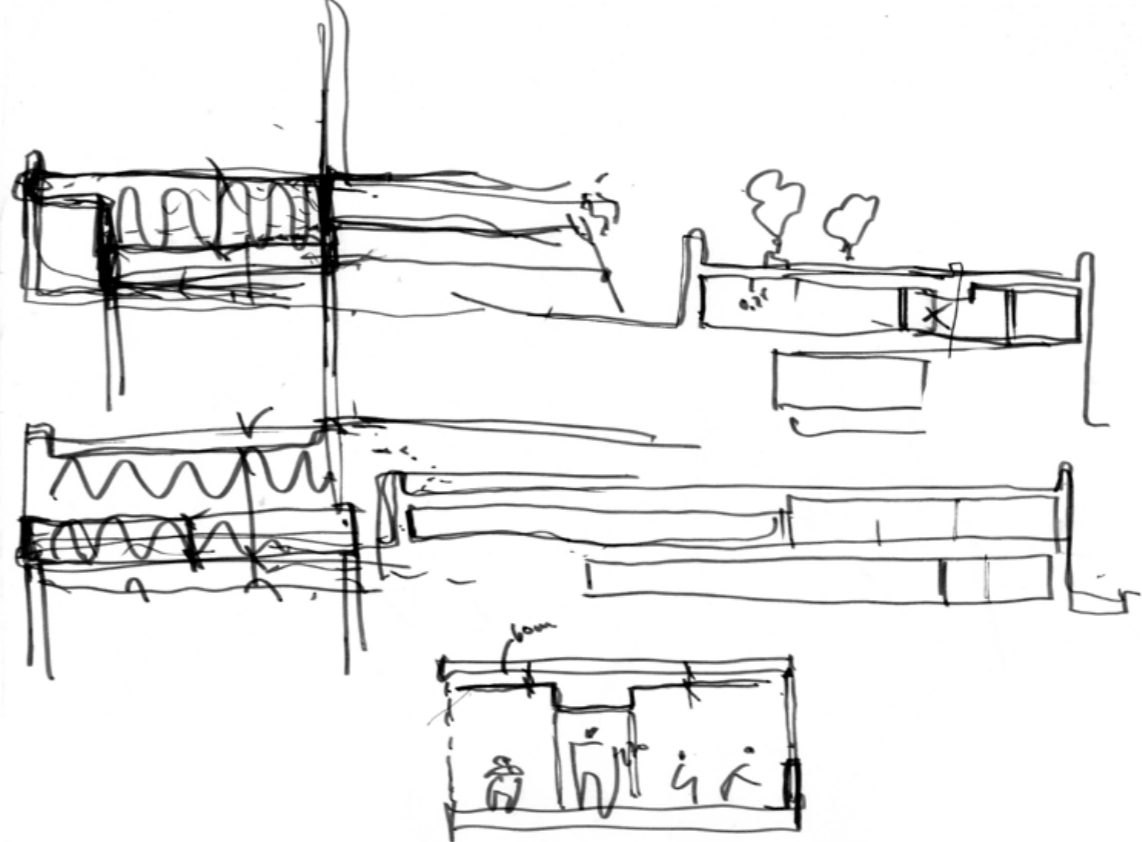
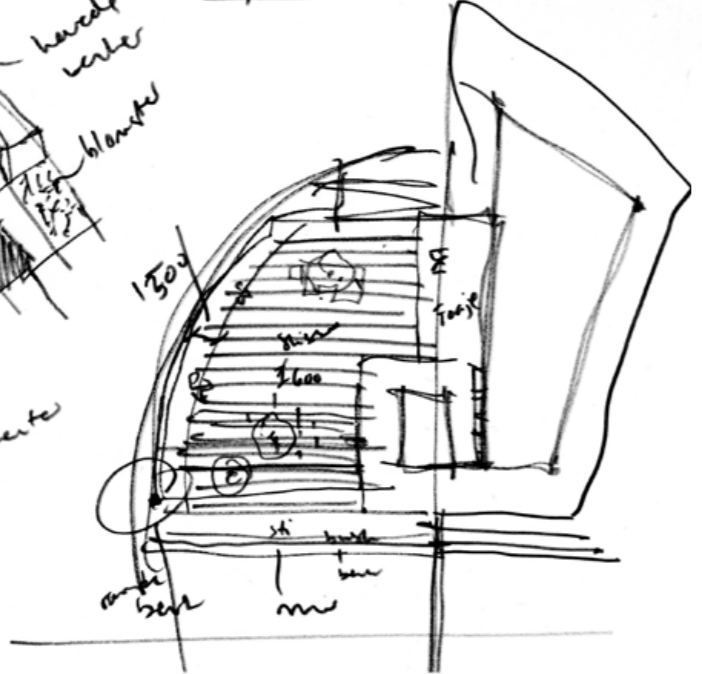


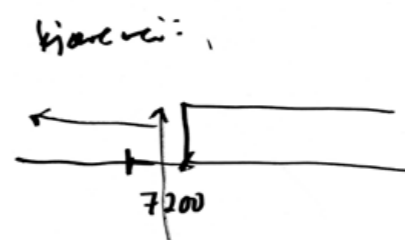
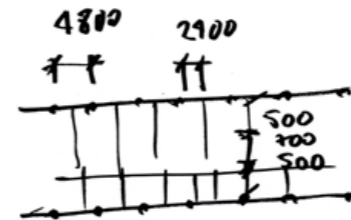
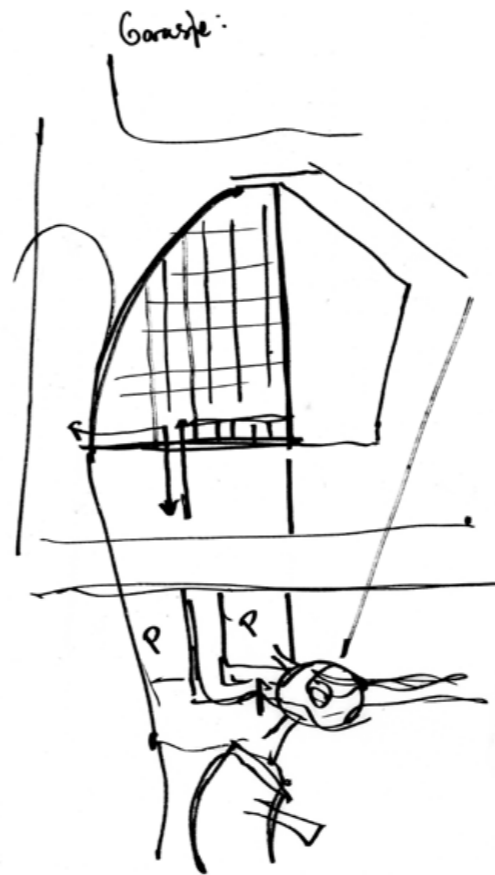
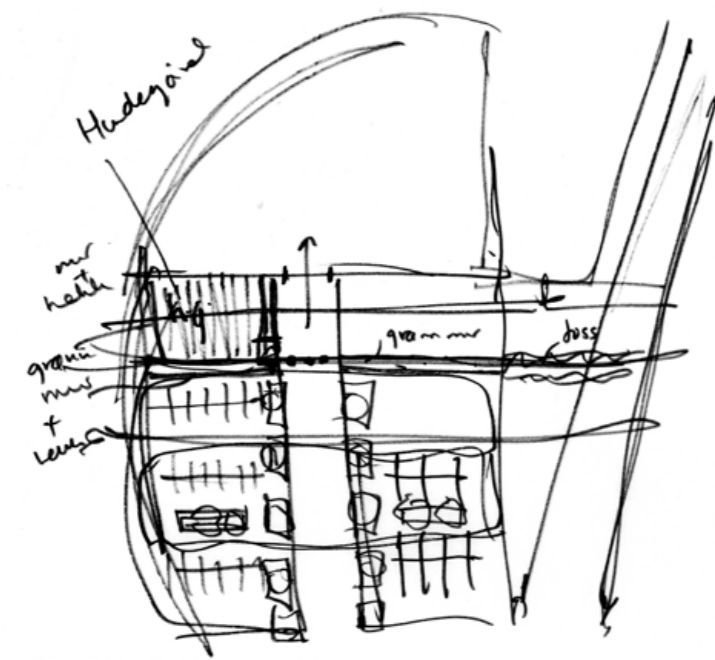






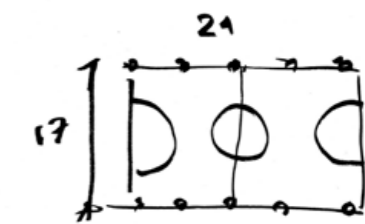
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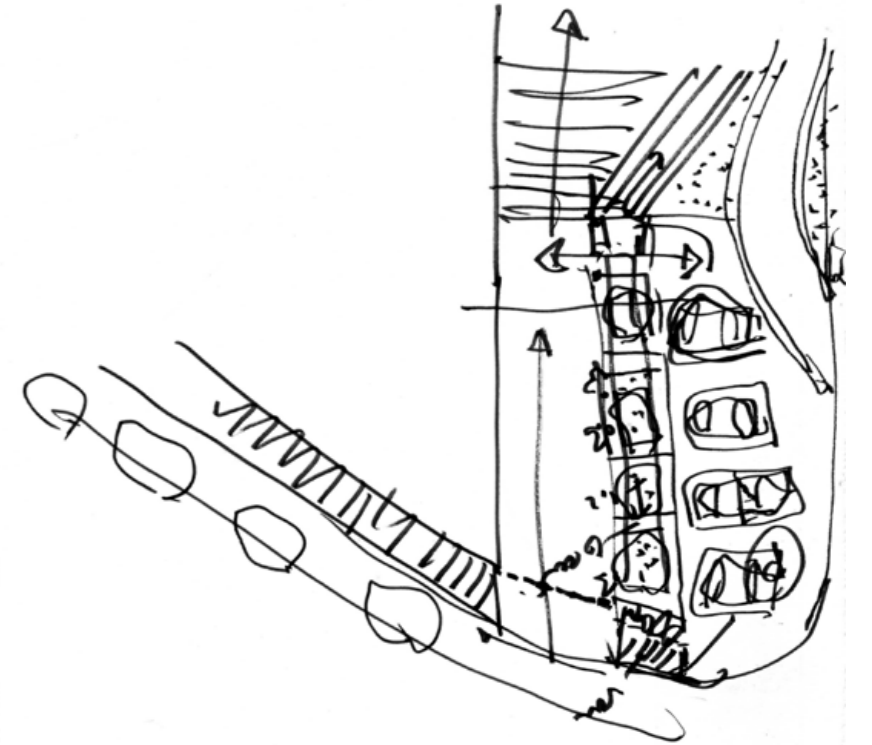
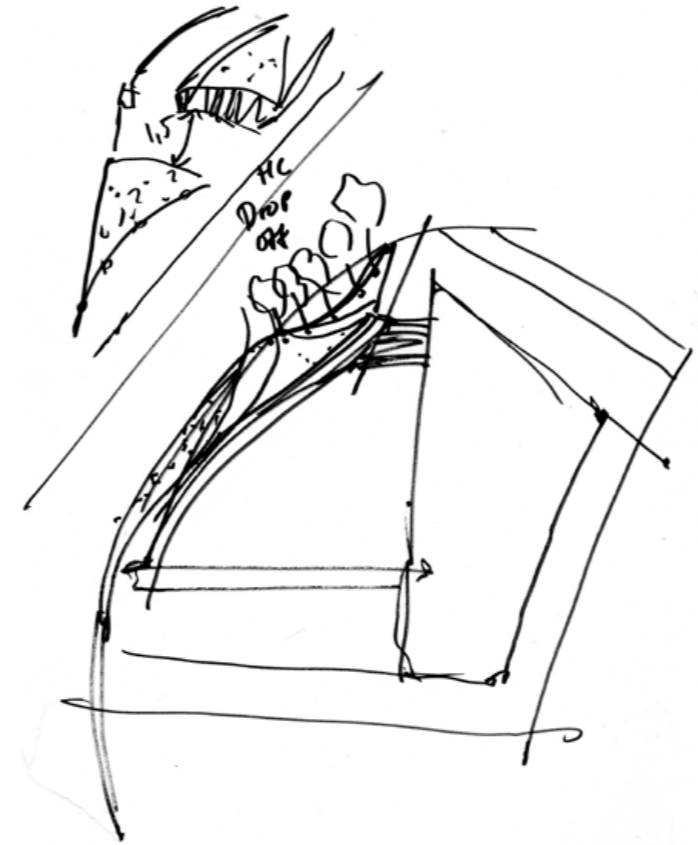
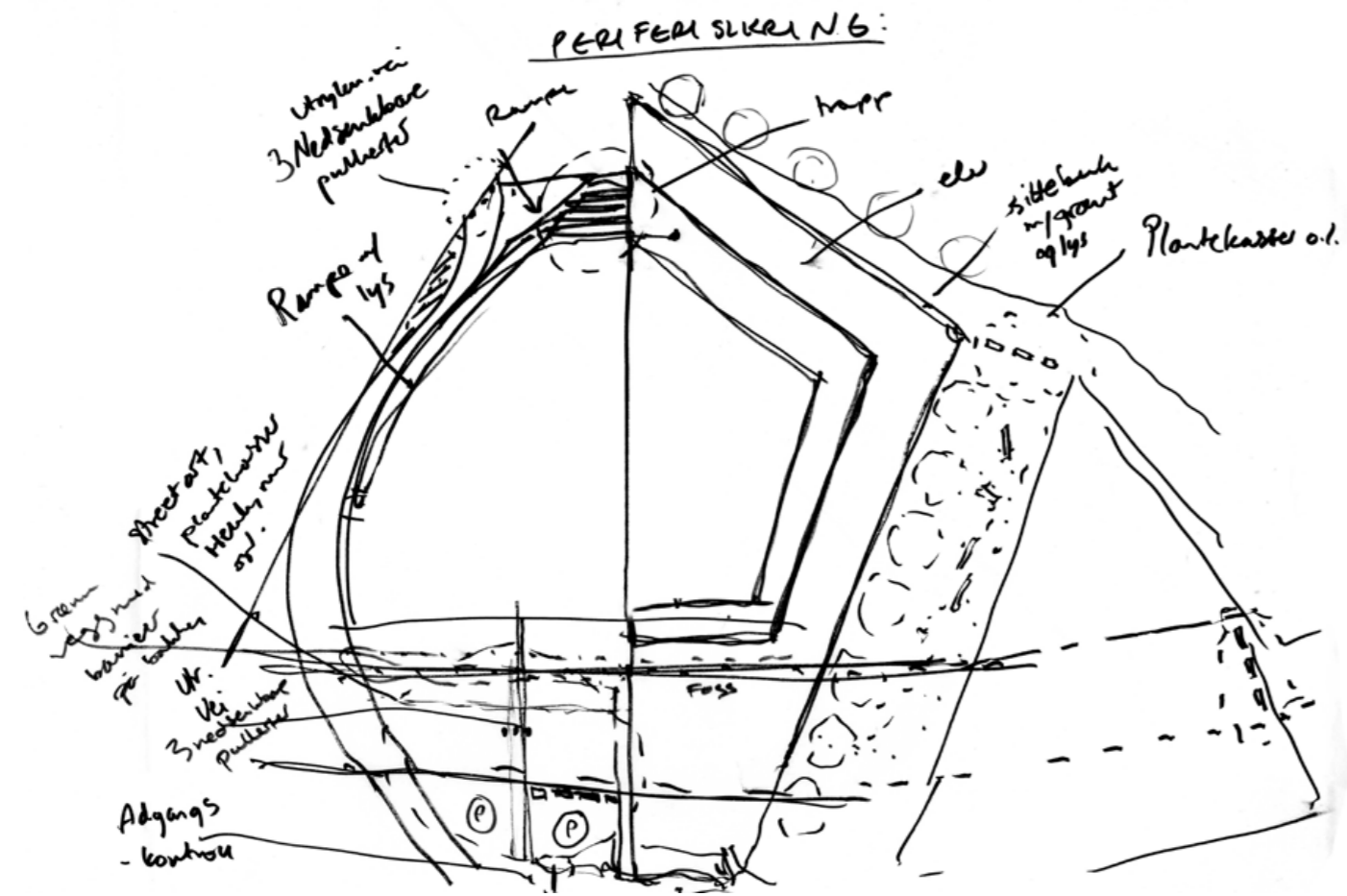


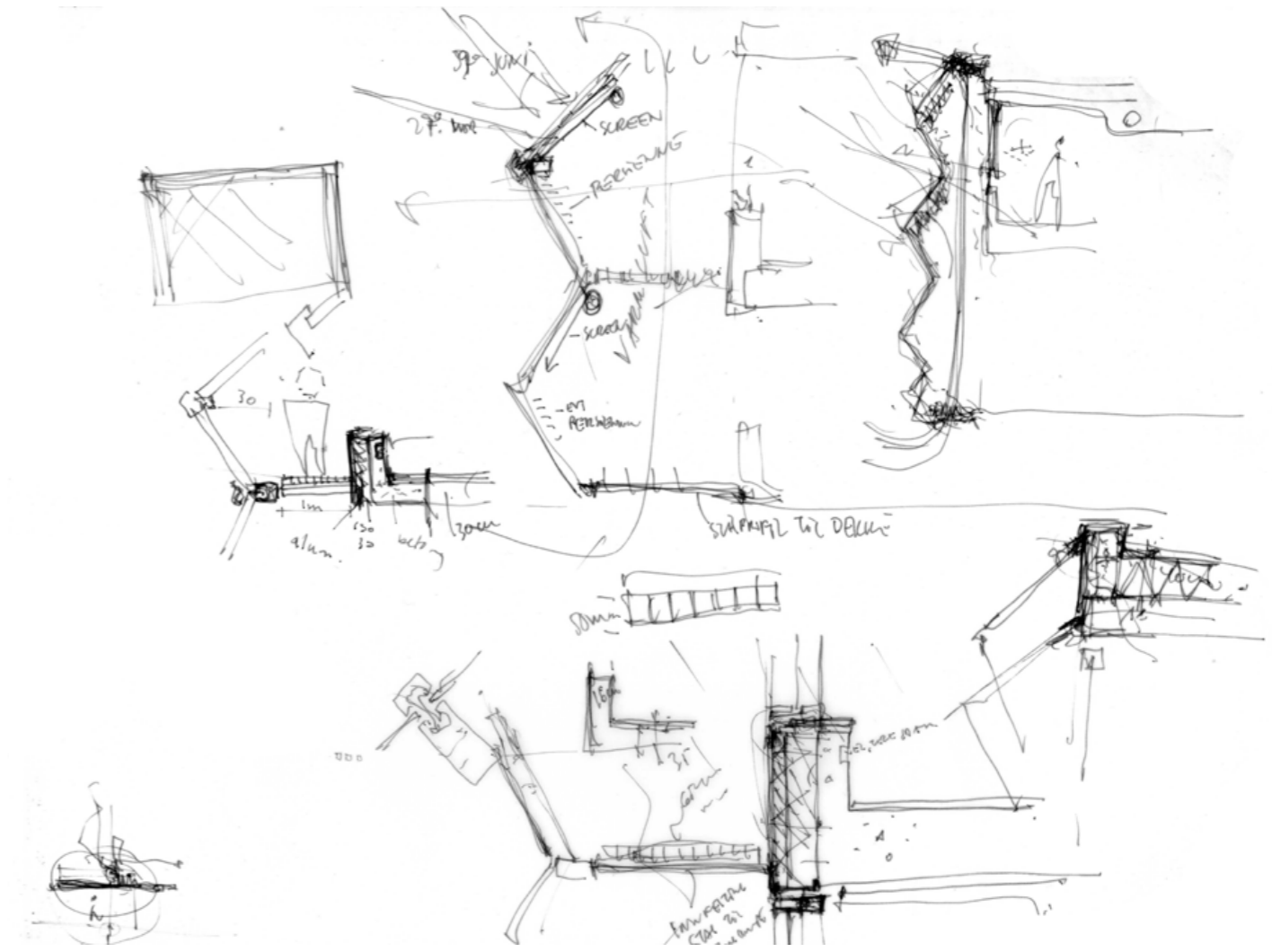
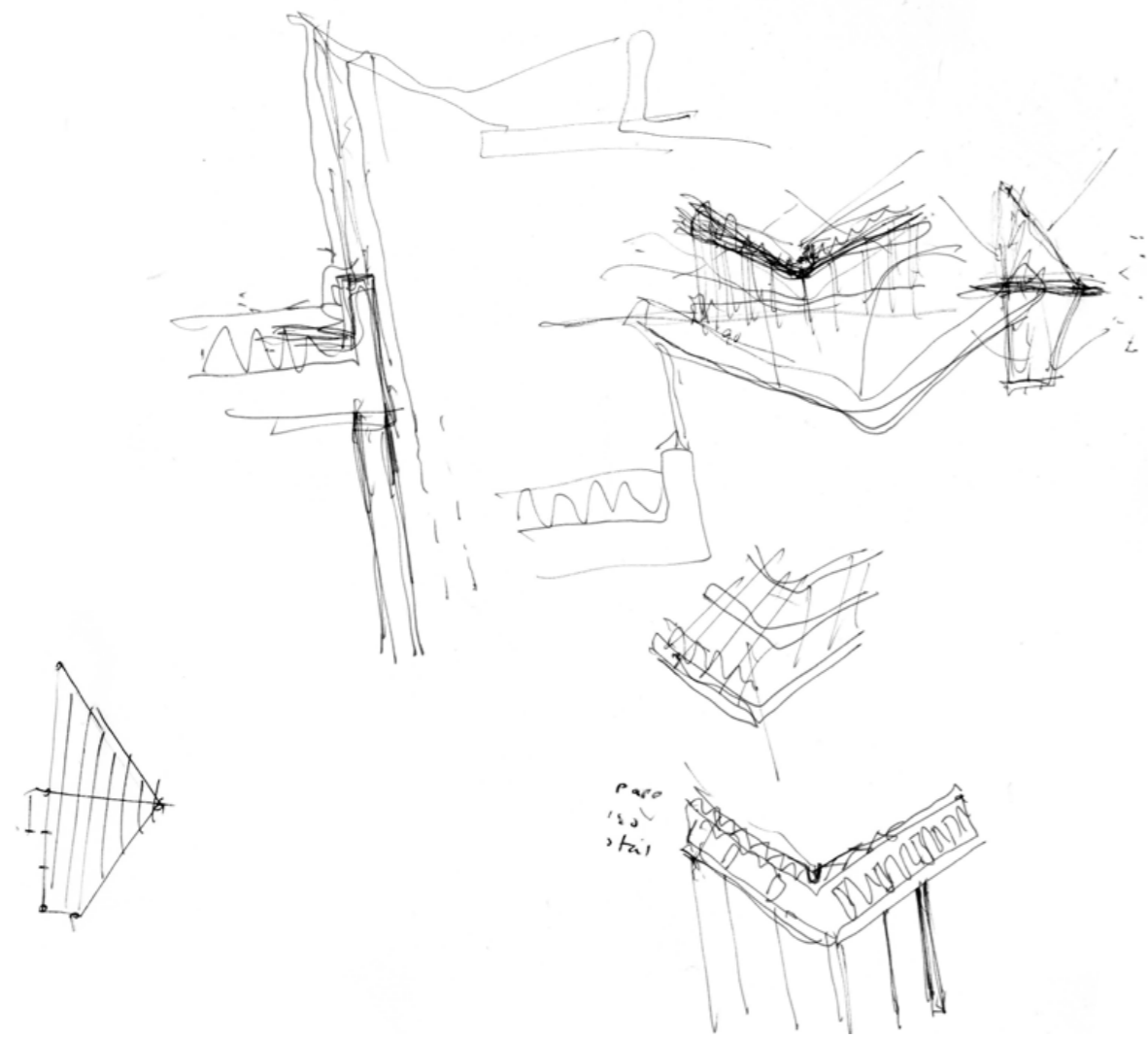


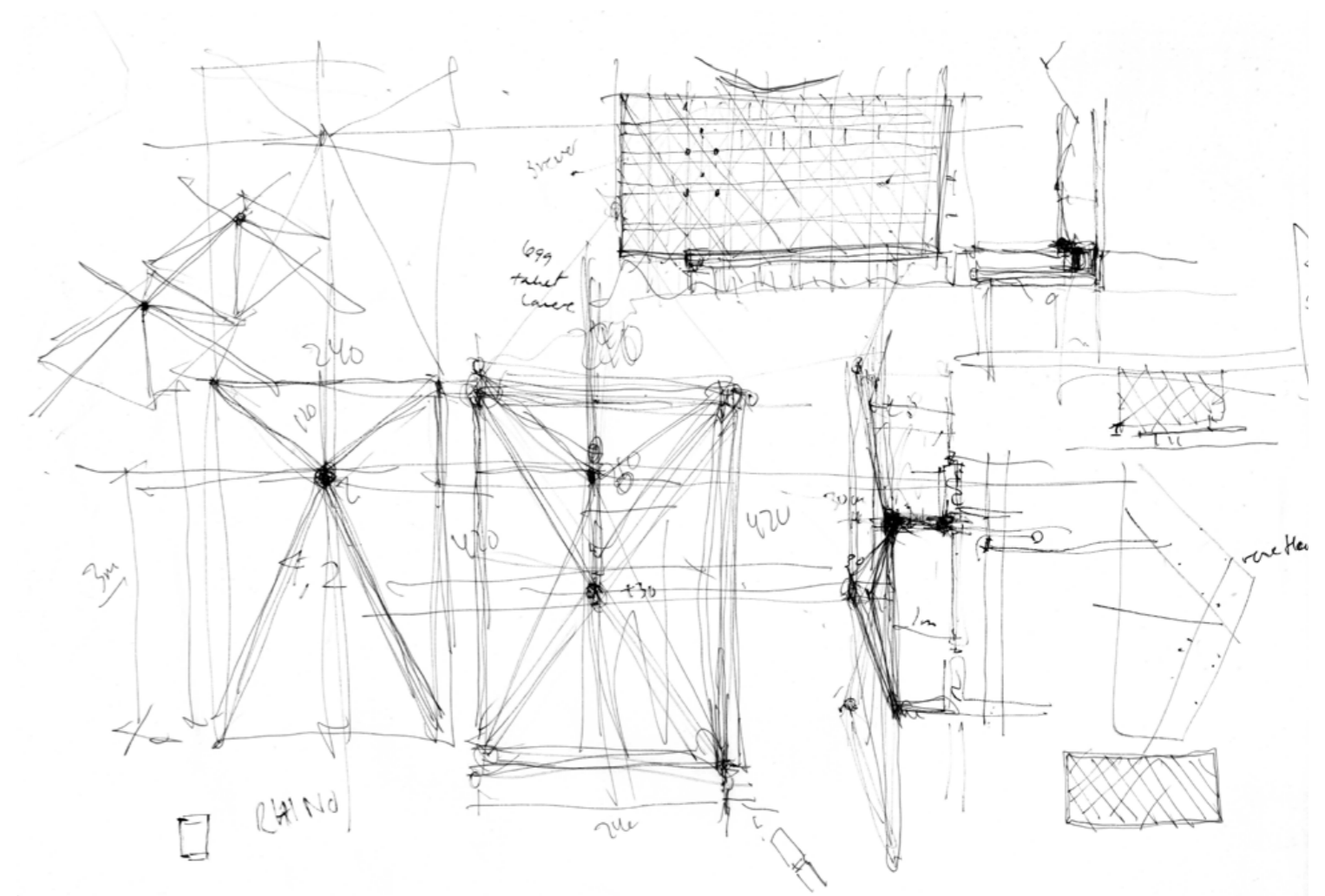
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litteratur

FEMA. Risk Assessment A How-To Guide to Mitigate Potential Terrorist Attacks Against Buildings FEMA 452 / January 2005

