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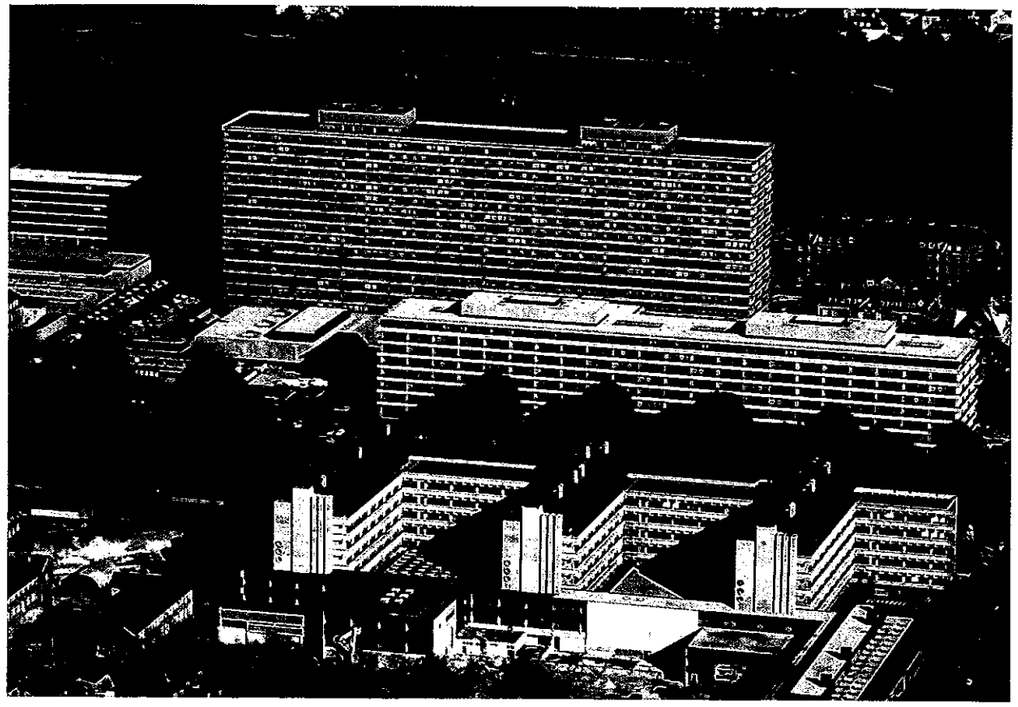
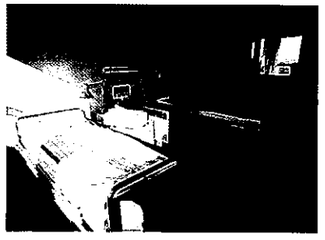
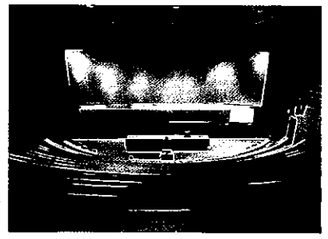
P149

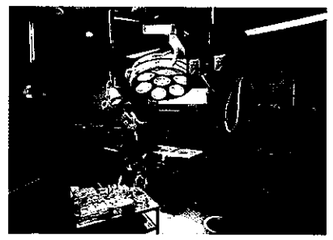
03-11-01-79

Copenhagen University Hospital
Rigshospitalet









Copenhagen University Hospital (Rigshospitalet) is the teaching hospital for the University of Copenhagen and, at the same time, receives patients from all over Denmark for specialist treatment. It is an advanced hospital with a complete range of specialities.

In 1947 a decision was made to enlarge and renew the hospital, and in 1953, an open Scandinavian competition was held on the design of a new hospital on the existing site in the centre of the city. The hospital has a total of 1900 beds and a floor area of 200,000 sq.m.

The new National Hospital is a very good example of a major building complex on an existing site in a congested urban area. The very compact and concentrated form of the buildings – dictated by the limitations of the site – called for completely integrated design and for co-ordination of the planning and architectural aspects and the design of the technical and mechanical installations.

Scope of professional services provided by:

Crone & Koch Consulting Engineers, International:

in co-operation with other consultants:

Mechanical installation design
Electrical installation design
Site supervision.

Key figures of the project:
Total floor area 200,000 sq.m
1900 beds

Architects:
Boeck-Hansen and Stærmose, M.A.A.

Client:
Ministry of Education

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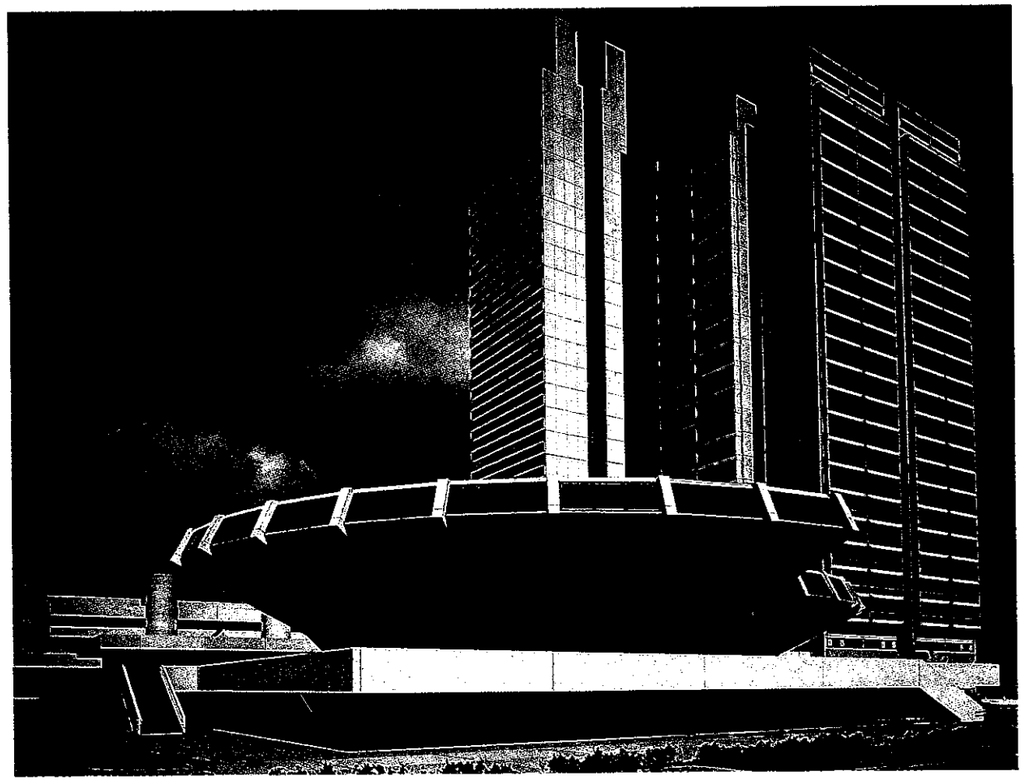
06-11-01-79 P146

The Herlev Hospital



The Copenhagen County Hospital at Herlev is a teaching hospital with approx. 900 beds and a total floor area of approx. 150,000 sq.m.

The ward block has 25 floors, 21 of which have wards and the balance have administrative purposes.

The treatment block is in principle a one-storey building. All diagnostic, treatment and therapy departments are located in this block, which is designed with emphasis on flexibility, adaptability and possibility for expansion.

The service block contains auxiliary functions such as central sterilizing department, kitchen, central bedding station, workshop, stores etc. For each department fully automatic transportation system can carry large size containers (trollies or beds) to and from the distribution centre.

Engineering services
All pipes, ducts and cables are placed with easy access for extensions, modifications and repair without disturbance to other departments.

Medical gases
Oxygen is supplied as liquid oxygen piped throughout the hospital.

N_2O is supplied in batteries of bottles piped to OP theatres, delivery units, intensive care wards etc.

A central vacuum plant produces vacuum to all ward rooms, to theatres and to a number of rooms in the treatment block.

Special gases are supplied only to areas with very specific need and include reticulation of N_2, He, Ar, H_2 and C_2H_2

Ventilation/Air conditioning
All buildings are totally air conditioned. All exhaust air is rejected, no air is recirculated.

Heating
Heating is supplied as district heating from a large incinerator plant situated about 4 km south of the hospital. The heating medium is h.t.h.w. with a flow temperature of 165°C.

Chilled water
Cooling is generated from the waste heated h.t.h.w. by absorption units supplying 6°C/12°C to air conditioning cooling coils.

Steam
Steam is generated from the waste heated h.t.h.w. for humidification in the ventilation plants, for disinfection and in autoclaves in the CSSD.

Fire protection
In all buildings automatic sprinkler extinguishing systems are installed. Furthermore a number of smoke detectors are placed in the buildings activating automatically closing smoke-doors.

Supervisory control data centre
All technical installations are supervised and controlled.

Scope of professional services provided by:
Steensen & Varming International Consulting engineers and planners.

Planning/briefing of hospital and design/documentation and contract administration/site supervision of engineering services described.

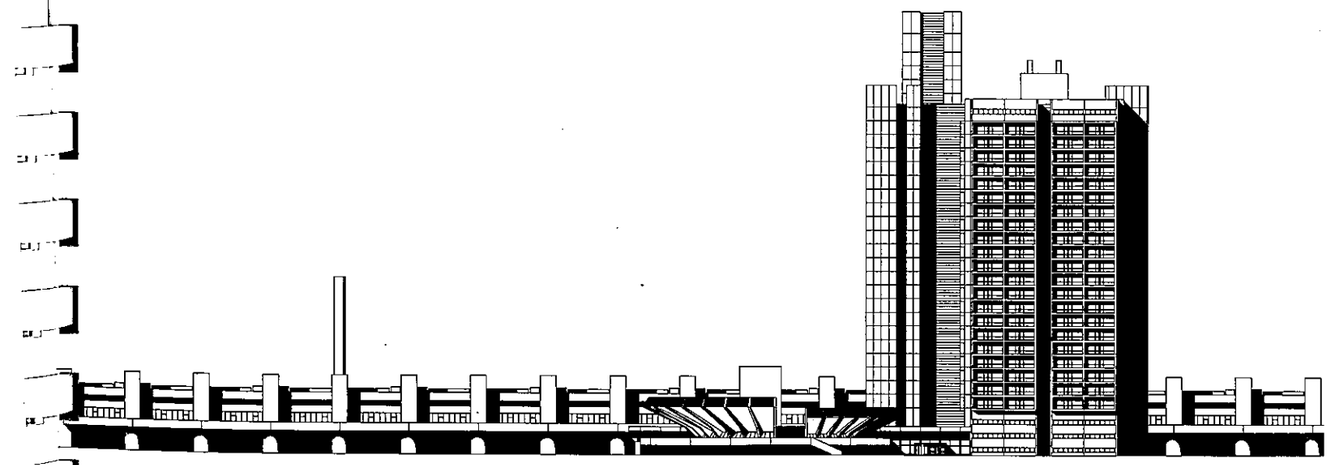
Key figures:
Phase 1 construction completed 1976.
Phase 2 scheme design being prepared.
Total number of beds approx. 900.
Total floor area approx. 150,000 sq.m.

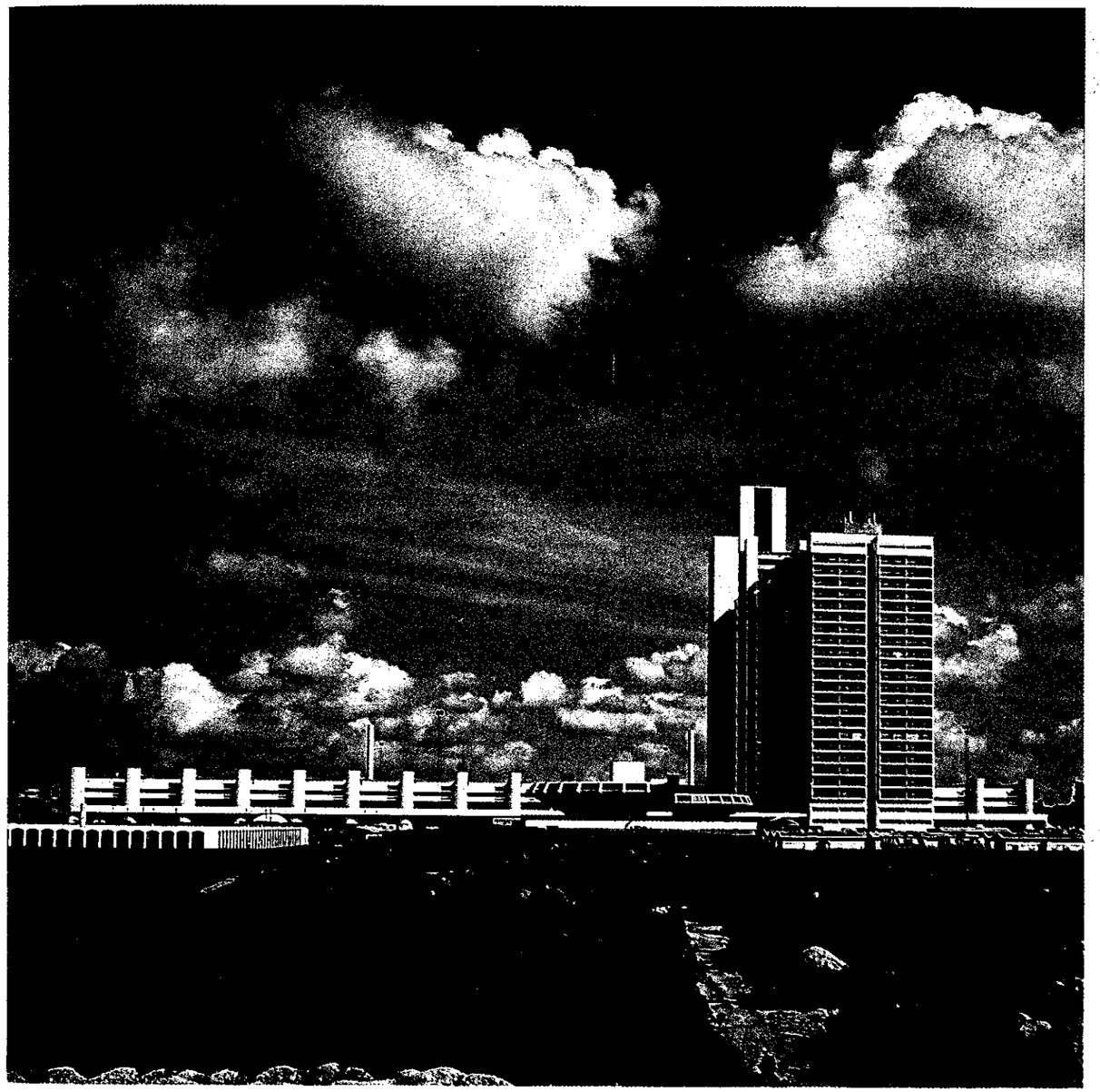
Architects:
Gehrdt Bornebusch, Max Brüel & Jørgen Selchau

Client:
Copenhagen County Council.

Københavns Amtssygehus i Herlev

Arkitekter: Bornebusch, Brüel & Selchau
ved professor Jørgen Selchau





Københavns Amtssygehus i Herlev

Arkitekter: Bornebusch, Brüel & Selchau ved professor Jørgen Selchau

I begyndelsen af 60'erne, da planlægningen af Københavns amts nye sygehus i Herlev blev påbegyndt, var hovedstadsregionen i stærk vækst, både befolkningsmæssigt og økonomisk. Det var tillige en periode, hvor sygehusteknologien var inde i en stærk udvikling. Sygehusets kapacitet, målt i sengepladser og behandlingsmuligheder blev bestemt af de forventninger til en fremtidig udvikling, som da var fremherskende. Sygehusets størrelse og relative centrale beliggenhed var desuden motivering for udformningen af hospitalet med to auditorier, så det kunne øge lægeuddannelsens faciliteter i hovedstadsområdet.

Fuldt udbygget vil sygehuset rumme 988 senge for somatiske patienter under direktoratet for Københavns amts sygehusvæsen. I behandlingsbygningen er der skabt fleksible muligheder for indretning af de mange behandlingsmuligheder, der skal være til stede i et stort sygehus.

I 1964 var man nået frem til at fastlægge sygehusets størrelse, disponeringen af rummene og bygningsanlæggets ydre form. I 1976 kunne størstedelen af sygehuset tages i brug. De øverste etager i sengebygningen er ikke taget i brug og udgør en reserve til fremtidig udvidelse. Desuden er det muligt at udvide behandlingsbygningen. De to auditorier er endnu ikke indrettet til brug.

Det enkle princip for sygehusets organisation er udtrykt i bygningens form.

Sengeafdelingerne er placeret i et 25 etager højt tårn, hvis vertikale kommunikations linier er placeret i et selvstændigt elevator-

Københavns Amtssygehus i Herlev.
Bygherre: Københavns Amtskommune.
Opførelsesår, 1. etape: 1966-76.
Projektet tidligere vist i Arkitekten 1-68.
Arkitekter: Bornebusch, Brüel & Selchau, ved professor Jørgen Selchau.
Rådgivende ingeniører:
bærende konstruktioner: Johs. Jørgensen A/S;
el-installationer: Mogens Balslev;
tekniske installationer: Steensen & Varming.
Rådgivende for økonomi, tidsplanlægning og produktionsstyring: CBC Byggeadministration A/S
Landskabsarkitekt: Sven Hansen, MDH.
Kunstnerisk udsmykning af forhal: Poul Gernes og Else Fisher Hansen (glasmosaik).
Fotos: Jørgen Selchaus tegnestue; Skriver.

Sengebygningens højde er 120 m. Den er blevet et vartegn for Herlev.
■ The in-patient building is 120 m. tall. It has become a landmark for Herlev.

tårn. Behandlingsafdelingerne er placeret i en lav blok, formet over et modulsystem på 15×15 meter, med mulighed for ovenlysbelysning af alle behandlingsrum og laboratorier. En række fællesanlæg, som henvender sig til både patienter, personale og besøgende er samlet i en to-etages foyerbygning. Knyttet hertil ligger de to store auditorier.

Sygehuset ligger ved den store Ringvej B 3, som giver god vejforbindelse til den region, sygehuset skal betjene. Grunden er svagt skrånende og er af havearkitekten Svend Hansen udformet i et stort terrasseanlæg, hvor der vil blive anlagt haver til ophold for patienter og sygehuspersonale. På en af terrasserne er bygget en centralskole for uddannelse af sygeplejersker og andet personale til amtets sygehuse.

Parkeringen er delt med parkeringspladser for de besøgende i en zone langs Ringvejen og parkering for sygehusets personale i en terrænetage under behandlingsbygningen. En del af dette parkeringsområde er endnu ikke overbygget, men vil blive det ved en eventuel udvidelse af behandlingsbygningen.

Bag behandlingsbygningen ligger servicebygningen, der indeholder centralkøkken, depot og værksteder, sengeredningscentral, sterilisation etc. Denne bygning er ved et automatisk conveyorsystem i en underjordisk tunnel forbundet med et fordelingscenter ved patientbygningens elevatortårn.

Endelig ligger nord for behandlingsbygningen et lille kapel.

Sengebygningen

Udformningen af sengebygningen som et højhus har den fordel, at der på hver etage kan indrettes en forholdsvis lille og overskuelig afdeling til 48 patienter. For de besøgende er det lettere at finde frem i den store sengebygning, når den er delt i etageafsnit. Efter at have orienteret sig i foyeren, for eksempel ved forespørgsel i informationen, bliver man med elevator ført direkte til en enhed, hvor vagtkontoret er det første man møder, og hvor gangafstandene er korte.

Sengetårnet består i realiteten af flere tårne: Det kvadratiske sengetårn er opdelt i 6 mindre tårne omkring en kerne med servicefunktioner, blandt andet to elevatorer til transport af brugt og urent materiel, for eksempel senge, der skal til sterilisation og opredning i servicebygningen. Disse transporter kommer altså ikke i konflikt med patienter og besøgende.

De mindre tårnafsnit i det store tårn kan opdeles i tre-sengs og to-sengs stuer, eller eventuelt til seks- eller fire-sengs stuer. To-sengs stuerne kan anvendes til en-sengs stuer efter behov.

Til hvert af de mindre sengeafsnit hører toiletter med brusebad og et skyllerum, så bækkener og lignende ikke skal transporteres mere end nogle få skridt. I hver etage er der et vagtrum og kontorplads til den journaladministration, der hører til afdelingen.

Ved siden af det kvadratiske sengetårn står elevatortårnet med ialt 16 elevatorer, hvoraf de fire helt er reserveret persontransport, medens de øvrige kan anvendes enten til person- eller båretransport. Det indiceres på et lysskilt til hvilken form for transport, den pågældende elevator i øjeblikket er reserveret. Det giver en meget stor kapacitet og den flexibilitet, som er nødvendig for at imødekomme vekslende belastninger i døgnets timer. Elevatortårnets forbindelse til henholdsvis sengetårn og lægetårn udgør en rummelig foyer, hvorover den store trafik i de travle tider kan afvikles.

Ved siden af elevatortårnet står lægetårnet, som indeholder kontorer for etageafsnittets læger. Her har lægerne rolige arbejdsforhold, men er alligevel ganske nær afdelingen.

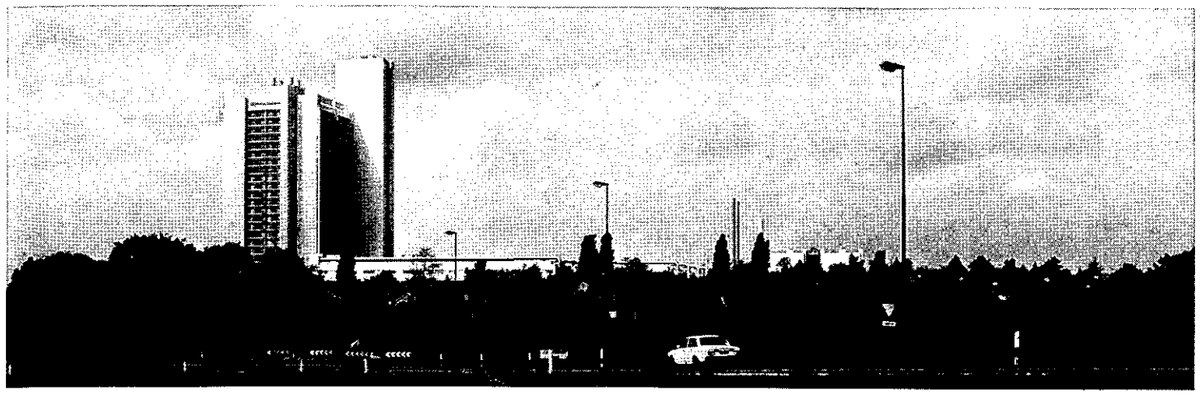
På etagen er der kun mindre opholdspladser for patienter og pårørende og for afsnittets personale. I sengetårnets øverste etager bliver indrettet veludstyrede opholdslokaler, tv-stuer, billardrum og bibliotek for oppegående patienter. Desuden har patienter og pårørende adgang til en restaurant ved forhallen. Der ligger også den store personalekantine.

De nære og overskuelige arbejdsforhold, som er tilstræbt ved denne plan, blev på et tidligt tidspunkt af byggeriet gennemprøvet ved opførelsen af et forsøgsmodul ved amtssygehuset i Gentofte. Her kunne hospitalstrænet personale afprøve teorierne i praksis og nyt personale kunne gøre sig fortrolig med arbejdsgangen, så det straks ved ibrugtagning af det nye hospital kunne udnytte dets muligheder. Også med hensyn til indretningen og det tekniske udstyrs placering kunne der gøres værdifulde erfaringer. Endelig blev prøvemodulet også anvendt til afprøvning af den helt utraditionelle farvesætning, som bygningens arkitekter har udviklet i samarbejde med maleren Poul Gernes. Farvesætningen spiller en meget afgørende rolle for dette hospitals miljø og omtales derfor i et særligt afsnit senere.

Behandlingsbygningen

Medens principperne for udformning af en sengeafdeling menes at have en lang holdbarhed, det viser blandt andet den historiske udvikling, så sker der relativt hastige ændringer med hensyn til indretningen af behandlingsafdelinger, laboratorier og ambulatorier, både med hensyn til pladskrav og indretning. I modsætning til sengeafsnittet er behandlingsafsnittet derfor udformet med stor flexibilitet for øje. Det er en lav bygning, i princippet en en-etages bygning med ovenlys, anbragt på søjler over en åben underetage, der overvejende anvendes til parkering for de i sygehuset beskæftigede. Fra dette overdækkede parkeringsareal er der korte gangafstande til en række indgange, hvorfra der igen er kort afstand til personalegarderober med elevatorforbindelse til behandlingsafsnittene.

Behandlingsbygningen er udformet over et modulnet med et hovedmodul på 15 m×15 m. Mellem modulerne går i begge retninger gange, som danner et kvadratnet.



De øst-vestgående gange, behandlingsgangene, er ovenlysbelyste, og derfor meget lyse. De nord-sydgående gange, forbindelsesgangene, er mørkere. Denne karakteristiske forskel letter orienteringen. Orienteringen støttes yderligere af tydelig skiltning og af signalfarver.

Hvert modul kan indrettes som en enhed med hovedrum og birum. For eksempel kan et modul indrettes med to operationsstuer og dertil knyttede anæstesirum, sterilrum og skyllerum. Andre moduler er indrettet til laboratorier og ambulatorier.

På grund af terrænforholdene ligger behandlingsafdelingen i højde med sengebygnings fjerde etage. Behandlingsbygningens parkeringsetage ligger i højde med sengebygningens tredie etage. Behandlingsbygningens kælderetage, som er i tunnelforbindelse med servicebygningen, ligger i højde med sengebygningens anden etage. (1. sal). I denne etage ligger fordelingscentrene for den interne transport, for eksempel af mad og rene, sterile senge. Denne transport kan foregå uden at krydse transporten af patienter mellem sengeafdeling og behandlingsafdeling.

Udefra kommende patienter kan fra forhallen fortsætte i samme niveau til ambulatoriegangen, som ligger i den underste etage af den sydlige 4-etages del af behandlingsbygningen. Ambulatoriegangen her er udformet som en stor glasveranda, med møbelgrupper, hvor man kan vente under mere afslappede forhold end i ambulatoriernes venteværelser. Fra denne gang er der udsigt til et haveanlæg.

De funktioner, der er placerede i behandlingsbygningen, kræver komplicerede installationer. Over og under de nord-sydgående forbindelsesgange ligger tunneler med fremføring af de mange tekniske installationer. Herfra kan installationerne føres med korte afstande til behandlingsafdelinger og laboratorier. Over ingeniørgangene ligger de store, blanke ventilationsrør synligt, denne placering har brandtekniske fordele.

I øvrigt er hele sygehuset brandsikret med sprinkleranlæg. Sygehuset har et fuldstændigt klimaanlæg med opvarmning, afkøling og luftfugtning.

Fælles anlæg og administration

Hovedadgangen til sygehuset sker fra en forplads med tilkørsel for taxi og sygetransport af ambulantpatienter. Der er fast holdeplads for taxi og telefonstander for tilkald af taxi. Fra hovedindgangen er der få minutters gang til busholdeplads.

Hovedindgangen er udformet med to store, motordrevne drejedøre, der danner luftsluser og hindrer træk i foyeren. Ved siden heraf er der en fotocellestyret dør med luftsluse for personer i kørestol.

Den store forhal, der går gennem to etager, er bevidst givet en udformning som et stort, lyst torv, og ikke som en ventesal. Det lyse marmorgulv, de grønne planter, den stærkt farvede billedudsmykning og de åbne butiksfacader udelukker enhver hospitalsatmosfære.

Fra hovedindgangen går den direkte trafiklinie til elevatortårnet, men passerer den lille informations-ø, hvor den førstegangsbesøgende kan blive vejledt. I øvrigt er der på store tavler med bogstaver, tal og farver givet tydelig anvisning på, hvorledes man færdes og finder frem til sit mål. Umiddelbart ved elevatortårnet ligger en stor garderobe.

Med åbne facader mod forhallen ligger en blomsterforretning og en kiosk med et stort udvalg af daglige fornødenheder. Umiddelbart herover, på balkonetagen, findes en frisørsalon og en sparekassefilial.

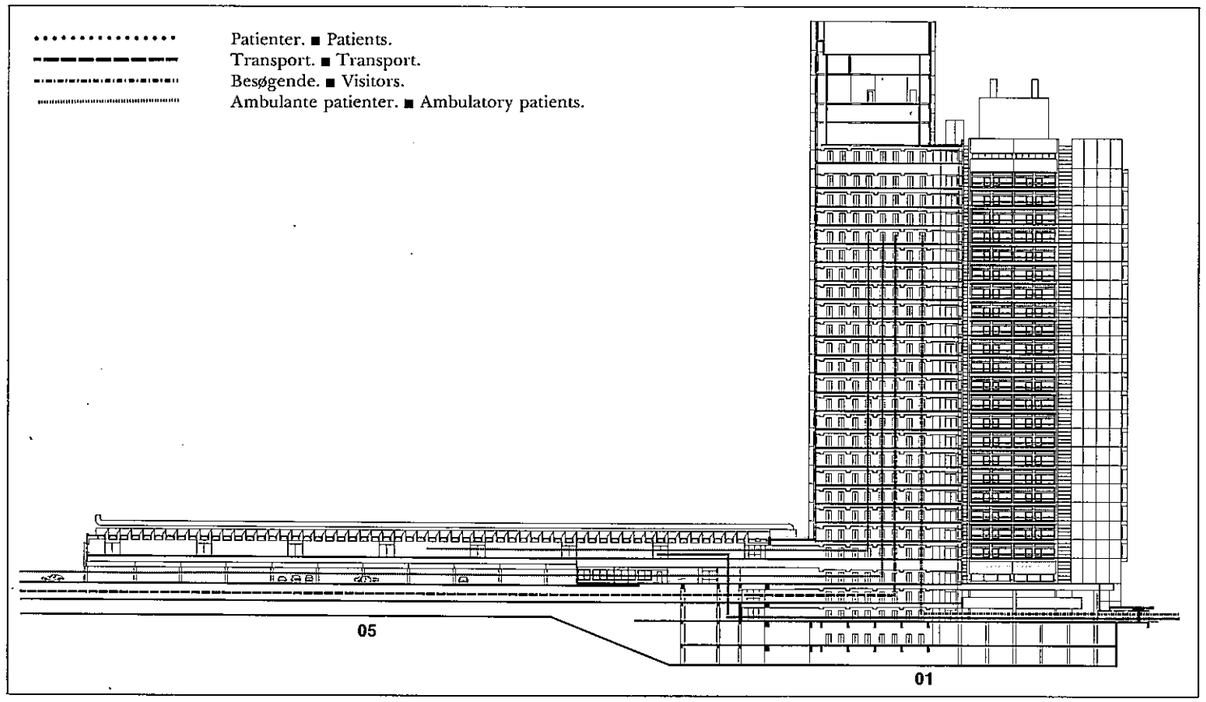
Med direkte adgang fra forhallen ligger, i sengebygningens to nederste etager, sygehusets kontorområde med administration, socialrådgivere m.m.

På første sal med adgang fra balkonetagen er indrettet et lille hotel med syv værelser, beregnet fortrinsvis til patienters pårørende, som i en akut situation kan overnatte på sygehuset.

I en selvstændig bygning, knyttet til forhallen ligger en stor mødesal, den store kantine og restauration og herover de to auditorier.

Personalekantinen og den offentligt tilgængelige restaurant er placeret sammen i et rum, som har fået en særlig festlig udformning. På de tre sider er det store lokale omgivet af glasvægge, hvorfra der vil blive udsigt over det terrasserede haveanlæg. Desuden får lokalet lys fra et ovenlys, der følger de to ovenliggende auditoriers runding. De søjler, der bærer auditorierne, danner en gennembrudt væg mellem restauranten og betjeningsskranken. De dybe nicher mellem søjlerne er møblerede med små kaffeborde og skaber associationer til de gamle traktørsteders lysthuse. En del af den lange serveringsskranke er indrettet som bar. I øvrigt er restaurant og kantine møbleret, så man efter behov kan placere sig i små eller større grupper.

Gulvet er tæppebelagt med undtagelse af gangene langs søjlerækkerne og langs serveringsskranken. Her er gulvet af hvid marmor. Den kunstige belysning er udformet som »lysekroner«, lampetter, anbragt omkring de runde søjler, der bærer loftet over kantine og restaurant. De giver et moderat lysniveau, og de mange lyspunkter giver belysningen en festlig karakter. Også farverne er her, som i sygehuset i øvrigt, et væsentligt bidrag til den uhøjtidelige holdning, der er disse sygehusinteriørers særpræg. S



Snit 1:1200.
01, sengebygning. 05, behandlingsbygning.
Signaturerne angiver person- og materieltransport.

■ Section, 1:1200.
01, in-patient building. 05, treatment building.
The various dotted lines indicate person and supply transport.

Copenhagen County Hospital in Herlev

General description

The Herlev project comprises a county hospital which when fully developed will contain 988 beds for somatic patients, under the Directorate for Copenhagen's County Hospital Authorities.

The project consists of a foyer building from which there is access to the high-rise in-patients' building, and to the treatment building, a building of one floor, on columns, situated on a terrain, raised two floors above the level of the foyer and main entrance.

To the north of the treatment building a service building has been erected, and east of this a chapel. At the approach from the circular road, children's institutions are to be erected. In addition a nursing school has been erected.

In-patients' building, block 01

The in-patients' building, situated south of the treatment building is a high-rise building of 25 floors. The building is arranged as three attached tower complexes: ward tower, doctors' tower and lift tower. The ward tower has a total height of 90 metres.

The form of the ward tower's plan is dictated by the demand for concentration and short corridor distances.

On each floor there are 48 beds in six groups of four wards each with related bath and toilet cabins, around a sluice room.

A duty area, depot, examination room, conference room, etc., are situated at the heart of the in-patients'building, as is an area for a fully automatic vertical transport system for supplies and two lifts for contaminated material.

On the roof floor of the in-patients'tower are arranged sitting rooms, library, hobby room, etc., and open-air terraces for ambulatory patients.

The doctors' tower contains offices for doctors, secretaries and department sisters, etc., in addition one floor will be arranged as a hotel for relations and one floor will be arranged as a medical library.

The doctors' tower is connected to the in-patients' tower by a connecting corridor to which the third tower is also connected.

This tower contains 16 rapid-action patient- and bed lifts which together make up the building's main traffic artery.

With its height of 120 meters it is in addition the buildings' highest point, with the upper floors arranged as technical rooms.

Foyer building, block 02

The foyer building is on two floors and comprises, in addition to vestibule and cloakrooms, an assembly hall, two auditoria for approx. 130 and approx. 300 persons respectively, kiosks, bank, hairdresser, etc.; and restaurant and canteen with a seating capacity of approx. 500 divided into approx. 210 in the canteen, approx. 175 in the restaurant and approx. 105 in a common area which can be added to restaurant and canteen according to requirements. There is, in addition, access to the administration department of the hospital which is situated on the two lower floors of the in-patients' building, and, via the lift tower in the in-patients'building, access to the ambulatory corridor, from whence lifts lead to the main corridor of the treatment building towards the south.

Treatment building, block 05

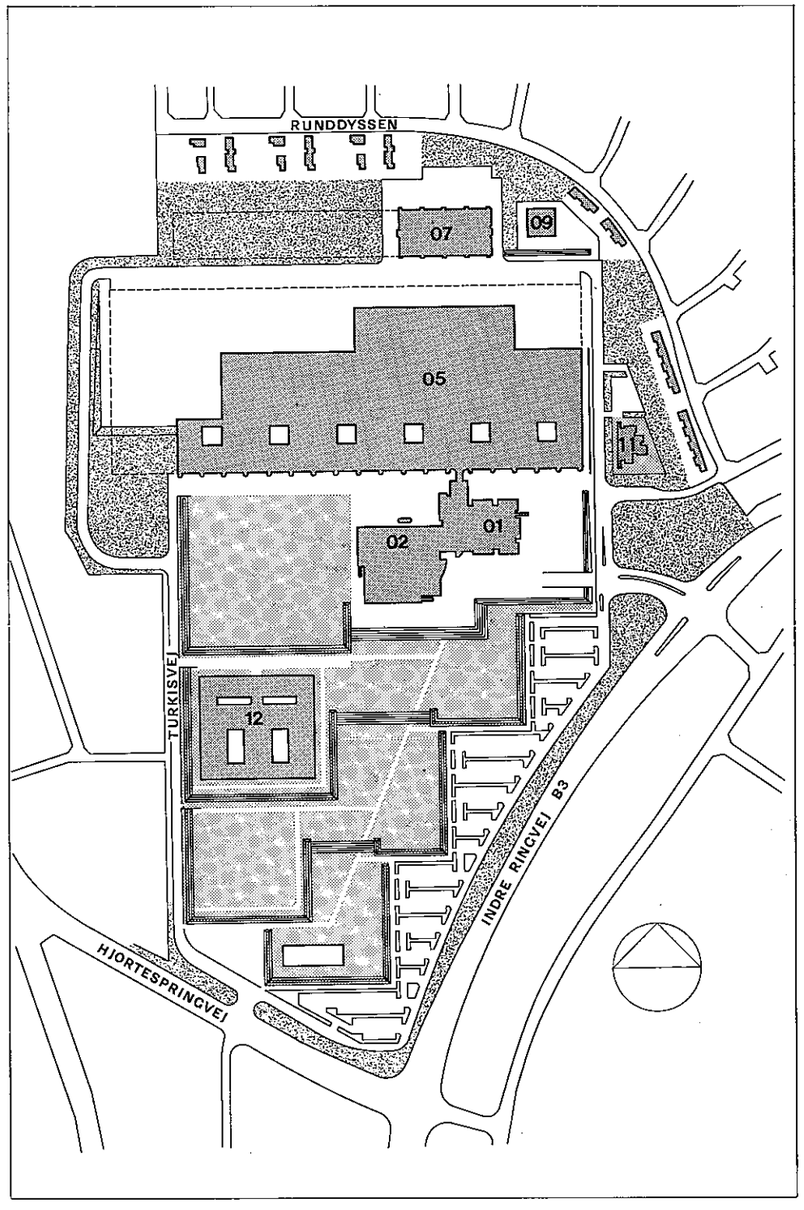
The treatment building, block 05, is to be used for both out-patients and in-patients.

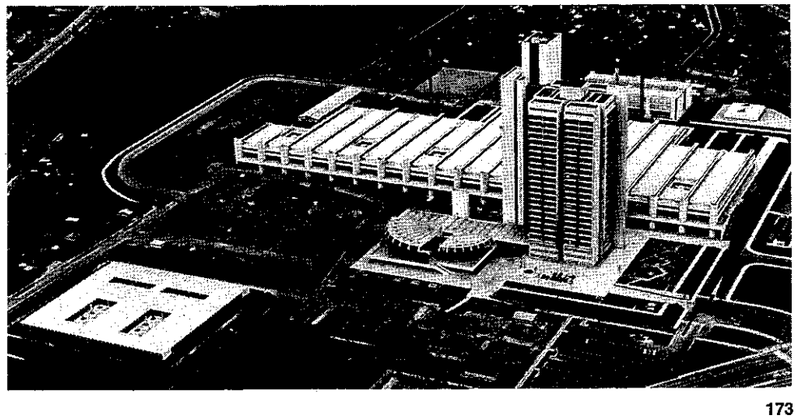
The slope of the ground is used in such a way that the building towards the south has a total of four floors.

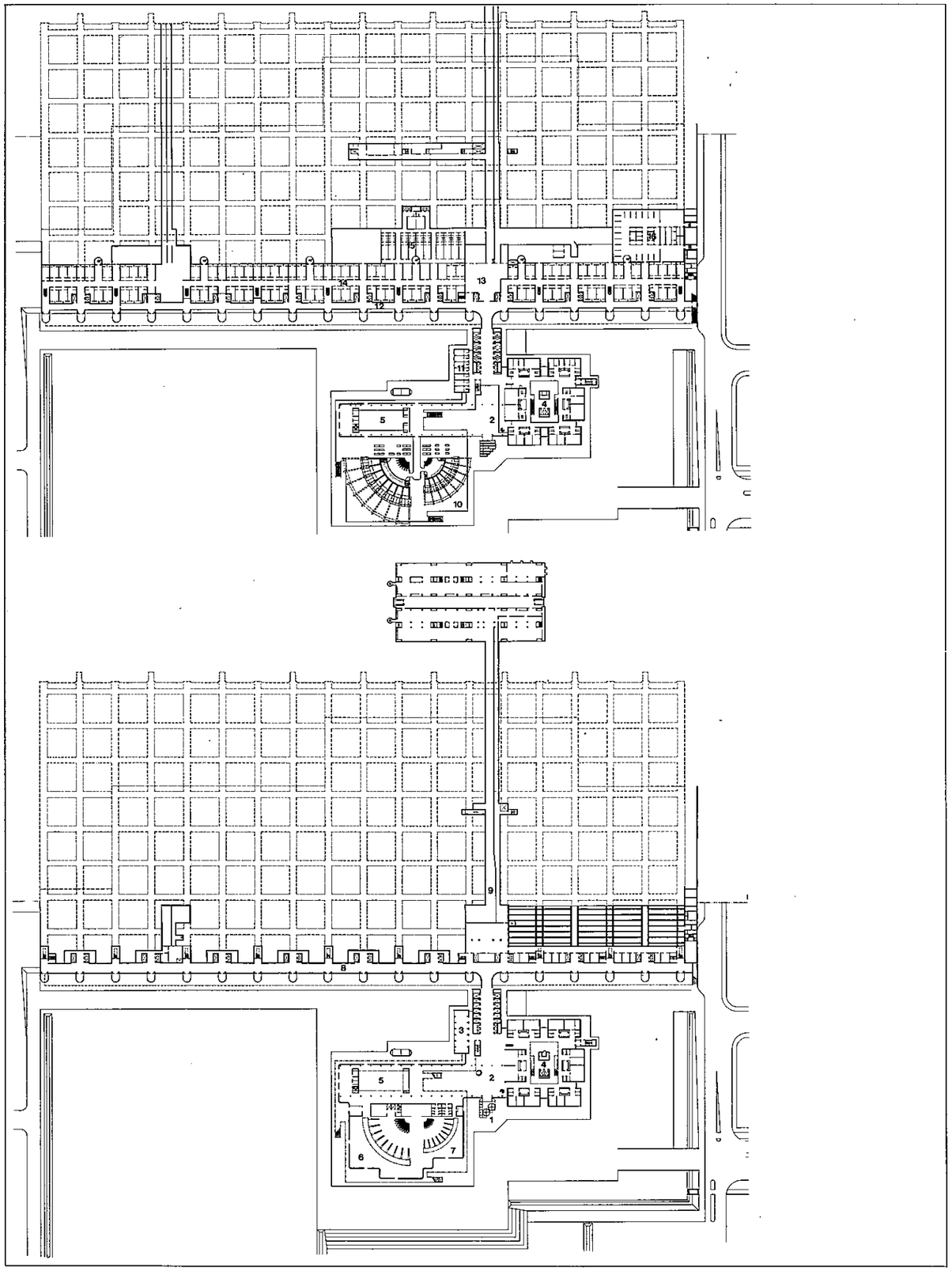
The treatment building, which is lit from above, is divided into standard units in a square module of 15 × 15 meters excl. corridor areas of 3 meters in width. All corridors in a north-south direction are distribution corridors, while all corridors in an east-west direction are treatment corridors from

Beliggenhedsplan, 1:5000.
01, sengebygning. 02, auditorium, forhal, restaurant. 05, behandlingsbygning. 07, servicebygning. 09, kapel. 11, børneinstitution. 12, centralskole.

■ Site plan, 1:5000.
01, in-patient building. 02, auditorium, foyer, restaurant. 05, treatment building. 07, service building. 09, chapel. 11, childrens' institution. 12, central school.







Etageplaner, 1:2500.
1, hovedindgang.
2, forhal.
3, garderobe.
4, administration.
5, mødesal.
6, kantine.
7, restaurant.
8, ambulatoriegang.
9, tunnel til servicebygning.
10, terrasse.
11, hotel.
12, transportgang.
13, fordelingscenter.
14, garderober.
15, operations-omklædning.
16, nødhospital.
17, auditorier.
18, lægevagt.
19, bibliotek.
20, kontorer.
21, EDB-central.
22, lysgård.
23, arkiv.
24, modtagelsesafdeling.
25, skadestue.
26, parkering, personale.
27, intensiv afdeling.
28, fysiologisk afdeling.
29, laboratorier.
30, operationsstuer.
31, røntgenafdeling.
32, radium afdeling.
34, behandlingsgang.
35, fordelingsgang.

■ Floor plans, 1:2500.
1, main entrance.
2, foyer.
3, cloakroom.
4, administration
5, assembly hall.
6, cantine.
7, restaurant.
8, ambulatory corridor.
9, tunnel to service building.
10, terrace.
11, hotel.
12, transportation corridor.
13, distribution center.
14, cloakrooms.
15, surgery changing.
16, emergency hospital.
17, auditoria.
18, duty doctors.
19, library.
20, offices.
21, data processing.
22, light well.
23, archive.
24, admissions.
25, casualty ward.
26, personnel parking.
27, intensive care.
28, physiological department.
29, laboratories.
30, operating rooms.
31, X-ray department.
32, radium department.
34, treatment corridor.
35, connecting corridor.

which there is access to the individual treatment sections.

Between the main corridors facing south vertical communication is established via lifts.

The connecting corridors each have their respective function: bed transportation, goods transportation and access for out-patients. This transport differentiation is carried out in such a way that the corridors outside the lift groups give access for out-patients, while the other corridors serve for the transportation of in-patients and supplies.

The roof-lighting in the treatment building gives daylight to the treatment sections.

Greatest possible flexibility
The plan arrangement of the treatment building is dictated by the desire for flexibility and possibilities for extension.

With regard to flexibility, the treatment building is divided into squares (working units) and with regard to the possibilities for extension it is designed as one floor on columns.

Every square has four columns as the supporting construction.

The division of space is carried out with light partition walls, so that the greatest possible flexibility is also achieved within the squares. The division can be varied in step with changing demands for arrangements, installations, etc., and likewise alterations can be made without affecting the construction.

Hot and cold air can be connected to every room from ducts in the ceiling and there are supply and drainage connections in the floor.

Service building, block 07
North of the treatment building a service building, block 07, has been built as two 3-floor wings with a glass-covered yard between. This building contains a central kitchen, main depot, workshops, bedmaking and central sterilization, etc.

A fully automatic conveyor system installed in the yard carries, via tunnels, goods from the service building to a distribution centre using the lifts in the in-patients' building.

Garden lay-out
The grounds are laid out as a park area formed in terraces, bordered with pillår elms. Towards the circular road B3 there are parking areas for visitors. The forecourt around the in-patients' building (block 01) and the foyer building (block 02) is paved with concrete tiles and arranged with benches, hedges and trees.

Materials
In the building of the hospital, three materials have been used for external surfaces: white concrete, brown anodized aluminium and glass.

All internal surfaces are painted so that internally the airy building expresses itself as a many-coloured world.

Conclusion: the airy building with its many-coloured interiors stands against green surroundings.

Main technical installations, pipe installations
In all building sections pipe installations are carried out in shafts, engineering channels, and service spaces or installation floors.

This arrangement provides easy access to the installations for maintenance and affords the possibility for carrying out alterations in a department with the minimum of inconvenience to adjoining departments.

Heating and ventilation
In all building sections full air-conditioning with a two-channel ventilation system is installed. Air is blown in at the facades of the building or from diffusers mounted in ceilings, and exhausted through the light fittings. The system is individually thermostatically controlled in every room.

Fire prevention
All buildings have sprinkler systems. All buildings are protected by smoke alarms which automatically close smoke doors which are normally open, so that the spreading of smoke is avoided.

Supervision centre
A supervision centre is situated in the service building from which all technical installations will be supervised and to a certain extent controlled.

Automatic transport system
The layout of the various blocks comprising the hospital is to a great extent based on mechanized transport systems.

Two large automatic transportation systems are installed, a suspended conveyor system for the transportation of empty beds and wagons with a weight of up to 400 kg., and a box conveyor system in which boxes of max. 35 kg. run on conveyor belts and in automatic lifts and bucket-elevators.

Lighting
The lighting installations are, for general lighting, predominantly carried out in built-in fluorescent light fittings, while the special lighting for work purposes is incandescent.

Krankenhaus des Kreises Kopenhagen in Herlev
Das Projekt Herlev umfasst ein Kreiskrankenhaus, das voll ausgebaut 988 Betten für somatische Patienten enthält und das dem Direktorat für Krankenversorgung des Kreises Kopenhagen zugeordnet ist. Vom Foyergebäude des Projektes aus gelangt man zum Bettentrakt, der als Hochhaus geplant wurde, sowie zum Behandlungsgebäude. Der Behandlungstrakt ist ein eingeschossiges, auf Stützen stehendes Gebäude. Es steht auf einem zwei Geschosse über das Niveau des Foyers und des Haupteinganges angehobenen Gelände.

Nördlich des Behandlungstraktes liegt das Servicegebäude und eine Kapelle.

Bei der Zufahrt von der Ringstrasse her werden Kindergärten und -krippen erstellt.

Darüberhinaus wurde eine Krankenpflegerschule gebaut.

Bettenhaus, Block 01
Das Bettenhaus ist ein Hochhaus mit 25 Geschossen. Es liegt südlich des Behandlungsbaues. Das Gebäude besteht aus drei zusammenhängenden Turmkomplexen: Bettenturm, Ärzteturm und Fahrstuhlturm.

Der 25-geschossige Bettenturm ist 90 m hoch. Forderungen nach Konzentration und kurzen Gehabständen bestimmten die Grundrissform.

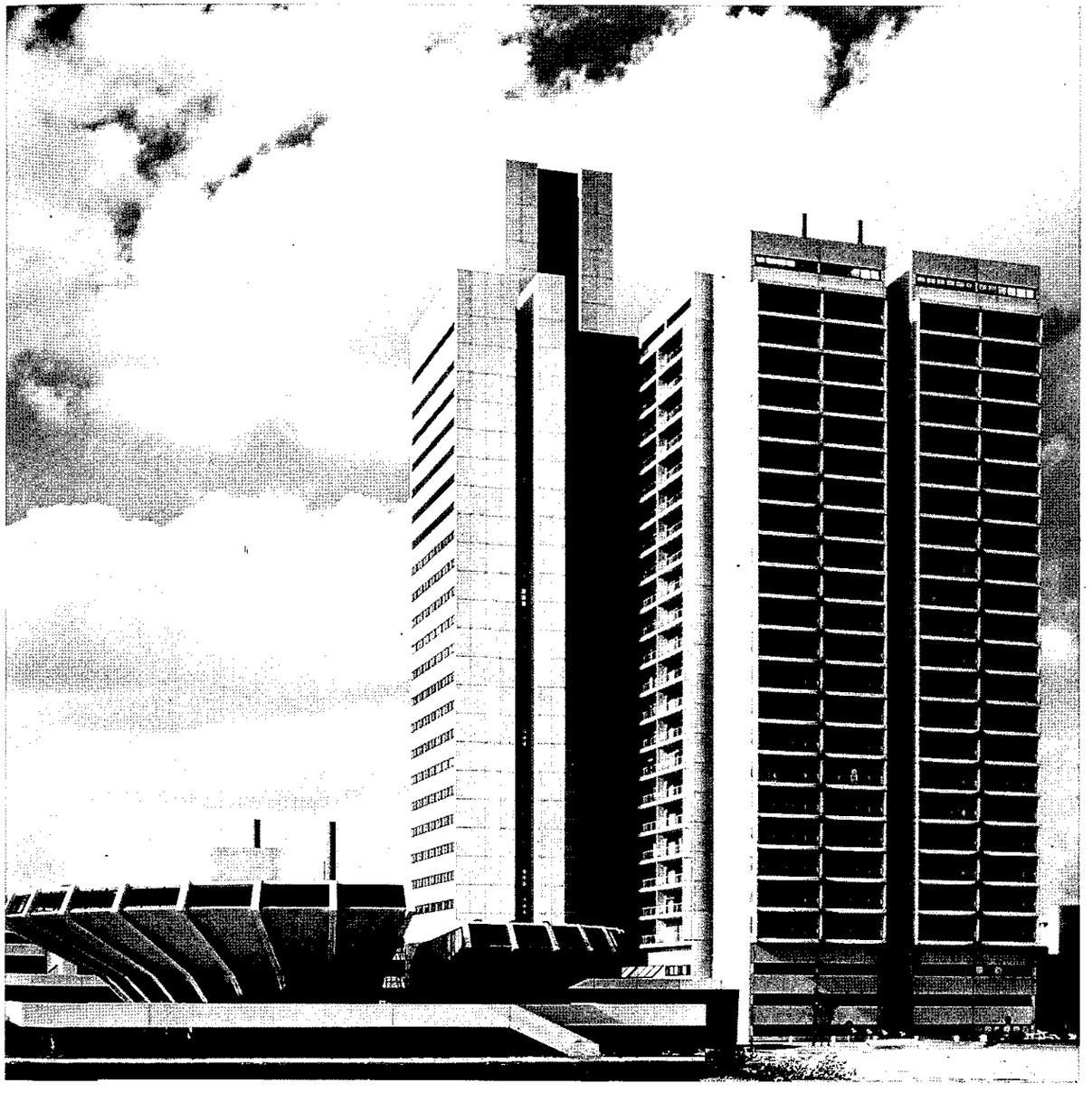
Auf jedem Geschoss befinden sich 48 Betten eingeteilt in sechs Gruppen mit je vier Bettzimmern und zugehörigen, um einen Spülraum angeordneten Bade- und WC-kabinen.

Im Kern des Bettengebäudes liegen Waschraum, Depot, Untersuchungsraum, Konferenzraum usf. sowie die Zone für das vollautomatische vertikale Transportsystem für die Versorgung mit zwei separaten Fahrstühlen für die Entsorgung.

Im Dachgeschoss des Bettenturms wurden Aufenthaltsräume, Bibliothek, Hobbyraum etc. sowie offene Terrassen für gesundere Patienten eingerichtet.

Der Ärzteturm enthält Büros für Ärzte, Sekretärinnen und Abteilungsschwestern u.a.m. Darüberhinaus wurde ein Geschoss als Hotel für Angehörige eingerichtet, in einem weiteren Geschoss wurde eine Ärztebibliothek eingeplant.

Der Ärzteturm ist mit dem Bettenturm über einen Verbindungsgang verbunden, an dem der dritte Turm, der Fahrstuhlturm, liegt. Dieser Turm enthält 16 schnellfahrende Patienten- und Bettenfahrstühle, die zusammen die vertikale Hauptverkehrsader des Baues sind. Mit 120 m Höhe bildet er zugleich den höchsten Punkt der Bebauung. In den obersten Etagen liegen Räume der Haustechnik.



Sydfacade. De store auditorier og sengebygningen.
■ South facade. The large auditoria and in-patient building.

Foyergebäude, Block 02
Das Foyergebäude ist zweigeschossig. Es umfasst ausser Vorhalle und Garderobe einen Festsaal, zwei Auditorien für ca. 130 und ca. 300 Personen, Kioske, Bank, Friseur usf. sowie Restaurant und Kantine mit insgesamt ca. 500 Sitzplätzen. Ca. 210 Plätze entfallen auf die Kantine, ca. 175 auf das Restaurant und ca. 105 auf einen gemeinschaftlichen Bereich, der je nach Bedarf dem Restaurant oder der Kantine zugeordnet werden kann.

Darüberhinaus führt das Foyer zu der Verwaltungsabteilung des Krankenhauses, die in den zwei untersten Geschossen des Bettengebäudes liegt. Über den Fahrstuhlturm des Bettengebäudes besteht Zugang zum Flur des Ambulatoriums, von wo aus Fahrstühle zum südlichen Hauptgang des Behandlungsbaues führen.

Behandlungsgebäude, Block 05
Das Behandlungsgebäude, Block 05, wird sowohl für ambulante wie stationäre Patienten verwendet.

Das Geländegefälle ermöglichte die Planung von 4 Geschossen im südlichen Gebäudeteil.

Das Behandlungsgeschoss, das mit Oberlicht versehen ist, wurde in Standardeinheiten in einem Quadratsystem von 15 × 15 m exkl. Flurzonen von 3 m Breite aufgeteilt. Alle Gänge in Nord–Süd Richtung sind Verteilergänge, während alle Gänge in Ost-West Richtung Behandlungsgänge sind, von denen aus Zugang zu den einzelnen Behandlungsabschnitten besteht.

Zwischen den nach Süden verlaufenden Hauptgängen wurden über Aufzugsgruppen vertikale Verbindungen geschaffen.

Die Verbindungsgänge dienen jeweils den spezifischen Funktionen wie Bettentransporten, Warentransporten und Zugang für ambulante Patienten. Diese Transportdifferenzierung wurde in der Behandlungsebene so geplant, dass die Gänge an den Aufzugsgruppen Zugänge für ambulante Patienten bilden, während die übrigen Gänge dem Transport der liegenden Patienten sowie der Versorgung dienen.

Oberlicht in der Behandlungsebene ermöglicht Tageslicht in allen Behandlungsabschnitten.

Grösstmögliche Flexibilität
Der Wunsch nach Flexibilität und Erweiterungsmöglichkeiten bestimmte die Grundrissorganisation des Behandlungstraktes. Auf Grund der Forderung nach Flexibilität wurde der Behandlungstrakt in Quadrate (Arbeitseinheiten) aufgeteilt und wegen gewünschter Erweiterungsmöglichkeiten wurde ein Geschoss auf freistehende Stützen geplant. Jedes Quadrat hat vier Stützen als tragende Konstruktion. Die Raumeinteilung geschieht durch leichte Trennwände, sodass auch innerhalb der Quadrate grösstmögliche Flexibilität gewährleistet ist. Die Aufteilung kann entsprechend den wechselnden Forderungen nach Einrichtung, Installation usf. variiert werden. Ebenso können Änderungen ohne Änderung der Konstruktion vorgenommen werden.

Jeder Raum kann über Leitungen in der Decke mit warmer und kalter Luft versorgt werden. Ebenso können in den Böden jedes Raumes Versorgungs- und Ablaufinstallationen eingebracht werden.

Neue Quadrate können angebaut, und vorhandene können umgebaut werden.

Servicegebäude, Block 07
Nördlich des Behandlungstraktes wurde das Servicegebäude Block 07 in Form von zwei 3-geschossigen Gebäudeflügeln mit einem dazwischenliegenden glasüberdeckten Hof erstellt. In diesem Gebäude wurden Zentralküche, Hauptdepot, Werkstätten, Bettenzentrale, Zentralsterilisation usf. eingeplant.

Im Hof wurde eine vollautomatische Transportanlage montiert, die über Tunnels die automatische Versorgung vom Servicegebäude aus zu einem Verteilerzentrum an den Aufzügen des Bettentraktes ermöglicht.

Gartenanlage
Das Grundstück wurde als Parkanlage terrassenförmig gestaltet, an deren Peripherie Ulmen gepflanzt wurden.

An der Ringstrasse B 3 wurden Parkplätze für die Besucher geplant.

Der Vorplatz beim Bettengebäude (Block 01) und vor dem Foyergebäude (Block 02) ist mit Betonfliesen ausgelegt und mit Bänken, Hecken und Bäumen versehen.

Materialien
Für die Aussenflächen wurden nur drei Materialien verwendet: weisser Beton, braun eloxiertes Aluminium und Glas. Alle inneren Oberflächen sind gestrichen, sodass das aussen helle Haus innen eine farbenreiche Welt darstellt.

Die Folge: Das Haus steht hell vor der grünen Umgebung und zeigt innen Farbvielfalt.

Technische Hauptanlage, Rohranlage
In allen Gebäudeabschnitten wurden die Rohrinstallationen in Schächten, Ingenieurrohren, Kriechkellern oder Installationsböden verlegt.

Durch dieses Verfahren wurde leichter Zugang zu den Installationen für Instandhaltungsarbeiten geschaffen sowie Änderungen in einer Abteilung bei minimaler Störung der anliegenden Abteilungen ermöglicht.

Heizung und Lüftung
In allen Gebäudeabschnitten ist Vollklimatisierung durch Zwei-Kanal Lüftungsanlagen vorgesehen. Die Zuluft wird längs der Fassaden oder über in den Decken eingebaute Anemostaten eingeblasen, die Abluft wird über Beleuchtungsarmaturen abgesaugt. Die Anlage kann über Thermostaten in jedem Raum individuell eingestellt werden.

Brandsicherung
Sämtliche Gebäude ausser der Zentralschule sind mit Sprinkleranlagen versehen.

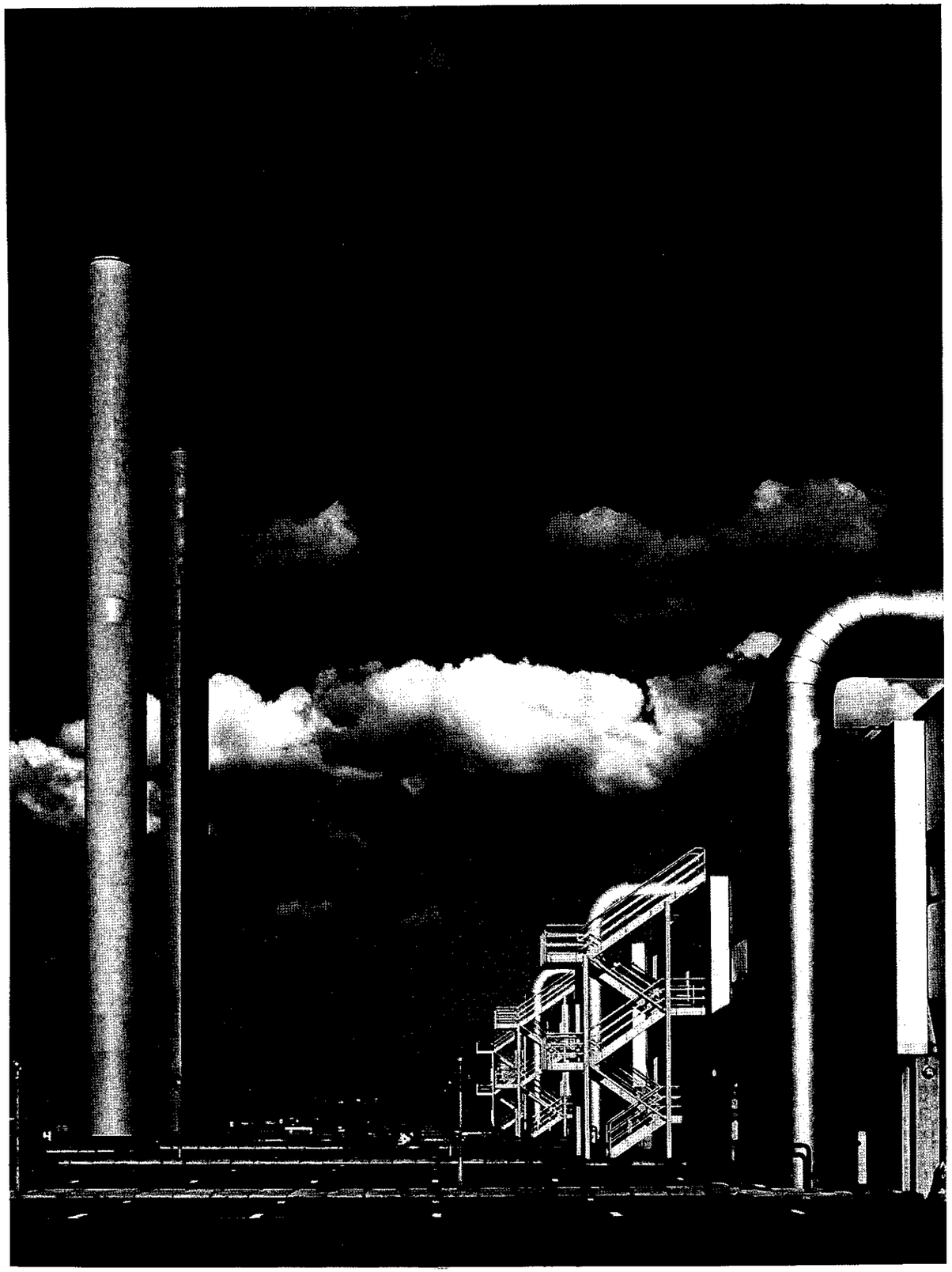
Die Gebäude sind mit Rauchmeldern bestückt, offenstehende Rauchtüren, schliessen automatisch, sodass Raucheintritt vermieden wird.

Überwachungszentrale
Im Servicegebäude liegt eine Zentralwarte, von der aus alle technische Anlagen überwacht und zum Teil bedient werden können.

Automatische Transportanlagen
Die Planung der gesamten Gebäudeanlage wurde in hohem Masse auf Anwendung mechanischer Transportanlagen abgestimmt.

Es wurden zwei grössere automatische Transportanlagen installiert: eine Hängeförderanlage für Transport von leeren Betten und Wagen mit Gewichten bis zu 400 kg sowie eine Kassettentransportanlage, in der Kassetten von max. 35 kg auf Transportbändern und in automatischen Aufzügen und Paternosteranlagen befördert werden.

Beleuchtung
Die Beleuchtungsanlagen für allgemeine Ausleuchtung wurden mit Leuchtstoffröhren bestückt, während für Sonderbeleuchtung und Arbeitsleuchten Glühlampen verwendet wurden.

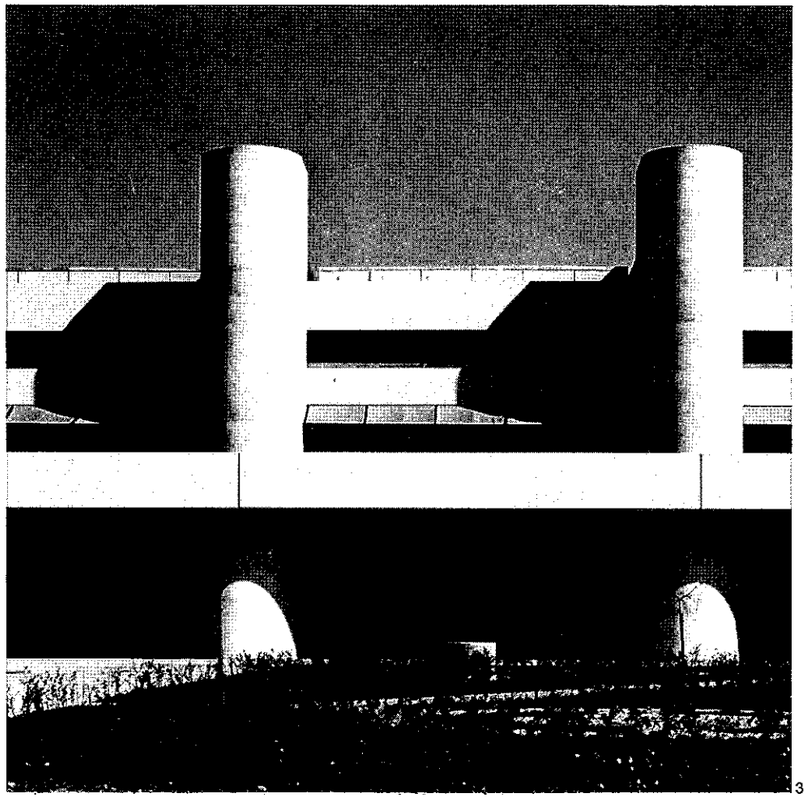


Nordfacade af behandlingsbygningen. De store ventilationskanaler er af tekniske grunde lagt uden på bygningen; samtidig er de formede som et arkitektonisk element. Skorstenene er en del af ventilationssystemet.
■ North facade of the treatment building. The large ventilation ducts are for technical reasons placed on top of the building, and are designed as an architectonic element. The chimneys are part of the ventilation system.

1

1-2. Den to-etages behandlingsbygning afsluttes mod syd som en fireetages bygning, der optager niveauforskellen i terrænet. »Tårnene« rummer tekniske installationer.
3. Udsnit af behandlingsbygningens sydfacade. Bag det store glasareal ligger nederst ambulatoriegangen og derover transportgangen på balkonetagen. I de to øverste etager er kontorer og behandlingsgang.
4. Indkørsel til parkeringsområdet. Den åbne underetage rummer parkering, i den øverste etage ligger behandlingsafsnittene.
5. Ambulanceindkørsel sker under behandlingsbygningen.
6. Behandlingsbygningens vestside.

■ 1-2. The two-floor treatment building is completed toward the south as a four-floor building, which takes advantage of the slope in the terrain. »The towers« house technical installations.
3. Part of south facade of the treatment building. Lowest, behind the large glass area is the ambulatory corridor and over this the transport corridor on the balcony floor. On the two topmost floors are the offices and treatment corridor.
4. Approach to parking area. In the open lower floor is parking, in the upper floor are the treatment departments.
5. The ambulance approach is under the treatment building.
6. The treatment building's west side.



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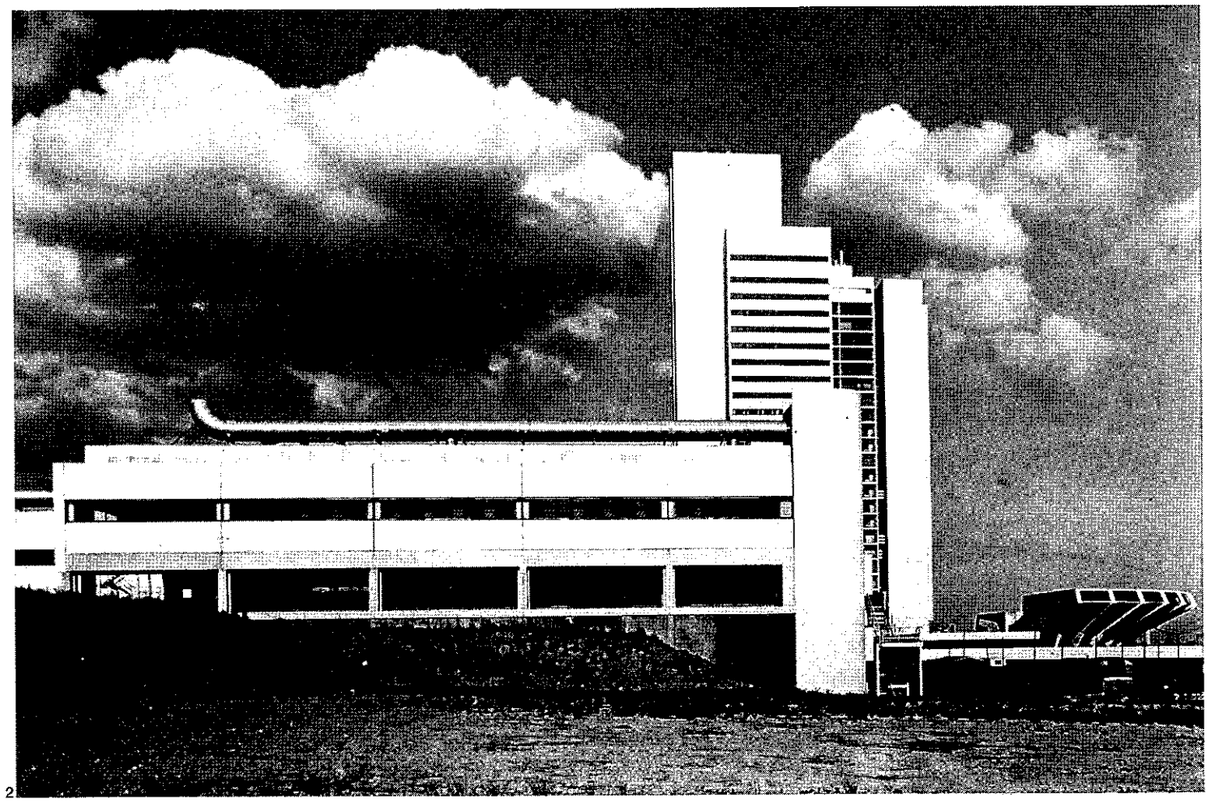

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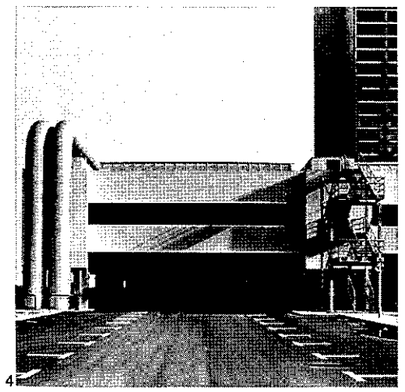

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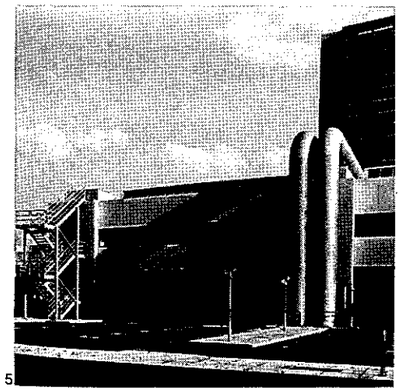

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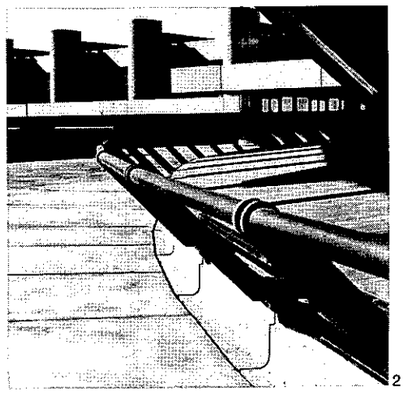
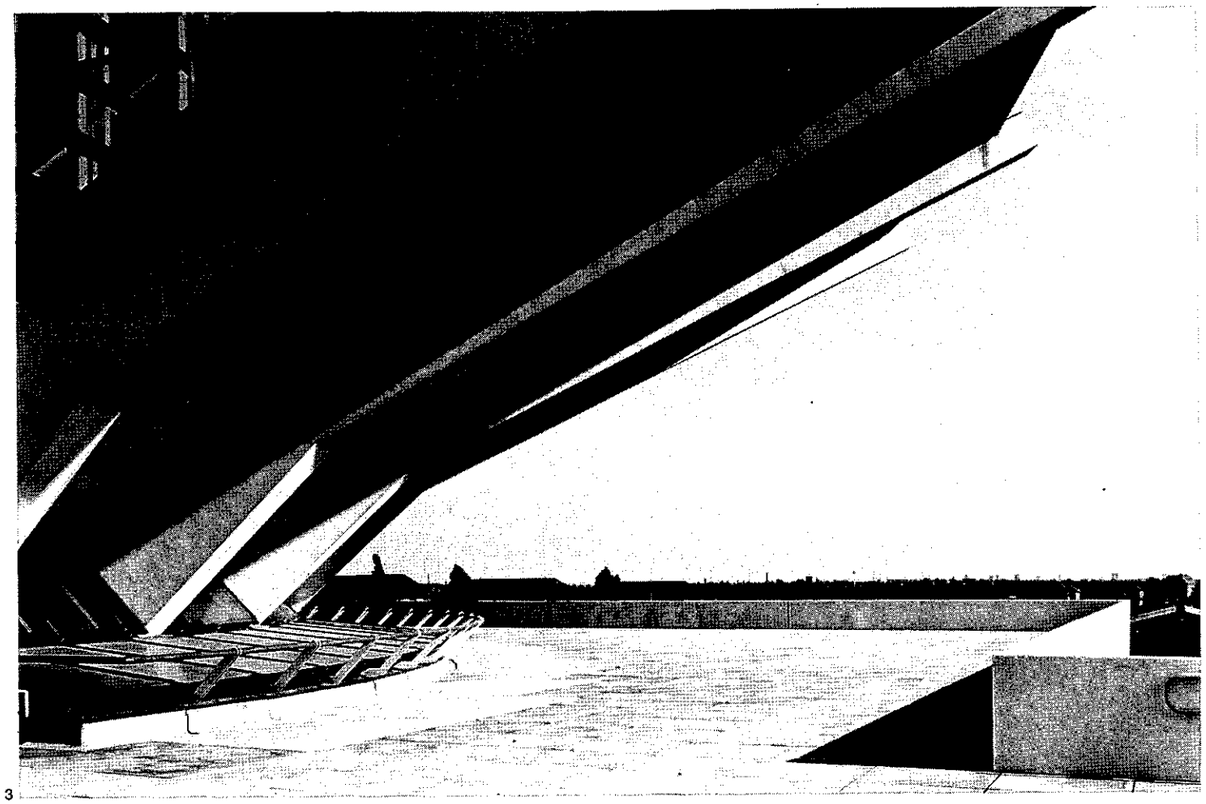
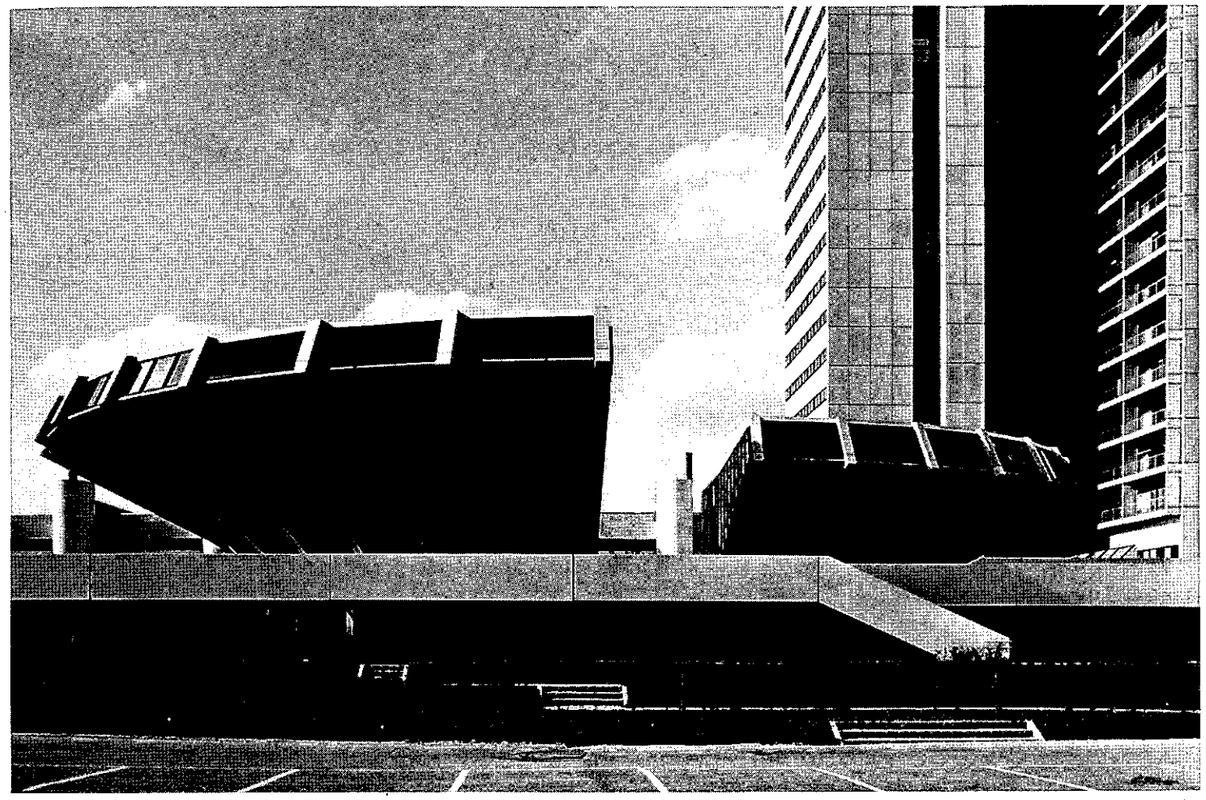


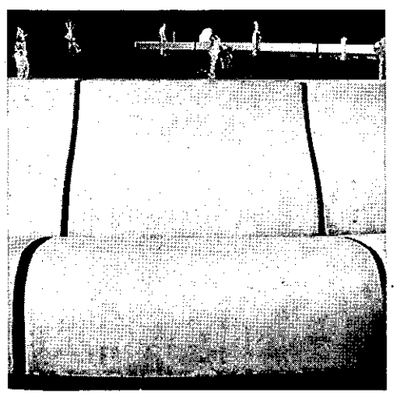
1. Terrasse mellem forhalsbygning og auditorier.
2. Bag rækværket er ovenlys til restaurant og cafeteria.
3. Auditorieterrassen, udsigt mod syd.
■ 1. Terrace between foyer building and auditoria.
2. Behind the parapet is the skylight for the restaurant and cafeteria.
3. South-view from auditoria terrace.

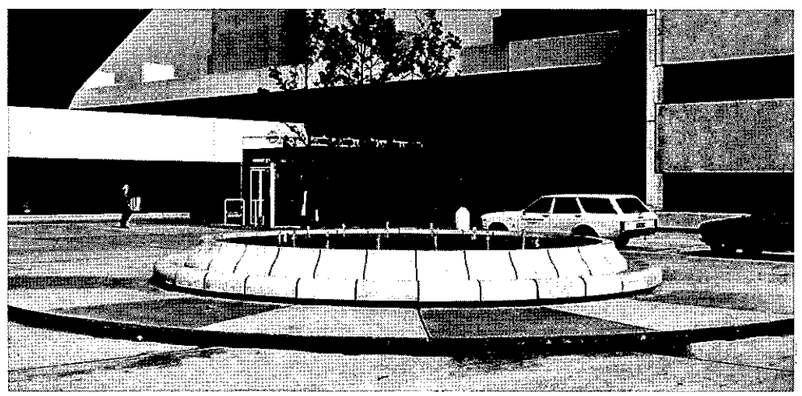


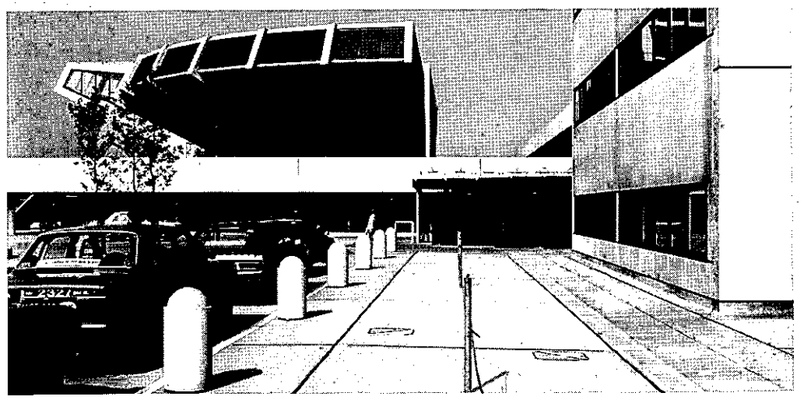


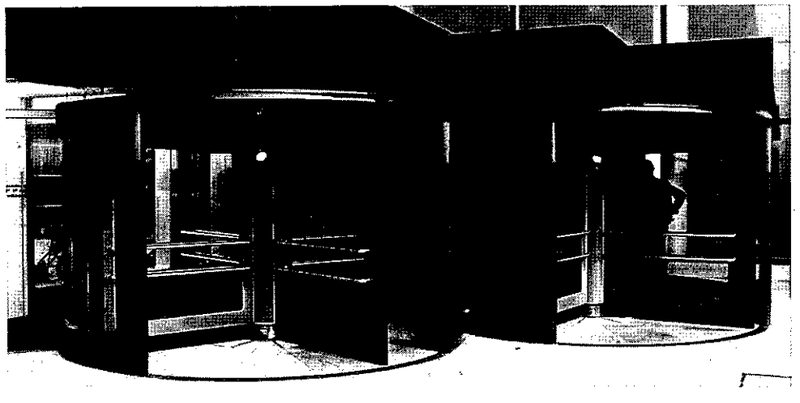
Restaurant og auditorier.
■ Restaurant and auditoria.

Forpladsen ved hovedindgangen. Springvandsbassinet er udformet som en bænk af præfabrikerede betonelementer.
■ Area in front of the main entrance. The fountain basin is designed as a bench made of pre-fabricated concrete elements.







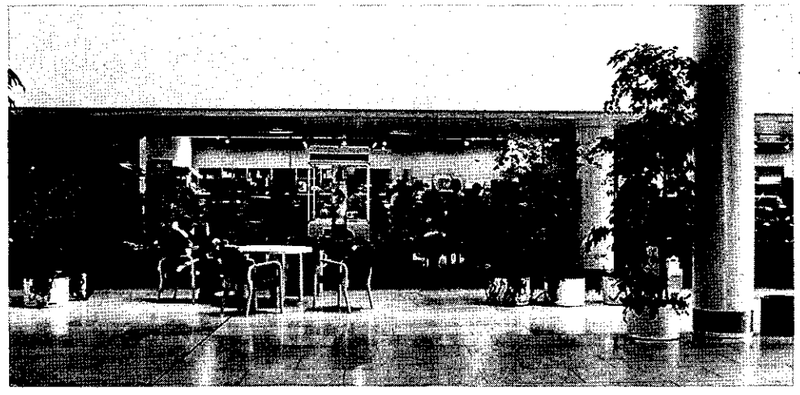


Sygehusets hovedindgang. Drejedørene i indgangen kører permanent og fungerer som luftsluser. Ved siden heraf er der kørestols-indgang, hvis døre er styret af fotoceller.
Forhallen er udformet som et torv med butikker såvel i indgangsniveau som på balkonetagen. Om aftenen bliver de lukket med foldevægge. Udsmykningen af vægge og foldedøre er udført af maleren Poul Gernes. Gulvbelægningen er af hvid Carrara marmor.

■ The hospital's main entrance. The revolving doors in the entry turn constantly and function as air sluices. Beside the revolving door entry is the wheelchair entrance, with photo-cell operated doors.
The foyer is designed as a market place with shops on both the entry and balcony level. At night they are closed by means of folding walls. The decorations on walls and folding doors were executed by the painter Poul Gernes. The flooring is white Carrara marble.

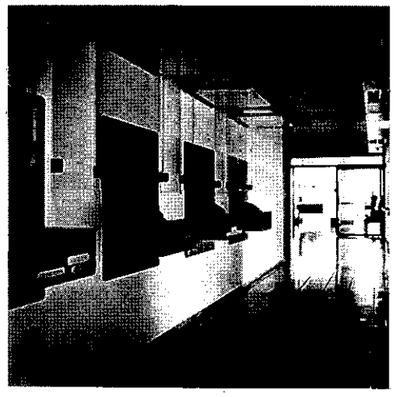
Forhallen. Maleren Else Fisher Hansen har udført den store glasmosaik til højre for hovedindgangen. Møblerne i forhallen og i andre områder af mere offentlig karakter er Artek-modeller, design Alvar Aalto.

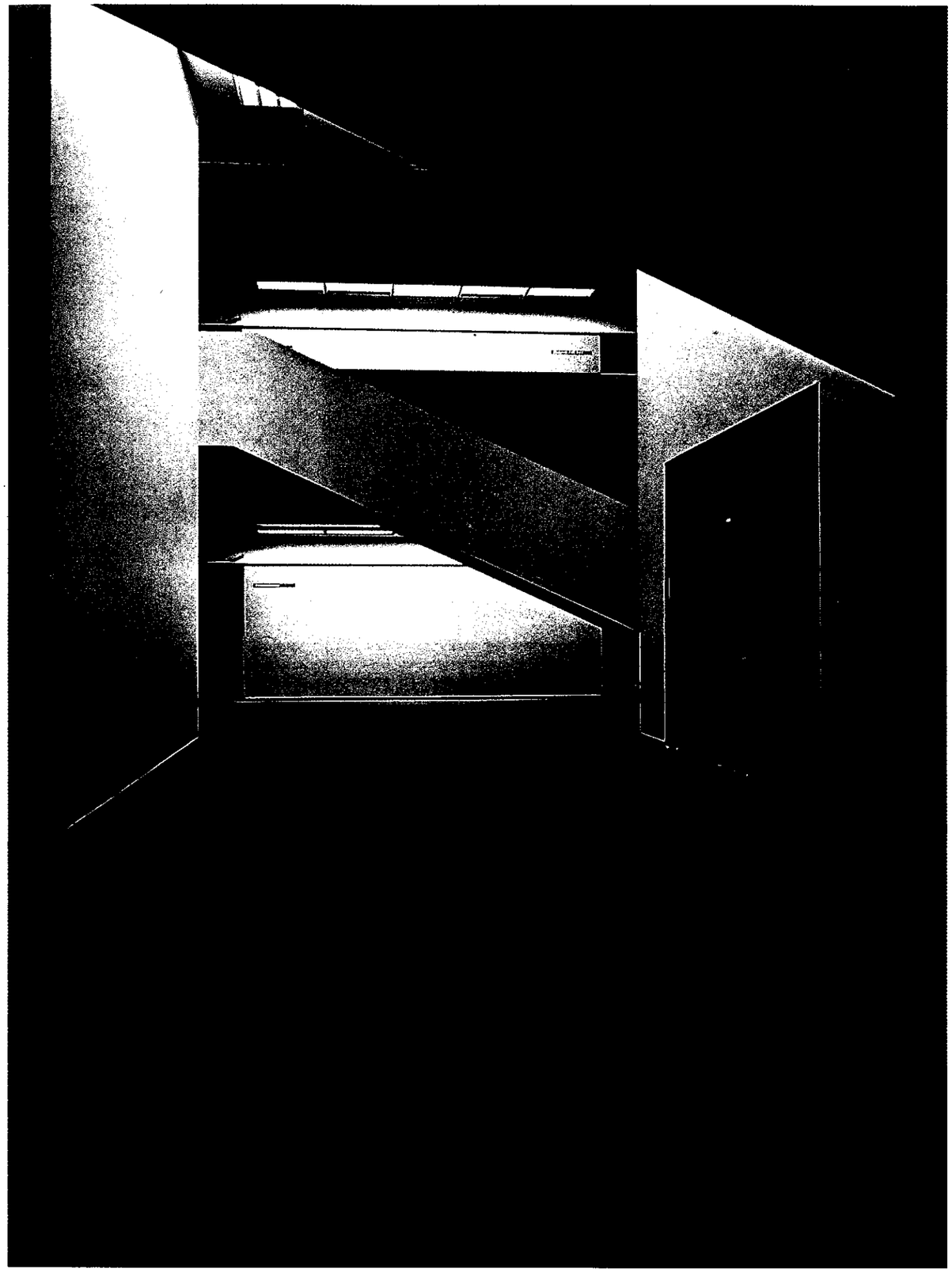
■ The Foyer. The painter Else Fisher Hansen designed the large glass mosaic at the right of the entrance. The furniture in the foyer and in other areas of a public nature is Artek, design Alvar Aalto.

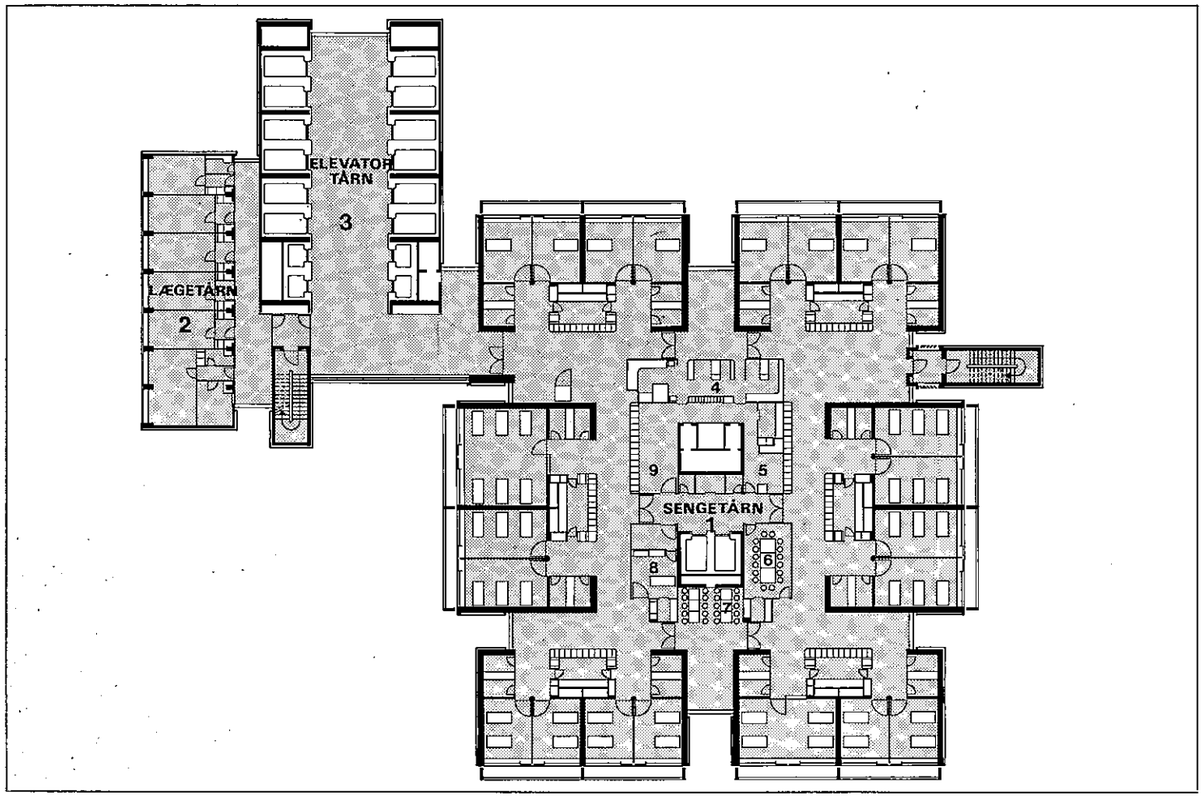


Administrationen, hvortil der er adgang fra forhallen, er placeret i sengebygningens to nederste etager.
■ Administration department with access from the foyer is located in the in-patient building's two lower floors.

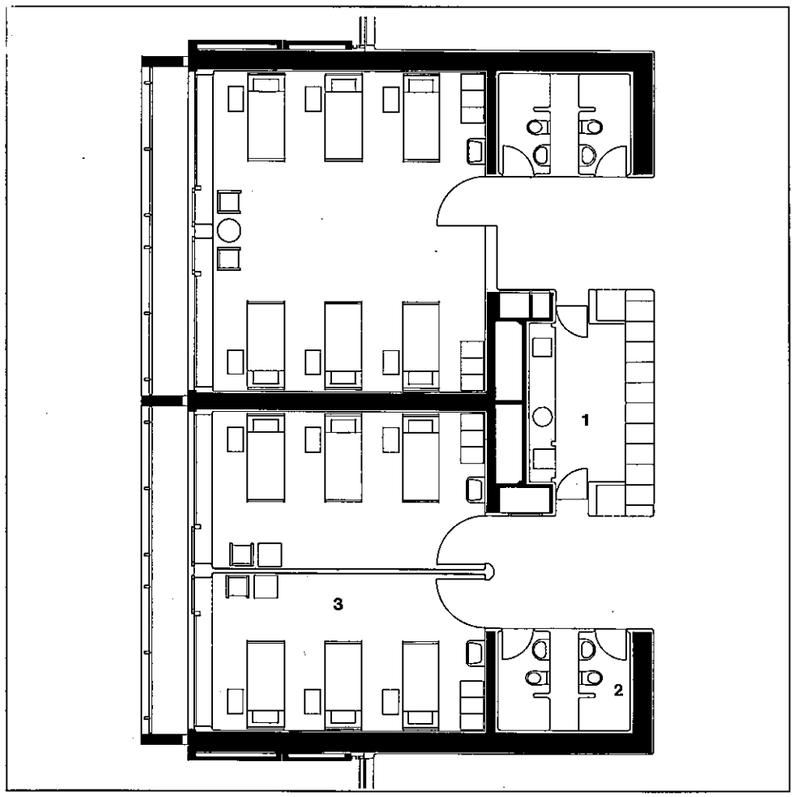
Herunder: Automattelefoner i publikums garderoben.
■ Below: Slot-telephones in the visitors' cloakroom.



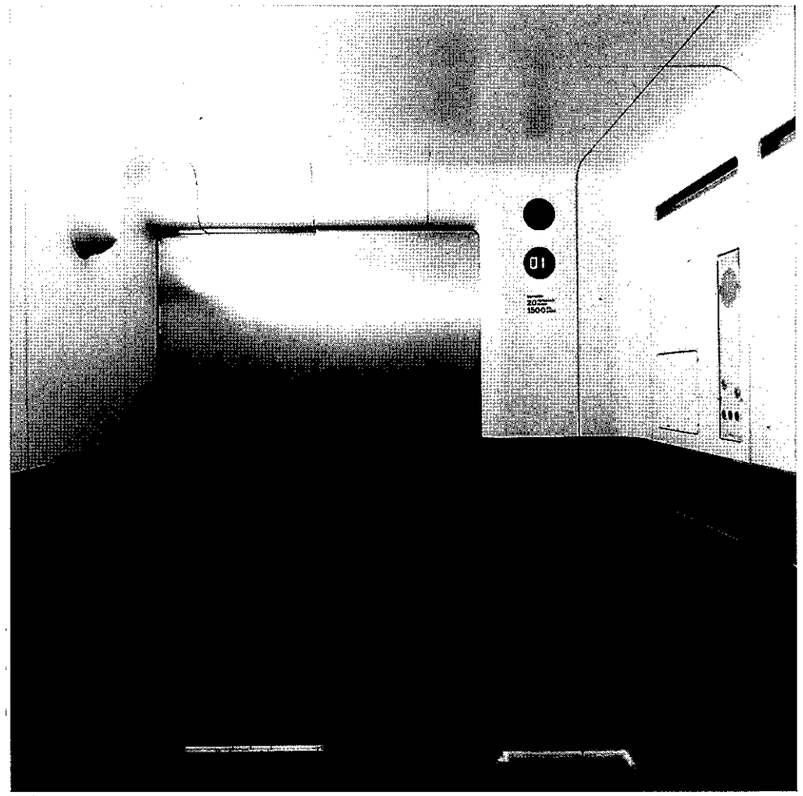




Normaletage, plan 1:500.
1, sengetårn. 2, lægetårn. 3, elevatortårn. 4, vagt. 5, køkken. 6, konferencerum. 7, spiseplads. 8, undersøgelse. 9, depot.
■ Normal floors, plan 1:500.
1, ward tower. 2, doctors' tower. 3, elevator tower. 4, duty station. 5, kitchen. 6, conference room. 7, dining area. 8, examination. 9, storage.



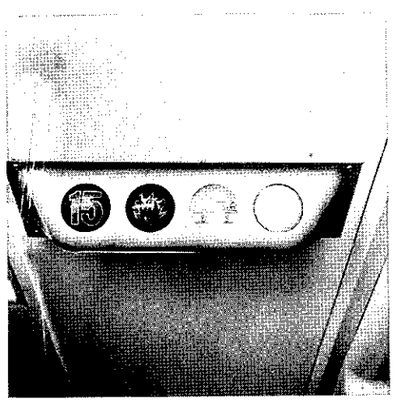
Plan af sengeafsnit, 1:150.
1, skyllerum. 2, toilet. 3, sengestue.
■ Plan of ward department, 1:150.
1, sluice room. 2, toilet. 3, ward.

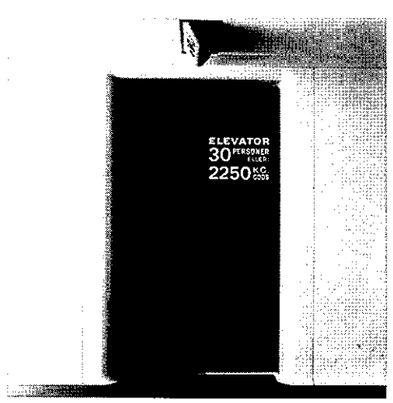


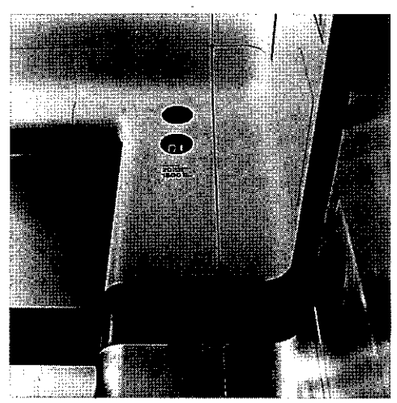
Den 25 etager høje sengebygning består i princippet af flere, sammenstillede tårne. Seks mindre tårne rummer sygestuerne. Omsluttet af disse ligger de centrale servicefunktioner. I midten to elevatorer til transport af urent gods. De øvrige elevatorer er placeret i eget elevatortårn.
■ The 25-floor tall in-patient building consists in principle of several grouped towers. Six smaller towers house the wards. The wards surround the central service functions. In the middle are two elevators for transporting contaminated materials. Additional elevators are located in a special elevator tower.

Elevatorsystemet i elevatortårnet er med sine 16 elektronisk dirigerede elevatorer blandt de mest avancerede i Europa. Et specielt udviklet indikatorsystem viser, om en elevator er reserveret til person- eller båretransport. Reservationen kan skifte efter behov.
På grund af systemets størrelse har det kunnet betale sig at specialtegne elevatorerne, bl.a. med henblik på let rengøring. De er udført af rustfrit stål. Interiørets vægge er hvide foroven og i røde nuancer forneden.
Øverst til venstre ses elevatorgangen i indgangsetagen.

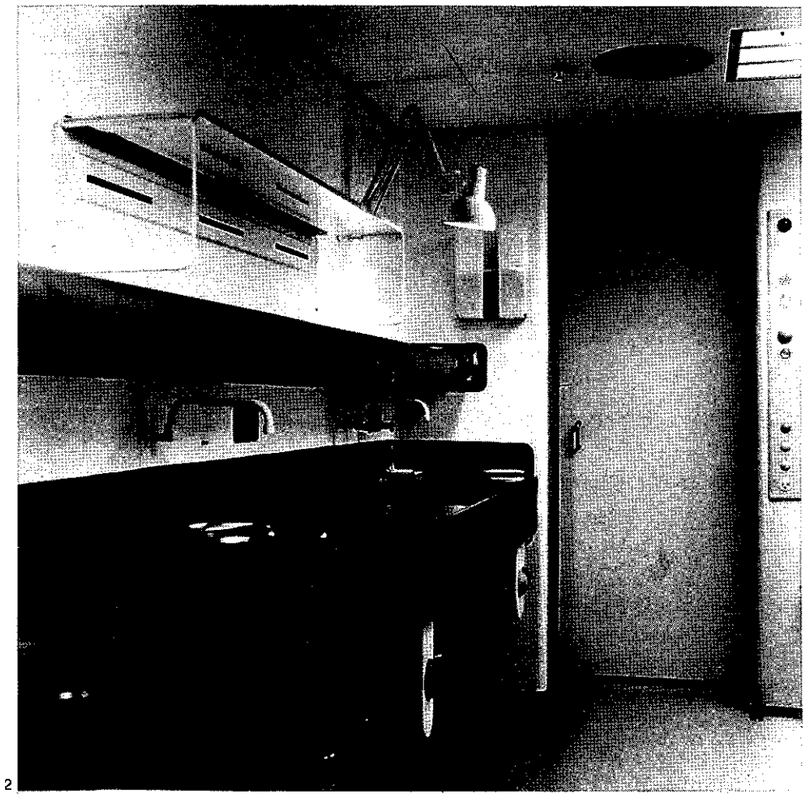
■ The elevator system in the elevator tower is, with its 16 electronically controlled elevators, among the most advanced in Europe. A specially designed indicator system shows whether an elevator is reserved for person or stretcher transport. The reservation can be changed according to demand.
Because of the size of the system, it was feasible to design the elevators specially, among other things with regard to ease of cleaning. They are built of aluminum. Interior walls are white at the top and in red tones at the bottom.
The photo top left shows the elevator corridor on the entrance floor.







1



2

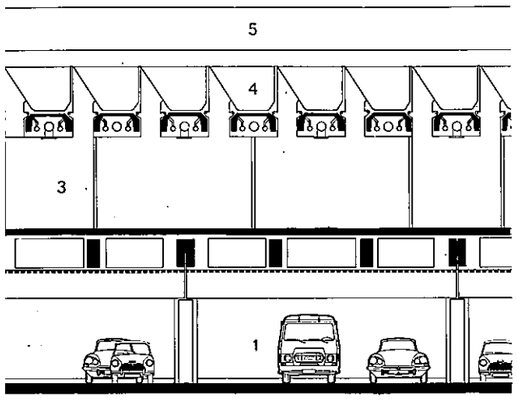
1. Fra elevatoren kommer man ud i etagefoyeren.
2. Skyllerum i forbindelse med sengestue.
3. Indgang til sengeafsnittet. Vagt og information findes straks indenfor indgangen.

■ 1. The elevator gives immediate access to the floor foyers.
2. Sluice room in connection with ward.
3. Entrance to the ward department. Duty station and information are found immediately inside the entrance.

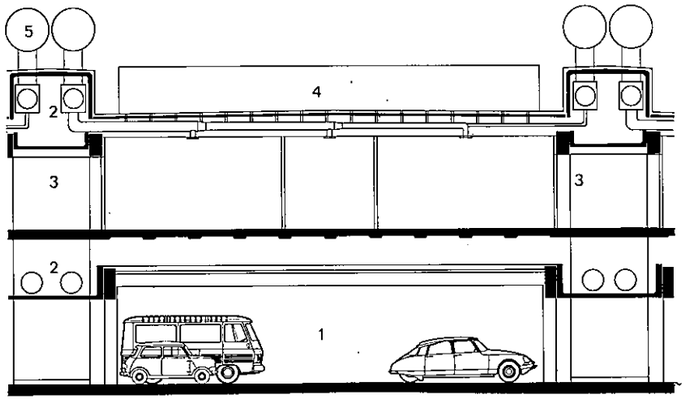
3

Sengestuerne er præget af de mange nødvendige tekniske armaturer, som her er udformet så diskret som muligt. Til gengæld er der anvendt kraftige vægfarver og mønstrede gardiner.
Til hver sengestue hører en altan til udvendig rengøring af vinduer.

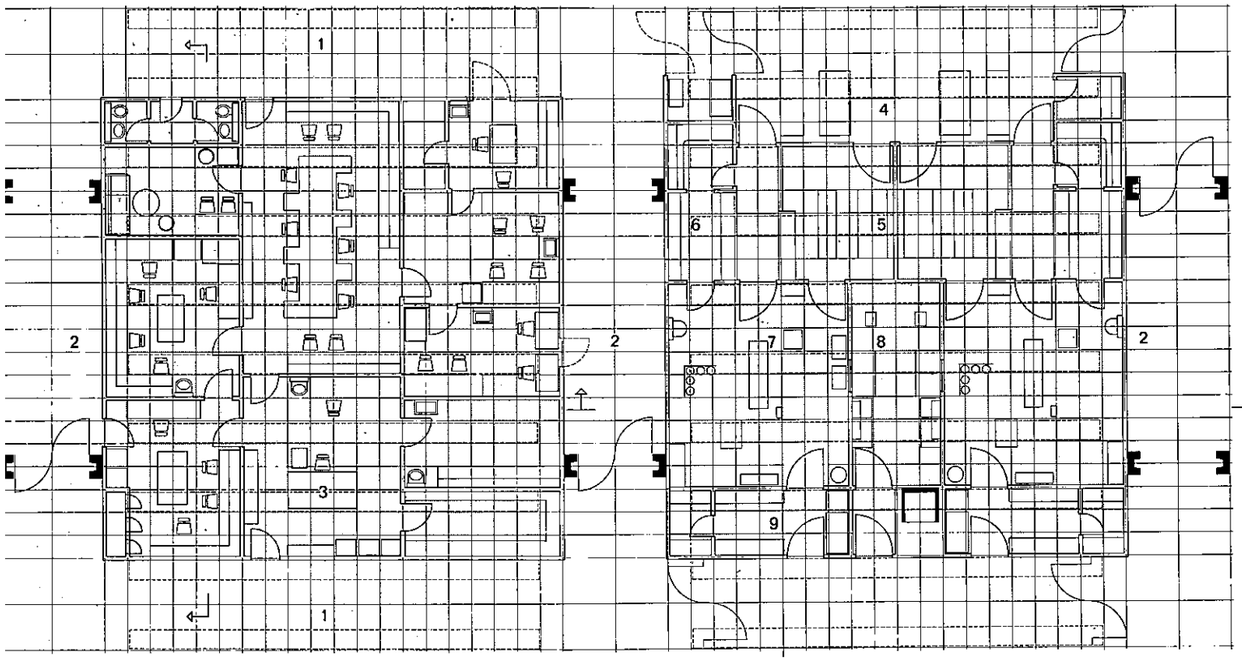
■ The wards are characterized by the manifold necessary technical fittings, which are designed to be as discreet as possible. On the other hand, strong wall colors and print curtains are used.
Each ward has a balcony for outside window cleaning.



Snit nord-syd. ■ Section north-south.



Snit øst-vest. ■ Section east-west.

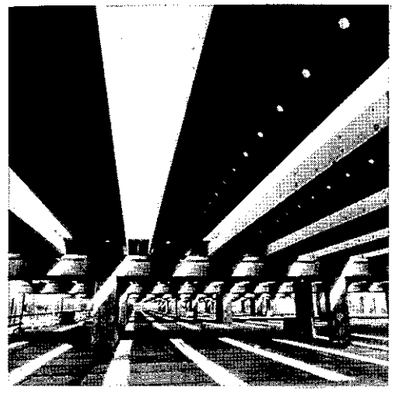


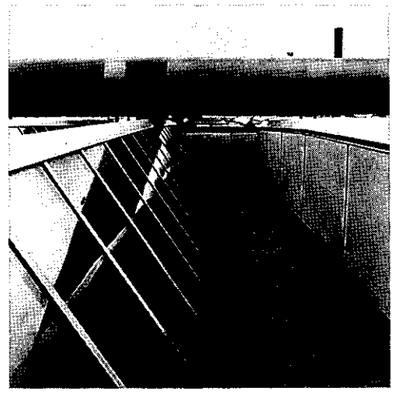
Snit 1:200.
1, parkering. 2, ingeniørgang. 3, gang. 4, ovenlys. 5, ventilationsrør.
■ Sections 1:200.
1, parking. 2, installation corridor. 3, corridor. 4, skylight. 5, ventilation ducts.

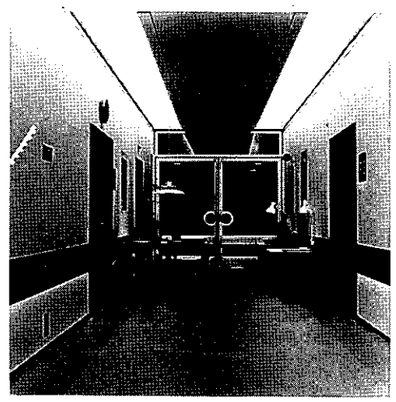
Planudsnit af behandlingsbygning, 1:200.
1, behandlingsgang. 2, forbindelsesgang. 3, laboratorier. 4, forrum. 5, anæstesi. 6, steril-rum. 7, operationsrum. 8, elektronik, røntgen. 9, skyllerum.
■ Partial plan of treatment building, 1:200.
1, treatment corridor. 2, connecting corridor. 3, laboratories. 4, foyer. 5, anesthesia. 6, sterile room. 7, operating room. 8, electronics, X-ray. 9, scrub room.

Princippet i behandlingsbygningen er, at de sydligste kvadrater er forbeholdt ambulante patienter. De øvrige moduler er udlagt til laboratorier, operationsstuer og undersøgelse og behandling af indlagte patienter.
Behandlingsbygningen består af kvadratiske moduler på 15×15 m, delt af 3 m brede gange. Over og under forbindelsesgangene ligger ingeniørgange med hovedfremførslen af ledninger og rør. De store ventilationskanaler ovenpå bygningen har forbindelse til den øvre ingeniørgang, hvorfra installationerne føres ind i kvadratmodulet via de U-formede betondragere.
Kunstlysarmaturerne i forbindelsesgangene er udformet, så de giver et højt lysniveau på væggene. Lysstofrørene er skjult af reflektorskærme, således at direkte lys undgås.

■ The principle in the treatment building is that the southernmost squares are reserved for ambulatory patients. The other modules are designed for laboratories, operating rooms and examination and treatment of in-patients.
The treatment building consists of 15×15 m. square modules, separated by corridors with a width of 3 m. Over and under the connecting corridors, the installation corridors housing the main wiring and piping are located. The large ventilation ducts on top of the building are connected to the upper installation corridor, from where the installations are conducted to the square-module via the U-form concrete girders.
Artificial light sources in the connecting corridors are designed to give a high level of light on the walls.







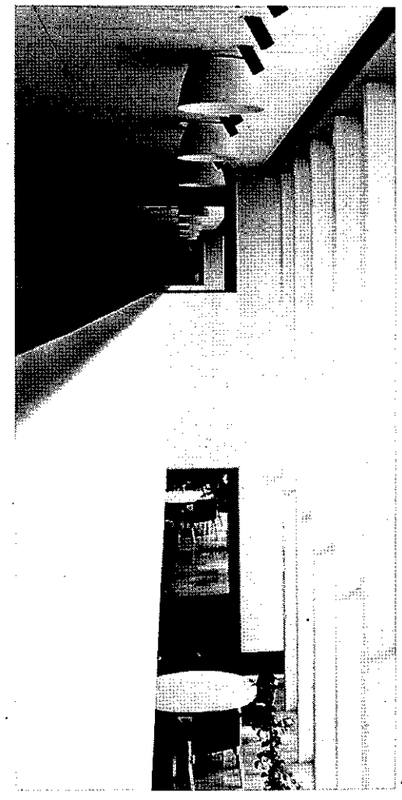
1

3

1. Behandlingsgang ved vindue.
2 og 5. Ambulatoriegang. Herfra fordeler ambulante patienter sig til de forskellige behandlingsafsnit.
3. Vejviser i ambulatoriegang.
4. Transportgangen ligger som en balkon i ambulatoriegangens rum. Den har forbindelse til tunnelerne fra servicebygningen.

■ 1. Treatment corridor at the window.
2 and 5. Ambulatory corridor. From here ambulant patients are distributed to the various treatment departments.
3. Directory.
4. The transport corridor lies like a balcony in the ambulatory corridor. It connects to the tunnels from the service building.

2



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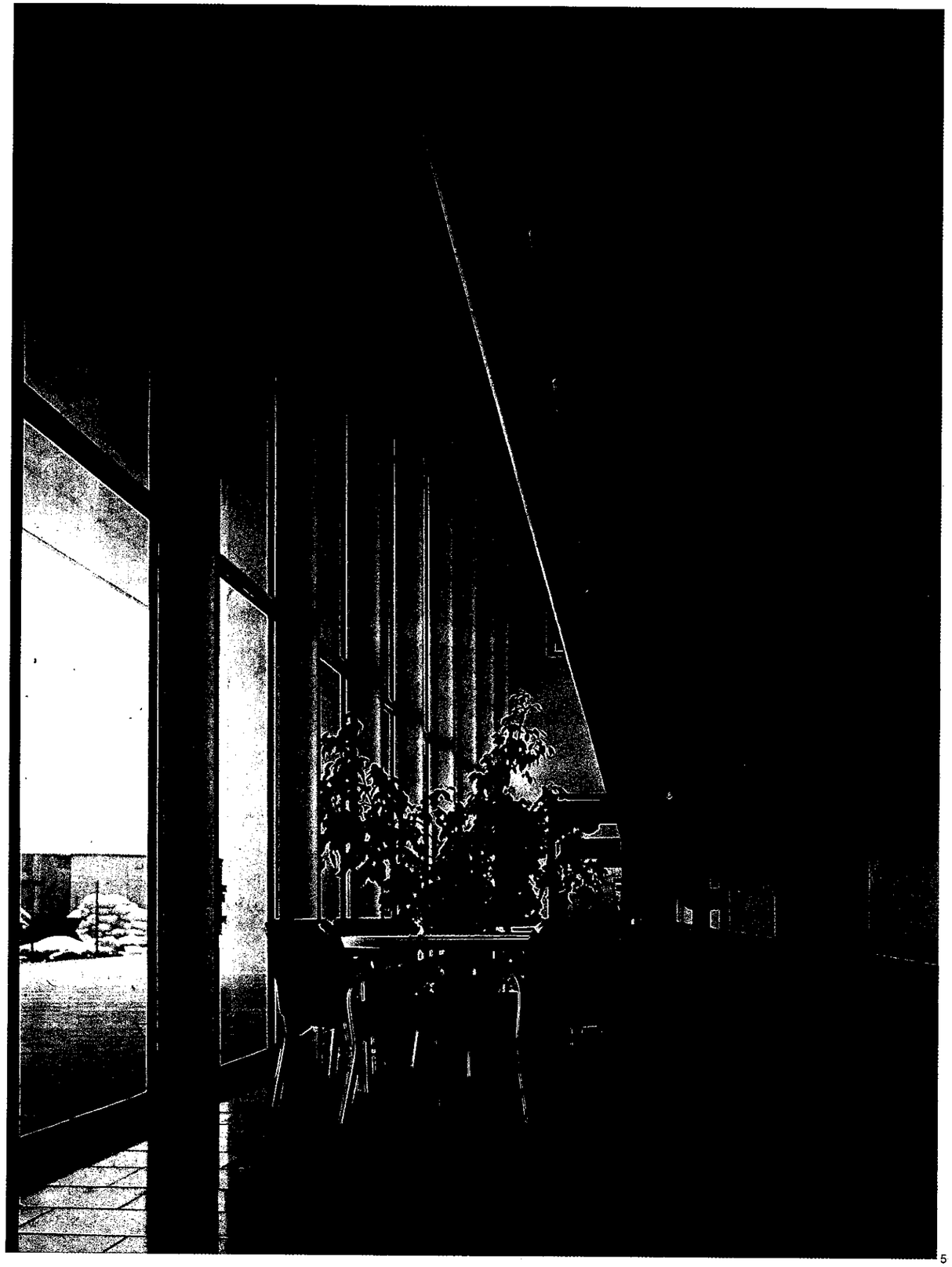
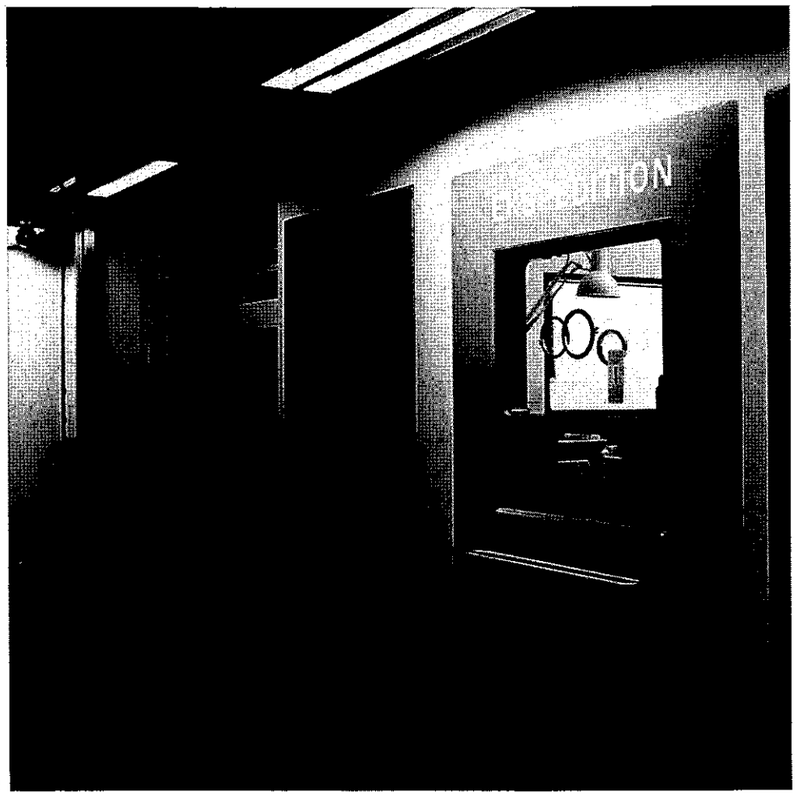


5

1

1. og 3. Behandlingsgang. De lange gangafstande kan i givet fald tilbagelægges på cykel.
Ovenlysene er den primære dagslyskilde i behandlingsbygningen. De er nordvendte, således at direkte sollys i behandlingsafsnittene undgås.
2. Ekspedition ved ambulatorium.
4. Fordelingsgang ved lysgård.
5. Kaffestue i fordelingsgang.

■ 1. and 3. Treatment corridor. The long corridor distances can be traversed by bicycle.
The skylights are the primary source of daylight in the treatment building. They are oriented toward the north so that direct sunlight in the treatment departments is avoided.
2. Service at the ambulatory.
4. Distribution corridor at the light well.
5. Coffee room in the distribution corridor.



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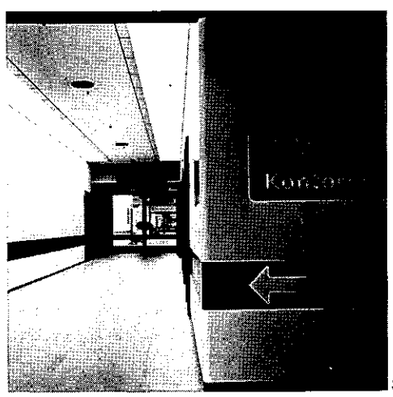


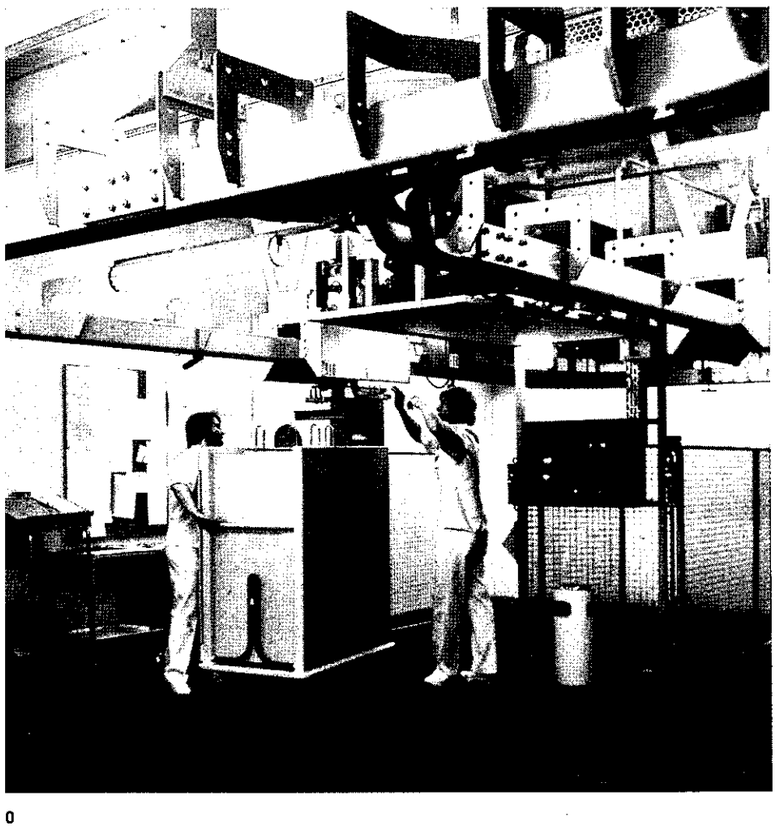
3

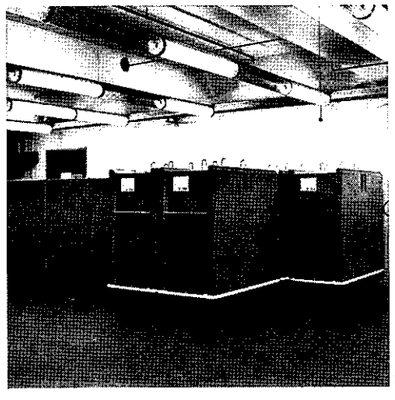
De øst-vest gående gange i behandlingsbygningen har ovenlys, medens de nord-syd gående forbindelsesgange imellem de forskellige afsnit belyses med kunstlys, der giver en mørkere karakter.
I skiltene er overalt anvendt Naur Klints skriftsystem Flexibility.

■ The corridors running east-west in the treatment building have skylights, while the connecting corridors between the various departments are lit artificially; this gives a darker character.
Lettertype in all direction signs is Flexibility designed by Naur Klint.

4

5





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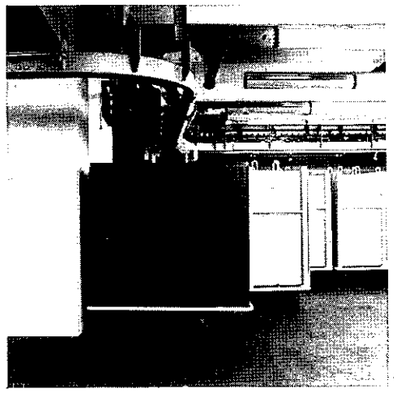


4

5

Der er tre forskellige systemer til vandret godstransport: Elektriske vogne, et conveyorsystem til transport af senge og containervogne og et kassetransportsystem til lettere kasser. Herudover er der et rørpostsystem.

1. Fordelingscenter. Containervognenes farver angiver deres anvendelse. El-vognene er specielt tilpasset container-vognene. Begge er tegnet af arkitekterne.

2-3. Fra en lokal containerstation kan man rekvirere en containervogn, som kan adresseres til en af de øvrige stationer. En central datamaskine holder styr på antallet af optagne vogne, deres art og placering, således at ekspeditionerne kan foregå rationelt.

4. Der er udlagt mere end tre kilometer skinner i sygehuset.

5. Sengetransport på conveyorsystemet.

6. Fra sengeredningscentralen sendes den opredte seng forseglet i depot, hvor den står parat til anvendelse. Efter brug går den tilbage til service bygningen og bliver afredt og steriliseret.

■ There are three different systems for horizontal freight transport: Electric cars, a conveyor system for transportation of beds and container cars, and a box-transportation system for light boxes. In addition there is a pneumatic mail system.

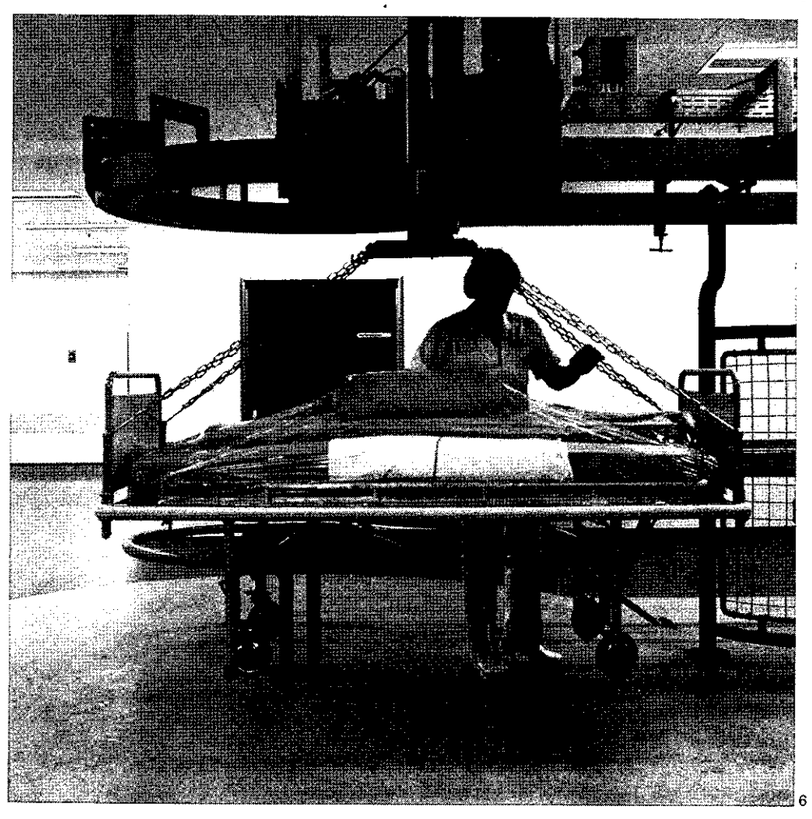
1. Container station. The container cars are color-coded according to their use. The electric-cars are specially adapted container-cars. Both were designed by the architects.

2-3. A container-car can be requisitioned from a local container station and addressed to one of the other conveyor stations. A central data processing machine controlls the number of occupied cars, their nature and location, so that rational dispatches are assured.

4. Over three kilometers of rails have been laid in the hospital.

5. Bed transport on the conveyor system.

6. From the bed-making central the made-up beds are sent sealed to the depot; here they are stored ready for use. After use they are returned to the service building and are stripped and sterilized.



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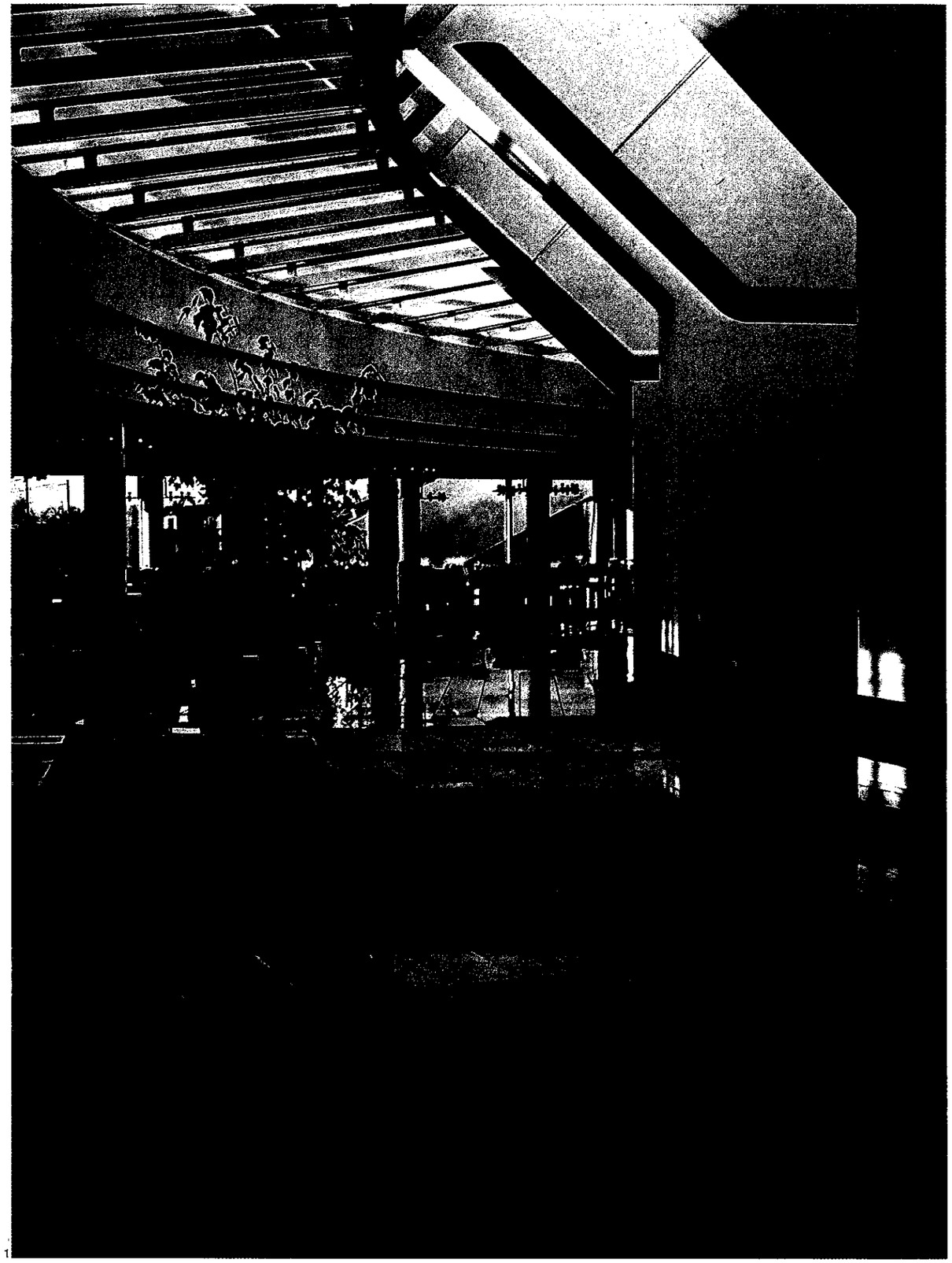
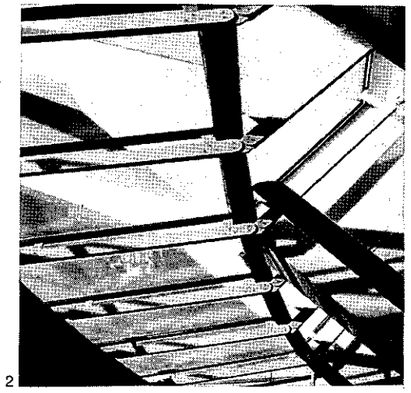
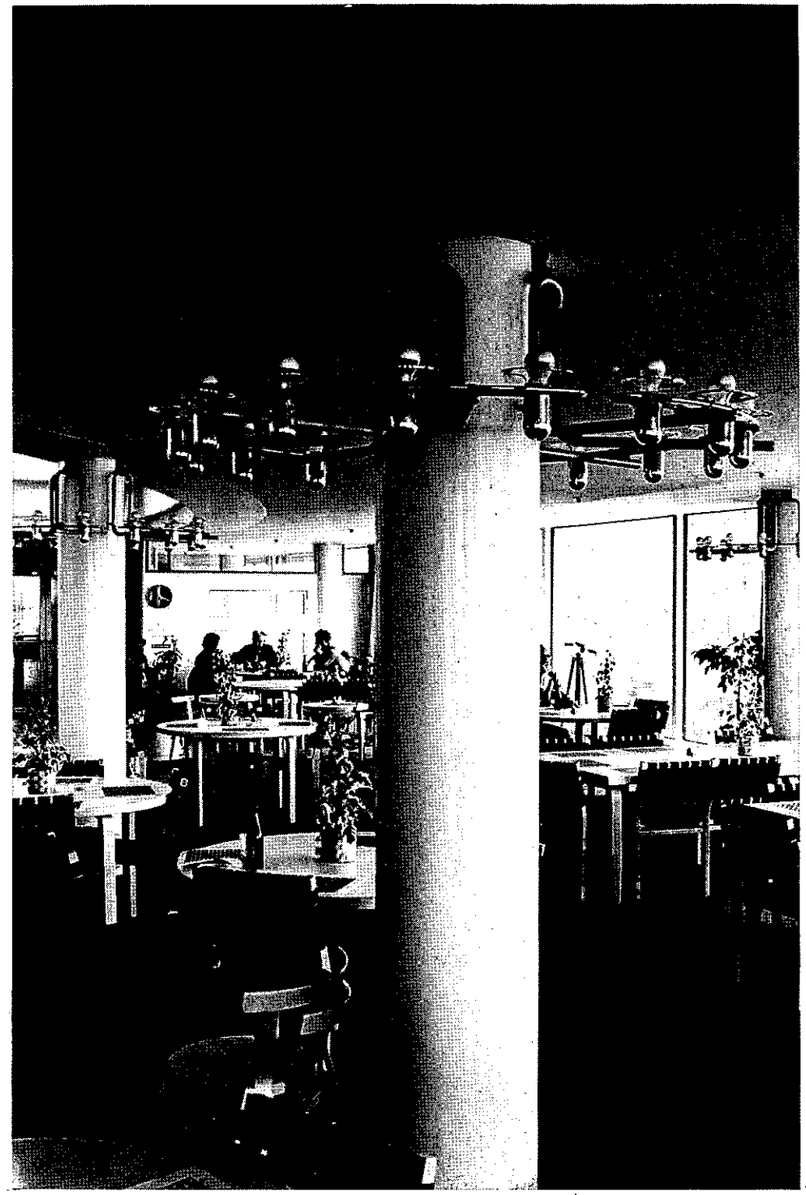
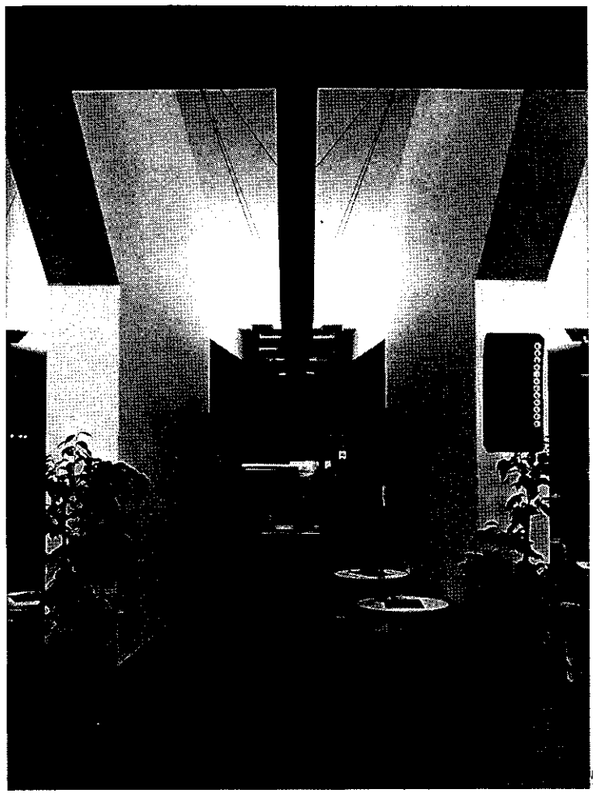






1. Restauranten.
2. Ovenlys mellem søjlerne, der bærer auditorierne.
3. Indgang til personalekantinen.
4. »Lysekronerne« består af fire lampetter, der er tegnet til restauranten.

■ 1. The restaurant.
2. Skylight between the columns which bear the auditoria.
3. Entrance to the staff canteen.
4. The »chandeliers« consist of four lamps which are specially designed for the restaurant.



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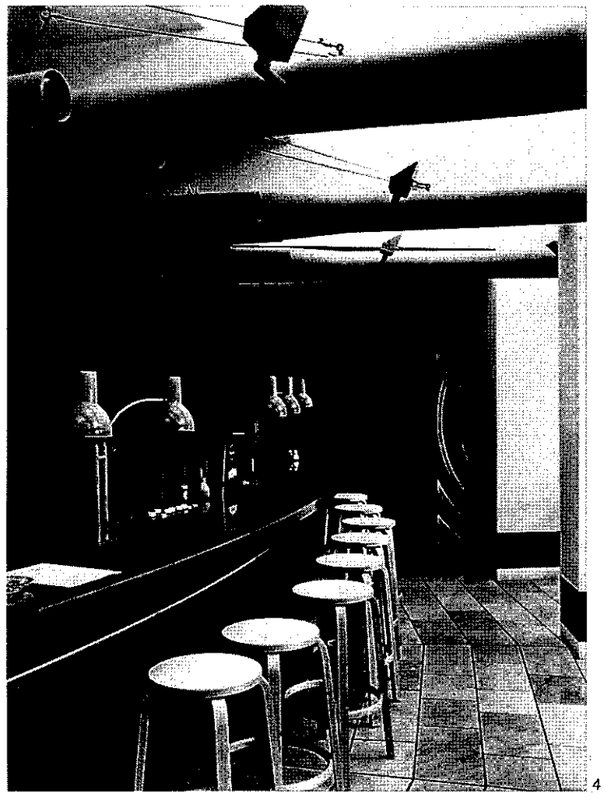
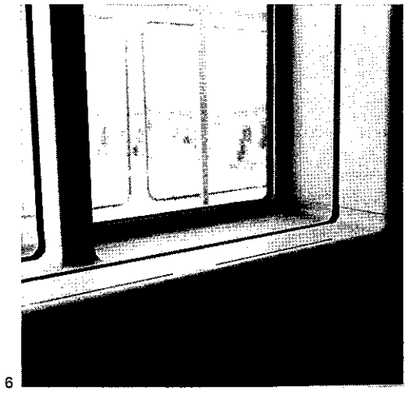


4

1. Mellem de brede søjler, der bærer de ovenliggende auditorier, sker adgangen fra restauranten til selvbetjeningsskranken.
2 og 3. Cafeteriaskranken og næsten alt køkken inventaret er formet til den specielle situation. De jetmotoragtige rør er varmluftsindblæsning.
4. En del af betjeningsskranken er indrettet til bardisk.
5. Detalje fra balkonetagen i forhallen.
6-9. Vinduesrammer, karme og lysninger er i hvid, ovnlakeret aluminium. Luftindblæsning sker fra spalter i karmen.

■ 1. The entrance from the restaurant to the self-service counter is between the wide columns which bear the superjacent auditoria.
2 and 3. The cafeteria counter and nearly all the kitchen inventory is specially designed. The jet-motor-like ducts are the hot-air intake.
4. Part of the service counter is arranged as a bar.
5. Detail from the balcony floor in the foyer.
6-9. Window casements, frames and aprons are in white baked-on enamelled aluminum. Air-intake is through slits in the frame.

5



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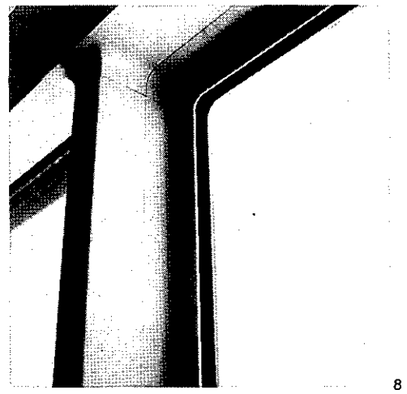

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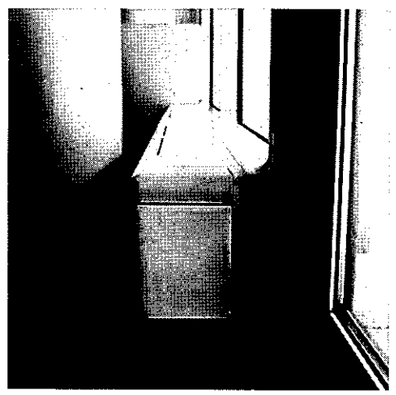


9

Farverne

Som foran nævnt lod man meget tidligt opføre et forsøgsmodul, svarende til en etage i det nye amtssygehus' sengebygning. En af flere muligheder var her at afprøve det farveprogram, som man tænkte sig anvendt i det nye amtssygehus.

Man havde den hypotese, at farverne havde stor betydning for patienternes og personalets trivsel, og dermed også betydning for patienternes sygdomsforløb. Hvis man ved den rette anvendelse af farverne kunne glæde og opkvikke patienterne, kunne indlæggelsestiden måske forkortes. Og under alle omstændigheder var det et tilstrækkeligt mål at skabe glæde hos både patienter og personale.

Derudover kunne farverne medvirke til at understrege husets arkitektur og lette de besøgendes orientering i det store bygningsanlæg.

Det idémæssige grundlag var, at huset udvendig skulle være hvidt med bronzebrune døre og vinduer. Indvendigt skulle huset være præget af farver, bestemt af deres funktionelle og psykologiske placering.

Man skelnede mellem farveholdningen i sengebygningen og behandlingsbygningen. Sengebygningens interiører ønskede man polykrome med stærke og rene kulører. Behandlingsbygningen med mange lyskrævende funktioner skulle være domineret af hvidt, men med enkeltobjekter og vejledende signaler som strålende accenter.

Ved farveforsøgene i forsøgsmodulet startede man med ekstremt kraftige farvevirkninger, som viste sig at blive ganske positivt modtaget af de fleste af forsøgsmodulets brugere. Man kunne derfor med få modifikationer videreudvikle det til det farveprogram, som er anvendt i det nye amtssygehus i Herlev.

Sengebygningen

De seks enkelttårne med sengestuer, som tilsammen udgør sengetårnet, har fået hver sin hovedfarve fra en kølig til en varm, fra nord til syd. Ved i rummenes farver at følge dagslysets temperatur forstærkes og levendegøres farverne.

Væggen bag patienterne er i alle sengestuer hvid. Vinduesvæggen er næsten helt af glas med hvide sprosser og kan dækkes med lyse persienner. Desuden kan vinduesvæggen dækkes af et mønstret gardin, hvis farveintensitet går fra det lette til det tætte, så lyset også på denne måde kan reguleres. De to andre vægge har hver sin nuance inden for samme farve. De nordvendte sengestuer har fem nuancer i henholdsvis grønt og blåt, de østvendte stuer fem forskellige gule nuancer, de sydvendte henholdsvis fem forskellige orange og fem forskellige røde nuancer og endelig har de vestvendte stuer fem forskellige abrikoslignende nuancer.

Behandlingsbygningen

Behandlingsbygningen er et udstrakt anlæg med jævnt fordelt ovenlys. Dette forhold og ønsket om at kunne skabe et højt lysniveau i undersøgelses- og behandlingsrum samt de strenge hygiejnekrav motiverede, at hvidt blev dominerende, i visse tilfælde ikke alene som vægfarve, men også som gulvbelægning. Også inventaret er i stor udstrækning hvidmalet.

De hvide flader får liv af reflekser fra de talrige, farverige installationer og metaldele.

Opdelingen af de store moduler er flere steder sket til relativt snævre rum. De hvide vægge og anvendelsen af glasvægge modvirker fornemmelsen af tranghed.

Hvide flader vil med tiden gulne eller gråne. Denne ældning mærkes mindre, hvis den måles med stærkt farvede elementer: døre, dørindfatninger, inventardele, låger, beholdere, rør og rækværker. Samtidig kan det være en hjælp at afmærke disse dele med farver, der signalerer deres brug, eller advarer mod deres brug.

Stærke farver er også anvendt til skiltning og til understregning af visse linieføringer, for eksempel er fodlister og lister, hvor loft og væg mødes, farvede.

Til lettelse af den geografiske orientering er anvendt farvede bånd. Hver afdeling er bundet sammen af sin egen farve, som samtidig er anvendt på vejvisertavler og til angivelse af nærmeste elevator. S

The colours

There is a difference between the colour schemes in the in-patient building and treatment building. Polychromatic interiors, with strong, pure colours were chosen for the in-patient building. The treatment building, with its many light-demanding functions, is predominantly white, with colourful accents used for some special objects and the directory signals.

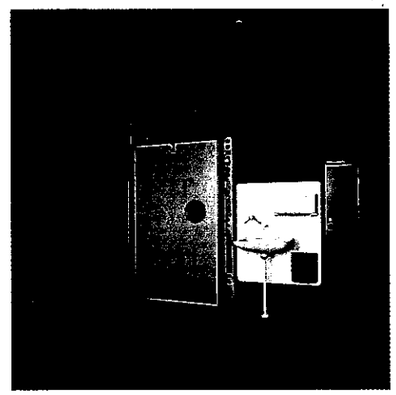
Each of the 6 individual ward towers, which together comprise the in-patient tower, has been given its basic colour, from cool to warm, from north to south. Because the individual room colouration corresponds to daylight temperature, the colours are strengthened and enlivened.

Walls behind the patients are white in all wards. The window wall is almost exclusively glass with white mullions, and it can be covered with light venetian blinds. In addition, a print curtain can be used to cover the window wall, and the colour intensity of the curtain varies from light to compact, so that light can also be regulated in this manner.

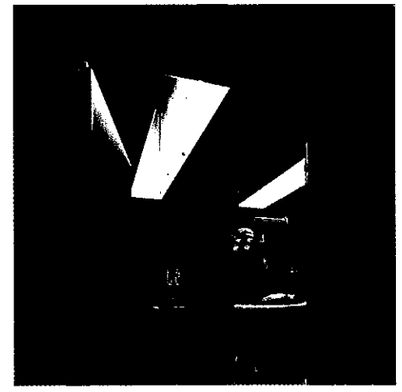
The two other walls each have its shade within the same colour. The wards with northern exposure have 5 shades in green and blue respectively. The wards with eastern exposure employ 5 different yellow tones. Those with southern exposure use respectively 5 different orange and 5 different red shades, and finally the wards with western exposure are coloured 5 different apricot-like shades.

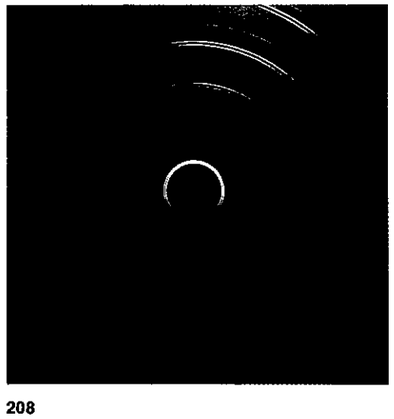


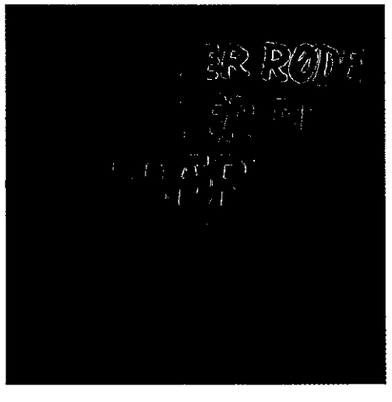






Den kunstneriske udsmykning

Farveplanlægningen er foretaget af bygningens arkitekter i samarbejde med maleren Poul Gernes, som også har forestået den billedkunstneriske udsmykning i forhallen. Her kulminerer farverne i billedrækker, hvis abstrakte motiver veksler mellem det lyriske og det meget konkrete, en kunstnerisk tolkning af de visuelle indtryk, vi møder i hverdagen, fra naturen til storbyens menneskeskabte signaler.

I forhallen er ophængt et stort glasmaleri 3×5 m. Motivet er to komplementære sole. Kunstneren er Else Fischer-Hansen, som har fået arbejdet udført hos den kendte glasmager Jacques Simon's atelier i Reims. Statens kunstfond har ydet økonomisk støtte. S

The artistic decoration

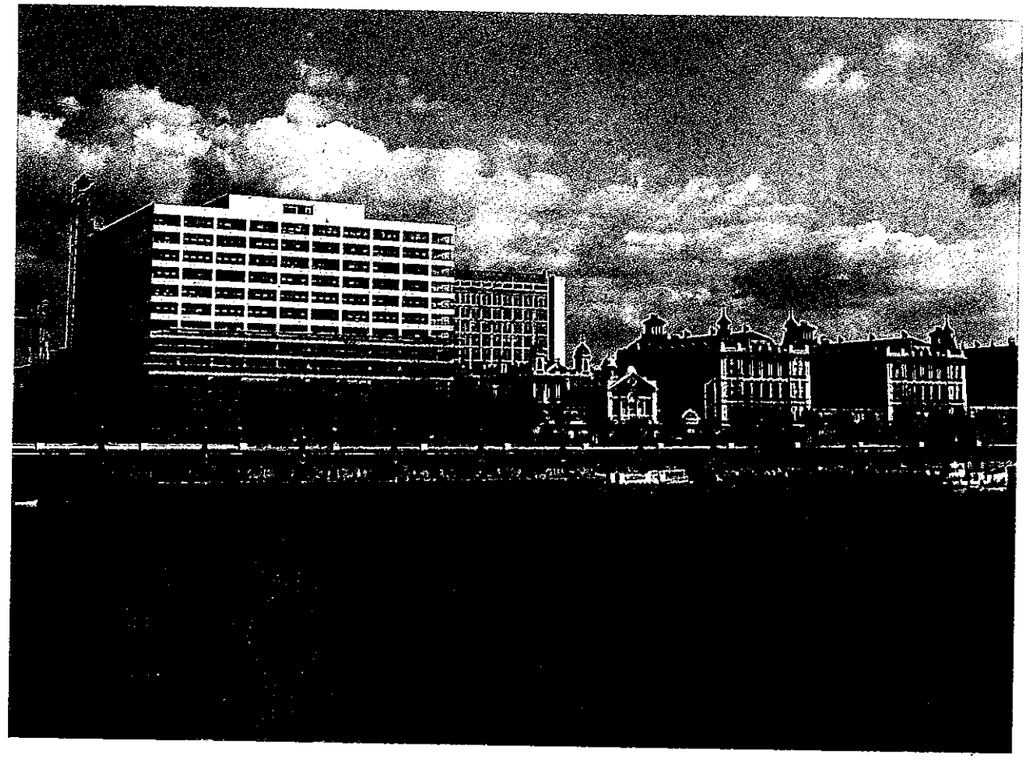
The colour planning was a cooperative venture of the building's architects and the painter Poul Gernes, who, in addition, executed the pictorial artistic decoration in the foyer. Here, the colours culminate in picture rows, in which abstract motives alternate between the lyric and the very concrete, an artistic expression of the visual impressions we meet in daily life, from nature to the man-made signals of the metropolis.

In the foyer, a 3x5 m. glass painting has been hung. The motive is two complementary suns. Else Fischer-Hansen, the artist, had the glasswork executed by the renowned glass artisan Jacques Simon in Reims. The Danish state art fund gave economic assistance.

MEMBER OF CIC · COPENHAGEN INTERNATIONAL CONSULTANTS · CONSULTING ENGINEERS AND PLANNERS

06-11-04-79 P150

St. Thomas' Hospital
London



The old St. Thomas' Hospital with its fine old buildings, situated close to the river Thames, opposite the Houses of Parliament, was opened in 1871 with 588 beds and the famous Florence Nightingale Nurses' training school. Some of these buildings were completely destroyed during World War II, and the new hospital development takes place on the site of the original hospital.

Generally the project consists of a 14 floor ward block with 630 beds in 27 wards, administration and patients' catering etc.

A 6 floor treatment block with treatment and clinical research facilities
A communal block
Twin residential blocks
Florence Nightingale training school for Nurses
and it was taken into use in November 1976.

Subsequent phase which is integrated in the scheme consists of an 11 floor ward block with 196 beds and an adjoining 3 floor treatment block with casualty department etc.

The hospital is fully air conditioned by a dual duct high velocity system.

Key figures and selected services data:
1,600,000 cu.m/h of air handled by the air conditioning system
6 refrigeration absorption machines of approx. 550 tons of refr. capacity each
2 boilers of 20,000 lbs of steam each per hour at 120 p.s.i.g. in stage 1.
2 boilers of 50,000 lbs of steam each per hour at 120 p.s.i.g. in stage 2
Area per floor, ward block approx. 4,200 sq.m
Area per floor, treatment block, approx. 5,400 sq.m

Scope of professional services provided by:

Steensen & Varming International Consulting engineers and planners.

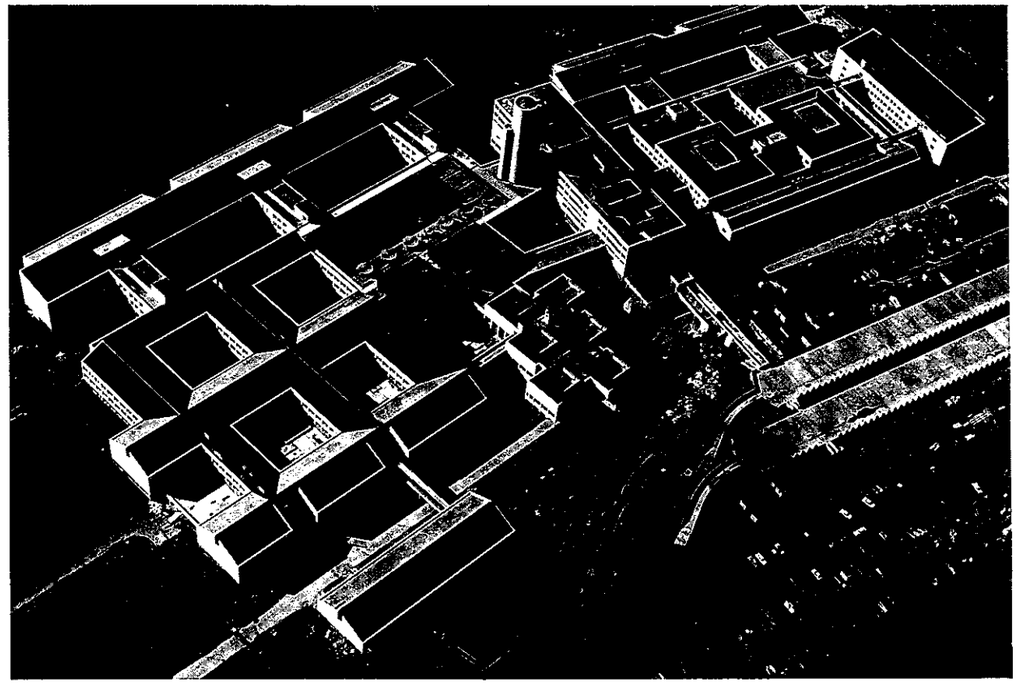
Design/documentation/contract administration/supervision of all engineering services.

Architect:
Yorke Rosenberg Mardall, London

Client:
St. Thomas' Hospital.

P152
06-11-06-79

Hospitals



Steensen & Varming International Consulting engineers and planners
has contributed to planning or design on following hospitals

	No. of beds	Floor area sq.m	Year
England			
St. Thomas' Hospital, London	800	120,000	1973
West Middlesex Hospital, London	240		1967
Nortwick Park Hospital, London	800		1973
Homerton Hospital, Hackney, London	430		1979
Wellington Hospital, London	100		1973
York District Hospital, York	800		1971
Royal Victoria Infirmary, Newcastle	450	84,000	1972
Scotland			
Ninewells Hospital, Dundee	800	120,000	1973
Royal Infirmary, Edinburgh	860	150,000	1969
Ireland			
St. Vincents Hospital, Dublin	450	45,000	1970
Cork Regional Hospital, Cork	600	45,000	1978
Beaumont Hospital, Dublin	700		1979
Extension of St. James' Hospital, Dublin	700		1979
Ardkeen Hospital, Waterford	500		1979
Tralee Hospital, Kerry County	450		1979
Denmark			
Copenhagen County Hospital, Herlev	900	160,000	1975
The County Hospital, Roskilde	kitchen + CSSD	10,000	1975
Hvidøre Hospital, Klampenborg	briefing	4,000	1979
Extension of Copenhagen County Hospital, Gentofte	48	4,000	1970
Singapore			
Kent Ridge Hospital	750		1979
Mount Elizabeth Hospital	250		1979
Australia			
Scottish Hospital, Sydney	180		1973
Extension of Royal Prince Alfred Hospital, Sydney	250	20,000	1979
Royal Alexandra Hospital, Sydney	Feasibility study		1976
Medical Centre, Merrylands, N.S.W.	0	1,000	1975
St. John of God Hospital, Burwood, N.S.W.		800	1975

General Professional Services

00-94-21-79 P161

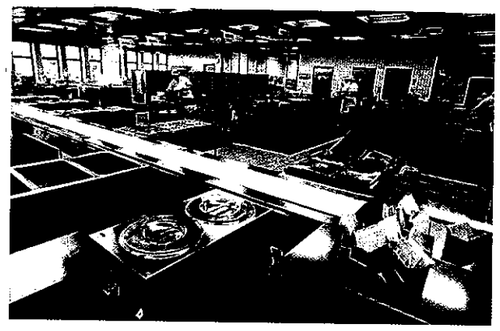
The CIC member firms have acted as consultants on the projects referred to, in own capacity or in cooperation with other firms

Further information regarding scope of professional services and names of other consultants connected with the specific projects may be obtanied at CIC

CIC

03-22-12-79 P171

Central Kitchen Denmark



Sønderborg Hospital took a new central kitchen into use in 1974. The kitchen is part of the hospital's extension and modernization programme, within which the hospital reckons on increasing the number of beds from about 400 to about 800.

The kitchen has the following functions:

- preparation of all meals for both patients and personnel,
- portioning arrangement and distribution of patients' meals,
- delivery of food to the staff canteen,
- receiving and washing-up of all tableware etc., from patients and staff canteen,
- buying and storage of raw foods.

The hospital's staff canteen is situated close to the kitchen.

The kitchen has been designed on the assumption that only fresh, raw products will be used. Meat is bought uncut, and vegetables are bought fresh whenever possible, although frozen vegetables are used out of season. The necessary refrigeration and freezing facilities are situated near the goods reception area.

The kitchen is highly mechanized in order to reduce heavy manual work to a minimum.

In addition to the goods reception area, the kitchen is divided into the following main sections:

Preparation section, with machines and work-tables for preparation of fish, meat and vegetables.
Hot food kitchen, with electrode-heated, tippable pots, fish-kettles and potatoboilers with in-built »lift«, tipping frying pans, deep fryers, baking and roasting ovens, warming cupboards and hob units.
Cold food kitchen with machines for slicing bread and cold meats etc., special work-tables for sandwich-making, and a cool unit for finished sandwiches.
Food distribution section with work stations at the portioning belt.
Central washing-up section, with dishwasher with delivery belt and removal belt.

In addition, the kitchen has a special milk kitchen designed to satisfy the needs of about 65 babies.

The kitchen, including staff cloakrooms, administration and technical areas, has an area of about 2,300 sq.m.

Crone & Koch undertook the structural design and layout of the kitchen, and the purchase and installation of all machinery and apparatuses.

Scope of professional services provided by

Crone & Koch Consulting Engineers International

Programming
Lay-out for the complete system
Design
Supervision

Key figures of the project:
Total floor area 2,300 sq.m.

Architect:
J. Stærmose, M.A.A.

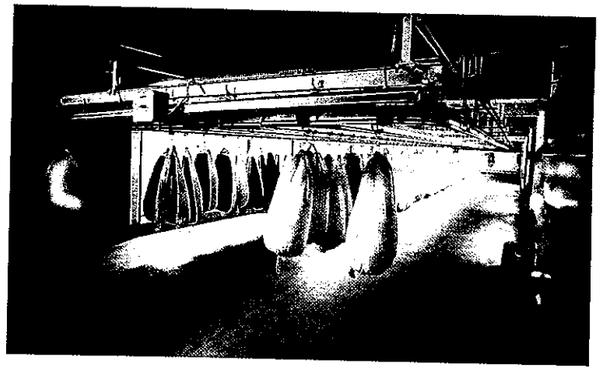
Client:
County of South Jutland.

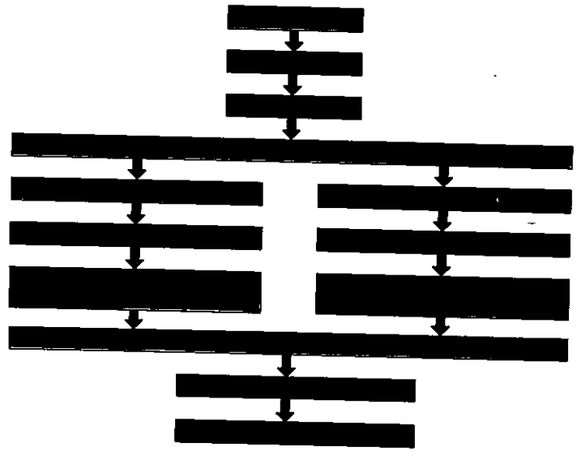
CONSULTANTS · CONSULTING ENGINEERS AND PLANNERS

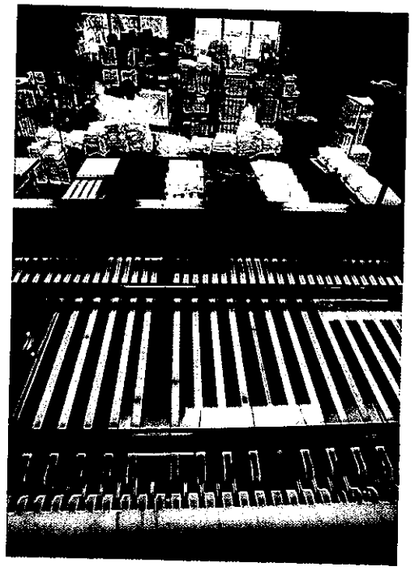
MEMBER OF CIC · COPENHAGEN INTERNATIONAL CONSULTANTS

03-22-13-79 P172

Central Hospital Laundry Denmark







The laundry at the Central Hospital in Nykøbing Falster, Denmark, burnt down on 11 August 1976. Reconstruction started on 1 December 1977, and the new laundry was taken into use on 1 January 1979.

In addition to the Central Hospital in Nykøbing Falster, the laundry serves three other hospitals – in the towns of Nakskov, Maribo and Sakskøbing.

Characteristics of the project

The laundry is equipped with sufficient machinery to handle 6.5 tons laundry per effective working day of 7 hours. The laundry can be extended with a few extra machines to bring the daily output up to 8-9 tons.

The laundry is also equipped with automatic handling and lifting equipment in order to reduce the heavy labour required of personnel to a minimum.

The laundry operates with 2 washing lines, one of which is equipped with washing machines incorporating spinning programmes, while the other is equipped with continuous washing machines.

The quantities and categories of the laundry and the washing and drying processes for both washing lines are registered and controlled by means of a mini-computer, which is operated in connection with the weighing of the unsorted dirty linen.

All the air-conditioning units are equipped for heat recuperation, and recuperation units for heat, water and chemicals have been installed at the washing machines.

For the well-being and thus the efficiency of the staff, most of the washing machines are also fitted with special screens to reduce heat radiation and noise-propagation.

Crone & Koch has provided the following services on this project: preparation of layout, purchase and installation of laundry machines and handling equipment, design, obtaining of bids and supervision of establishment and piping/wiring of all supplies, such as steam, water, softened water, heavy current and low current, air and compressed air, etc., together with all structural aspects in connection with the construction of the laundry.

Scope of professional services: provided by

Crone & Koch Consulting Engineers, International:

Programming
Lay-out for the complete system

Design:
Supervision

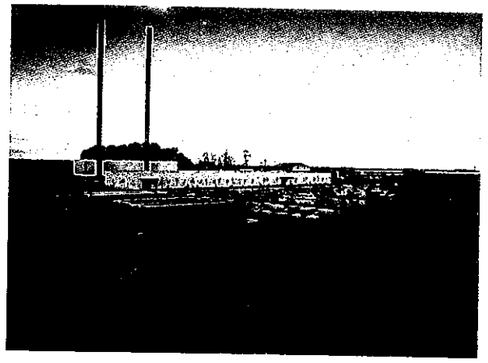
Key figures of the project:
Capacity 6.5 tons/day.

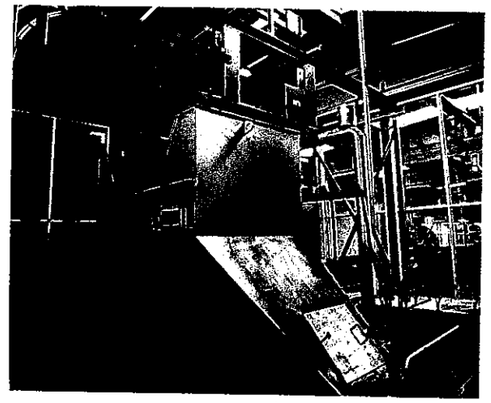
Client:
County of Storstrøm.

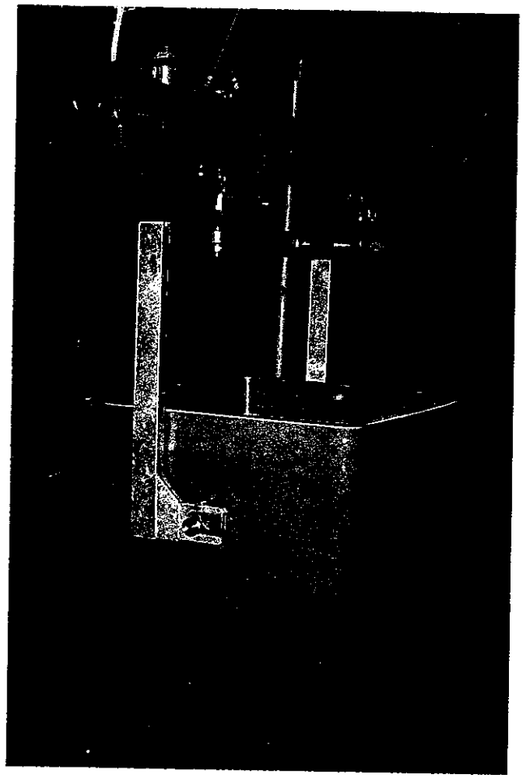
MEMBER OF CIC · COPENHAGEN INTERNATIONAL CONSULTANTS · CONSULTING ENGINEERS AND PLANNERS

03-22-11-79 P173

Waste-Incineration Plant
Sønderborg County Hospital
Denmark







Hospital waste comprises:
1. pathological and infected waste
2. special hospital waste
3. ordinary refuse.

Special requirements are made to the removal of hospital waste because completely hygienic handling is necessary at all levels, from 'production' to destruction.

The hygienically perfect solution to this problem has been chosen at Sønderborg Hospital – a solution that does not require sorting of the waste because all waste is treated in the same way and incinerated in the hospital's own incineration plant under proper, hygienic conditions.

Sønderborg hospital is the main hospital in the County, with all the necessary specialities. At present, it has 640 beds, with the possibility of extension to 800 beds.
The new boiler-house, which is situated in the service area of the hospital, is equipped with 2 nos. waste incinerators, each with a capacity of 250 kg/hour.

The handling of the waste has been planned to meet the hygienic requirements in the various departments, and the procedure is largely as follows:

In the dirty linen rooms in the various departments, the waste is collected in big plastic sacks, which are sealed when full. From here the sacks are collected and placed in a container on a flat car, which is transported by elevator to the tunnel level, where all horizontal transportation takes place. Here, the flat cars are joined together in trains and drawn by electric truck to the waste-incineration plant. At the plant the container is hooked onto an overhead conveyor, which takes it into a cooling room. The cooling room acts as a store, and from here, the container is transported automatically, controlled by the furnace, to the loading funnel, from which the waste is taken into the incinerator automatically, controlled by the incineration process. Before the container is returned to the hospital it is disinfected. Ash and clinker are removed automatically from the furnaces and outside the boiler-house are loaded in containers, which are transported to a controlled dump.

The furnaces are equipped with a convection boiler in order to exploit the heat energy in the waste.

The entire incineration plant is equipped with filtration plant etc., so that all environmetal requirements are satisfied.

Scope of professional services provided by

Crone & Koch Consulting Engineers, International:

Feasibility studies.
Analysis.
Planning.
Design.
Supervision.

Key figures of the project:
2 nos waste-incinerators
Capacity: 500 kg/hour.

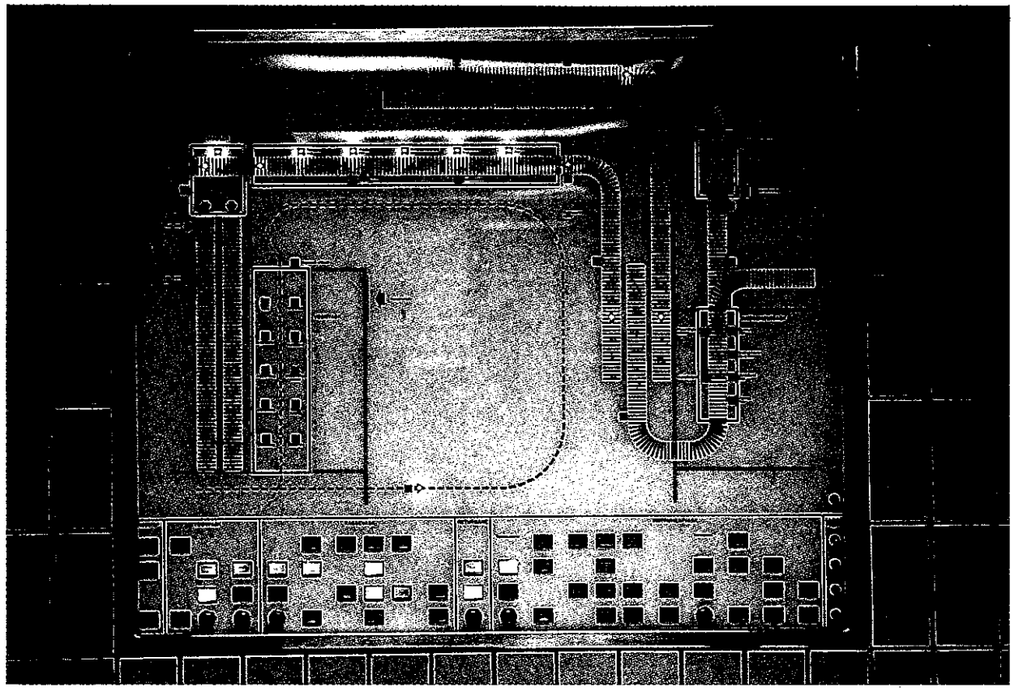
Architect:
J. Stærmose M.A.A.

Client:
County of South Jutland.

MEMBER OF CIC · COPENHAGEN INTERNATIONAL CONSULTANTS · CONSULTING ENGINEERS AND PLANNERS

03-22-79 P176

Electronic Sterilizing Plant
University Hospital, Denmark



A special plant with spray-washers and driers has been designed for sterilizing reusable utensils in order to achieve automatic cleaning and sterilization for the complete hospital, i.e., requiring very little personnel.

The highest possible degree of bacteriological cleaning requires automatic monitoring of critical processes, therefore reducing the risk of human error.

A specially designed electronic controller was built for this purpose, with facilities for control of temperatures, steam pressures, concentrations of chemicals etc. The controller and the process display interact in such a way that the staff is conducted through all relevant operations. Use is made of illuminated push-buttons, whereby only operative and relevant steps in the process are indicated – all other push-buttons being inoperative. If irregularities occur in the process, the fault program selects the necessary new procedures. At the same time, the fault signals are sustained to enable the personnel to correct the fault.

This scheme has proved to be extremely efficient and reliable in practice, and the principle is being considered for use in other systems. Downtime has been only a few hours since 1973.

Scope of professional services provided by

Crone & Koch Consulting Engineers International:

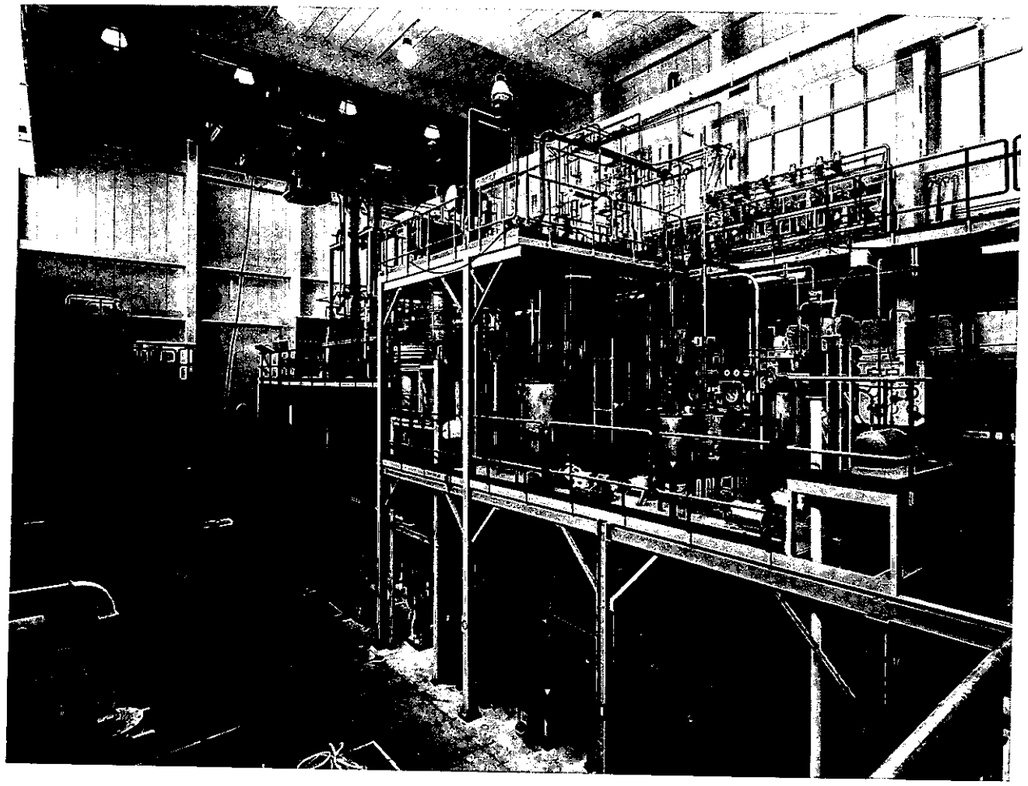
Design.
Supervision.

Client:
Ministry of Education

MEMBER OF CIC · COPENHAGEN INTERNATIONAL CONSULTANTS · CONSULTING ENGINEERS AND PLANNERS

06-21-79 P165

Preventive Maintenance



Steensen & Varming International
Consulting engineers and planners
has developed a preventive maintenance system covering:

1. Buildings
2. Building services
3. Process plant

Systematizing of the maintenance activities and introducing planned preventive maintenance as a rule will result in improved economy due to more efficient resource exploitation and fewer breakdowns.

Preventive Maintenance Features
The Steensen & Varming system for preventive maintenance (PM) introduces planned inspections and maintenance activities to correct anomalies and to detect defects before they develop into costly break-downs, resulting in:

- fewer break-downs, i.e. production plant available greater percentage of the time
- less overtime for planned maintenance and repairs than for break-downs
- fewer large repair works
- better product quality due to proper working equipment.

Development of Systems for Preventive Maintenance
Steensen & Varming provides assistance in the development of systems for Preventive Maintenance with scope adapted to the actual need:

- Equipment identification
  The identification is based on plant survey indicating the equipment on flow-sheets. The identification includes equipment lists, numbering system and individual equipment records based on obtainable information.
- Maintenance definition
  Preparation of maintenance instructions and procedure guides.
- Maintenance execution policy
  The execution policy is based on the identification of operational maintenance tasks.
- Maintenance procedures
  The defining of procedures includes the establishment of maintenance order form, maintenance schedule and formula for routine preventive maintenance. It also includes the set up of priority policy.
- Materials and spare parts control
  The control of materials and spare parts is based on material commodity codes and material catalogues and it includes identification of all standard supply materials and spare parts.
- Technical analysis procedures
  Establishment of failure report formulas, reporting procedures and equipment history records. Technical analyses for the identification of equipment which has:
  caused most production hours lost
  been out of order most times
  caused the highest repair cost
  Cost reporting and cost control procedures
  These procedures to include definition of maintenance cost, charging policies and the establishment of cost records.
- Organization
  Detailed organizational chart to be prepared including maintenance, materials and engineering functions and their relationsship.
- Documentation
  The maintenance system to be documented in a maintenance management manual.

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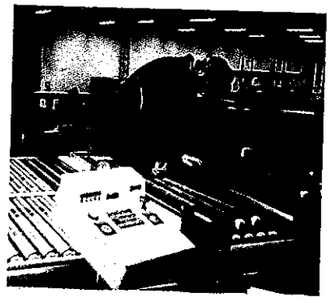
03-22-02-79 P178

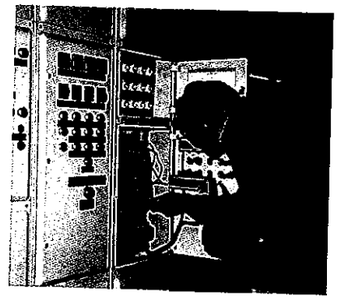
Computerized Preventive Maintenance
Denmark

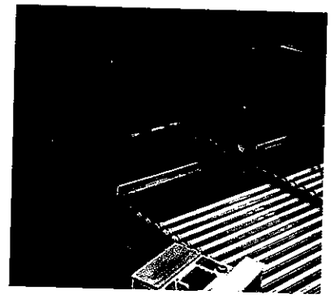
```
WORK ORDER 00161    * TEAM  9 * EXECUTE  79-46 *  2 W *
*************************************************************************
INTERVAL  12 W * ADVIS       * INFO     * SYNC
*************************************************************************
92.1 PARCEL SORTING MACHINE                                  BUILDING 02
*************************************************************************
0  02.06.0520  PSM3-KB4
0  02.06.0520  PSM3-KB3
0  02.06.0520  PSM3-KB2
0  02.06.0520  PSM3-KB1
!
/--INSPECTION, CLEANING OF KEYBOARD




*************************************************************************
FEEDBACK:              DATE:              INIT:              HOURS:
*************************************************************************
SPARE PARTS ETC.                                        PRINTED 791210
```







In connection with the renewal of the Post and Telegraph Service's facilities for sorting letters and parcels in the Copenhagen area, a large number of different types of mechanical and electronic plant and equipment has been installed, for example, conveyor belts, overhead conveyors, elevators, cooling machines and air-conditioning equipment. Reliable and economical operation of this plant can only be achieved through systematic, preventive maintenance.

The technical organization in charge of the maintenance of the parcel and letter sorting installations in Copenhagen is also responsible for maintenance of all mechanical sorting plants on Zealand, which are expected to increase to about 5,000 units.

Maintenance procedures have been defined for each of these units. When the system has been fully developed, about 250,000 different procedures will have to be performed at specific intervals varying from once a day to once every six years.

The plant and the associated maintenance procedures are described in a data bank containing all the data needed for control of operations.

The system comprises functions for controlling and following up the maintenance work, resources planning for the personnel performing the work, financial reporting, etc., and for construction, maintenance and analysis of the data bank for the system.

Scope of professional services provided by

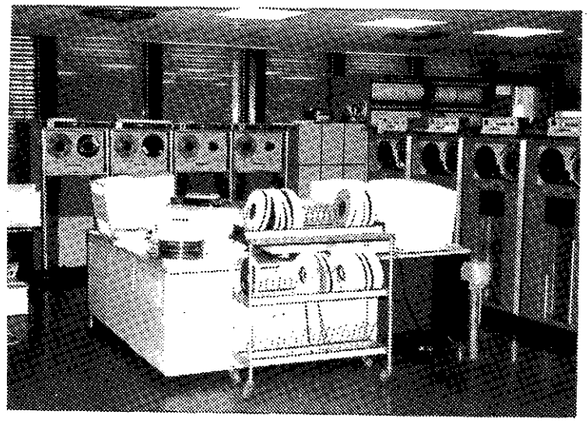
Crone & Koch Consulting Engineers International:

Development of software
Implementation
Supervision.

Client:
General Directorate of Posts and Telegraphs.

STEENSEN & VARMING INTERNATIONAL APS · CONSULTING ENGINEERS · STEENSEN & VARMING INTERNATIONAL APS

COMPUTER CENTRES

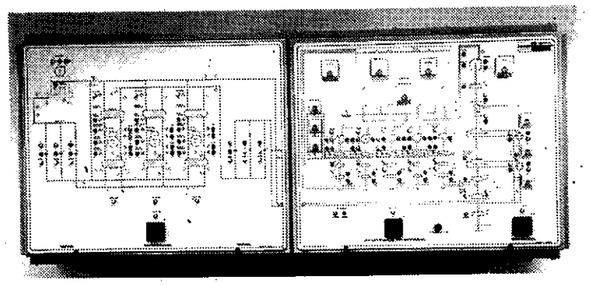


BURMEISTER AND WAIN — COMPUTER INSTALLATION

SELECTED REFERENCES

The Niels Bohr Institute, University of Copenhagen, Denmark	One of the very first computers installed in Denmark.	1963
Burmeister and Wain Shipyard and Motor Construction, Copenhagen, Denmark	Computer installation for administrative as well as design and construction purposes. Electrical converter and stabilizer air conditioning split in two systems, one for computer equipment and one for room air. Extension and reconstruction.	1966 1972 1978 1979
European Space Research Organization, Noordwijk, Netherlands	Computer Centre for research and testing establishment, ESTEC.	1966
Agricultural Computer Centre, Roskilde, Denmark	Computer Centre for the farmers' association to provide statistics as well as production control for farmers.	1968
Department of Inland Revenue, Birkerød, Denmark	Centre for registration and collection of all personal tax in Denmark.	1973
H.C. Ørsted Institute, Copenhagen, Denmark	The Faculty of Chemistry at university of Copenhagen has installed their own computer for research and teaching purposes.	1974
Herlev Hospital, Copenhagen, Denmark	Central computer for 900-bed teaching hospital, available for administrative as well as medical use (diagnosis, laboratory tests etc.)	1976

P.T.O.



UNIVERSITY OF AARHUS
CONTROL PANEL FOR AIR-CONDITIONING OF COMPUTER INSTALLATION

Aarhus University, Denmark	Centre for all institutes at Aarhus University, and also centre for research and teaching.	1970
Aalborg University, Denmark	Computer Centre for the University.	1972
Datainform, Aarhus, Denmark	Private Computer Service Bureau.	1978
Dansk Søassurance, Copenhagen, Denmark	For an insurance company in Copenhagen a computer central is being installed for administration of all their insurances.	1979 80

Central Control and Monitoring System Copenhagen Post Terminal

During the last two or three decades most countries have concentrated mail handling and sorting in large sorting centres equipped with modern installations that are able to perform the often hard and tedious work of manipulating, segregating, facing, sorting and bagging postal items.

During 1979 the Danish Post and Telegraph Service has taken into use its new Central Sorting Office in Copenhagen, which is equipped with extensive, advanced mail-handling and sorting installations.

The equipment includes belt conveyors for transporting parcels, bags and letter-trays of various kinds, overhead chain conveyors for transporting bags, parcelsorters, bagsorters, etc.

The handling and sorting equipment is grouped in six separate sections, each of which is controlled by its own duplicate minicomputer. These minicomputers are, in turn, controlled by a seventh »Central Control Computer«.

Within the confines of rather limited building space, transport equipment with a total length of about 18 km has been installed, comprising approx. 1,000 conveyors co-ordinated to achieve an even flow of mail through the sorting centre. The automatic control and monitoring of the conveyors has required very extensive programming and systematization.

The conveyors can be started/stopped/monitored individually or in groups from the Control Centre, where the operational state of each is registered through the central control computer and shown on a control desk with flow diagrams, control lamps and pushbuttons for issuing control orders.

In the event of failure in the central control computer, separate operation of the mail handling and sorting installations is allowed by means of teleprinters connected to each of the twelve minicomputers.

If and when irregularities occur in the operating states and in the case of breakdowns, the minicomputers pass the relevant data to the central control computer, which is equipped with screen terminals on which the irregularities are reported in plain language. The necessary arrangements and control orders can then be returned from the Control Centre via the same screen terminals.

The irregularities are also reported on screen terminals in the Maintenance Department where a detailed error-report appears on a matrixprinter as well, in case of serious failures.

In a special field on the screen terminal is always displayed the list of existing failures in the complex system.

For daily control purposes, the central management may at any time request statistical reports on screen terminal or matrixprinter concerning the quantities of mail of various categories and classes, and statistical data for each day can be collected for use in long-term planning.

In addition to the equipment in the Control Centre and the Maintenance Department, a screen terminal and an indicator board is installed in the sorting sections. Thus the quantities to be sorted can be read directly.

Besides central control and monitoring, the central control computer is used for other purposes – administrative as well as educational.

Special professional services provided by:

Crone & Koch Consulting Engineers, International:

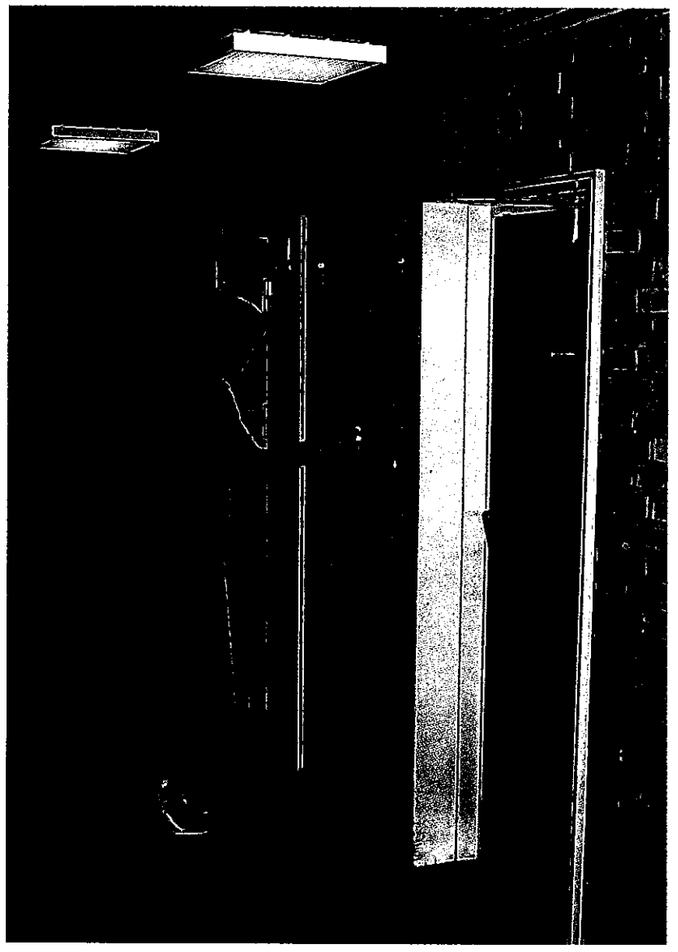
Development
Planning
Site Supervision

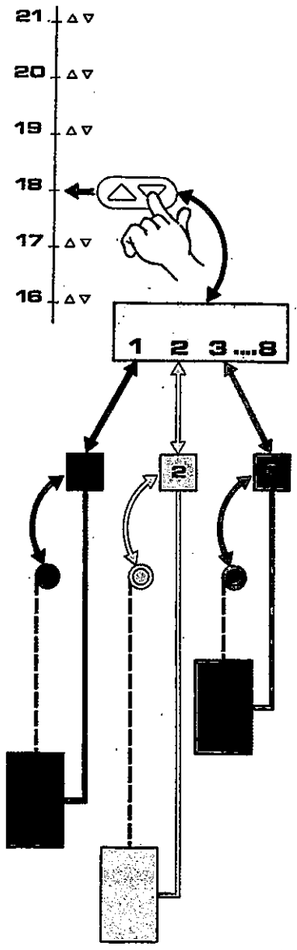
Key figures of the project:
1,000 conveyor units with a total length of 18,000 m

Client:
General Directorate of Posts and Telegraphs, Denmark

P182
03-22-07-79

Electronic Elevator Control, GDR





When the elevator service for a building is designed it is often necessary to compromise, and irrevocable desicions have to be made on the future operation of the elevators. This is because of the normal arrangement of relays or electronic relays in the elevator-control. If use of the elevator after occupation of the building shows that a different control program would be more efficient, the controller can be altered, but the cost is very high and is usually found prohibitive.
This very considerable drawback has been effectively removed through an elevator controller and elevator-group controller based on microprocessor technology. In this system, it is possible to control a group of up to eight elevators by means of various programs, possibly clock-controlled, for selection of the optimum program for distributing parked elevators and selecting an elevator from the group for a given floor call. Each elevator has its own controller for keeping track of its cage position and for controlling floor addresses from pushbuttons in the cage.

Each elevator can serve up to 40 floors and can operate at speeds up to 6 m/sec. (20 ft/sec.). The necessary adjustments for the building's data (speed, floor height, weighing devices, etc.) are made on the front panel at the time of installation and can be changed according to later requirements. In this way, the cost of spares and repairs is reduced, and the high reliability of modern electronic computer components assures very long periods of uninterrupted service.

Scope of professional services provided by

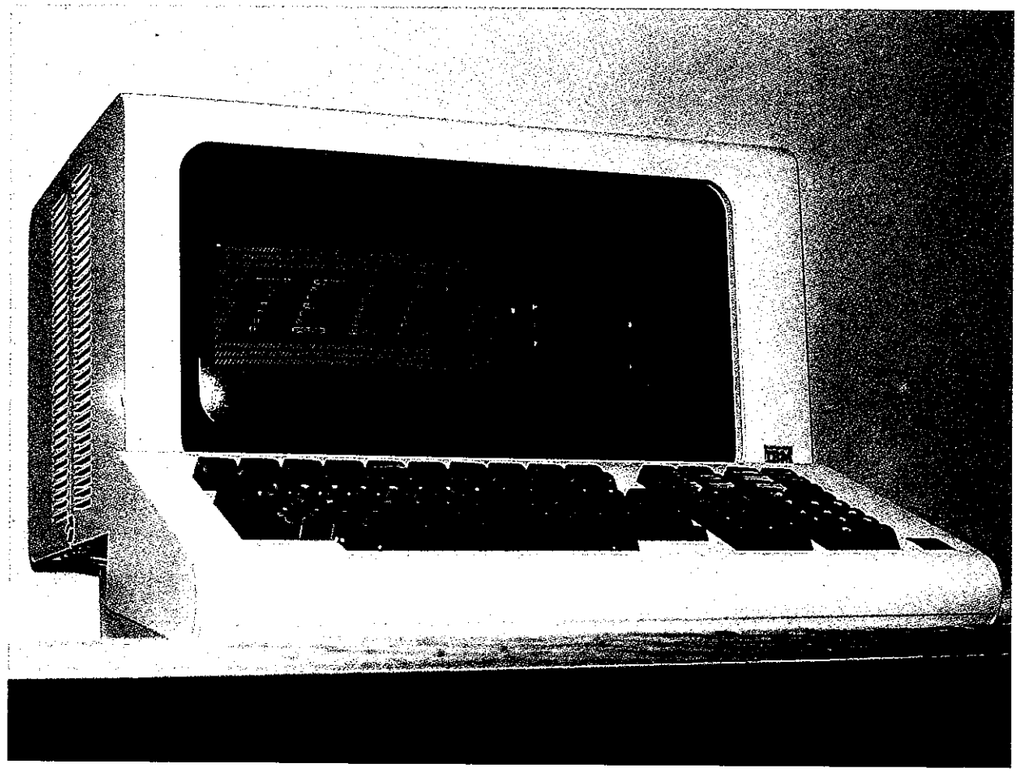
Crone & Koch Consulting Engineers International:
Design.

Key figures of the project:
40 floors
6 m/s.

Client:
German Democratic Republic

P180
03-22-05-79

Computer-Controlled Telex Communications Denmark



Many medium-sized to large firms with heavy telex and telegraphic communication requirements eventually come to the conclusion that they must automate this function and possibly integrate it with their other information systems. Following repeated enquiries from such firms, Crone & Koch edb decided, at the end of 1978, to develop a minicomputer-based system to take care of and integrate the following three tasks:

- communications with public and private telex networks
- word-processing and editing
- information processing and retrieval.

The project is based on an IBM Series/1 minicomputer, and the first installation incorporates the following facilities:

- handling of 3000 tele-commmunication messages each day, with the possibility of local storage of and retrieval of 30,000 messages
- 7 screen terminals for key input and local editing of tele-messages
- print-out of tele-communication messages, partly on centrally situated matrixprinters and partly on teleprinters placed locally in the various departments of the firm
- communication over 5 public telex lines and one private line to Cable & Wireless's message-switching centre in Hong Kong
- complete physical and logical addressing, including possibility of group addresses
- system operator-console with all necessary facilities for monitoring and control.

The software is modular in design and can thus be adapted easily to individual requirements in both small and large installations. Furthermore, it is equipped for future extension, connection of word-processing equipment, connection to central computer installations, etc.

Special professional services provided by

Crone & Koch Consulting Engineers, International:

Design.

Client:

Major Danish industrial enterprises.