Connecting the Maassilo
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Rarity value: An ensemble of different building parts and machines that is still intact.
HISTORICAL DEVELOPMENT
Phase 1: designed by J.P. Stok, finished in 1910.
Phase 2: designed by J.A. Brinkman & L.C. van der Vlugt, finished in 1930.
Phase 3: designed by A.G. Postma & J.D. Postma, finished in 1951.
Phase 4: designed by H. Haan, finished in 1963.
The industry has moved away from the city center, on to industrial areas further along the harbour.
IDENTITY
The Maassilo on the border of north and south. Two areas in different states of socio-economic development.
The small and unnoted original entrance of phase 1, showing the private / non-public character of the functional building that was never meant for people.
The exterior of the building has readable different phases and its shape hints towards the intended function, but what really happens inside is concealed by the large closed-off façades with hardly any windows.
PROBLEMS
The Brielselaan and the Maashaven Oostzijde: two heavy traffic roads that act as hard physical borders that isolate the Maassilo from its surrounding neighbourhoods.
The images above show the loss of activity on the north side of the building, at the Maashaven.

Once vibrant with lots of activity.

Now an empty body of water and no activity on the waterfront.

The functional building is left with a lot of unusable space on the silo levels after it lost its original function.
The Maassilo was never a public building. It has closed-off / monolithic façades with no clear entrance and a lack of daylight.

In the original situation, daylight penetrated the concrete mass, in order to provide a more pleasant working environment for the workers. Obviously, the silos were completely dark on the inside, in order to protect the grain from growing into little plants. The bundled rays of light, together with the rigid lines of columns must have been a powerful spatial interplay. Unfortunately, little historic photos can be found to verify this. However, an impression can still be found on the seventh floor in the Stok building part, see image to the right.

In the current situation, many of the openings in the facade have been closed off, mainly in order to prevent noise pollution coming from the disco. This disco completely inverts the system of light penetrating the building. In the current situation, artificial coloured light and laserbeams come from the very center of the building and shine on the inner surfaces of the building.
RESEARCH QUESTION
How can the Maassilo get physically and socially connected to the urban fabric with an integrated sustainable design?
Physically connecting: By introducing a bridge on the southside and elevated walkway at the waterfront.
Socially connecting: By choosing social and creative functions to attract and connect different people.
Sustainably connecting: By connecting different material- and energy streams in circular systems within and around the building.
URBAN INTERVENTIONS
(physical connections)
Site drawing (1:1000) of the new design.
Site drawing (1:1000) showing the physical connection of the Maassilo to its surroundings. With a public route over the new bridge that crosses the Brielselaan and connects to the metrostation, running through the center of the building, and continuing as an elevated walkway alongside the Maashaven.
Site drawing (1:1000) showing the physical connection of the Maassilo to its surroundings. With a public route over the new bridge that crosses the Brielselaan and connects to the metrostation, running through the center of the building, and continuing as an elevated walkway alongside the Maashaven.

Elevated walkway with views on the water. (Highline, New-York)

Constructed wetland integrated in landscape architecture. (Chattanooga, Tennessee)

Old infrastructure turned into a new elevated public landscape. (The Goods Line, Sydney)
Cross-section (1:500) of the new design.
Cross-section (1:500) showing the physical connection of the Maassilo to its surroundings. With the new bridge crossing the Brielselaan, the central hall in the Maassilo, and the elevated walkway above the quay with newly constructed wetland.
NEW FUNCTIONS
(social connections)
The grey areas in this long section of the Maassilo are the spaces that have already been reused and filled with a new function. The groundlevel and basement are used as a nightclub and the upper floors on the right have been reused as creative offices.

3D view of building parts that have recently been changed to fit their new function.

New entrance to the Creative Factory on the north-east side of phase 1.

The facade of phase 1 has been opened up on the ground floor to accommodate the new restaurant.

The middle row of columns on the ground floor of phase 2 has been removed, others have been replaced by slender steel columns to create a wider field of view.
Choosing new functions for future use of the Maassilo
An ensemble of public functions and new industry.
Long section of the Maassilo, showing the placement of the new functions. (1:500)
Floorplans of the Maassilo (1:500), showing the placement of the new functions.
Floorplans of the Maassilo (1:500), showing the placement of the new functions.

Performing arts school
Theatre
Central hall
Beer brewery
Bakery / restaurant
Existing functions

Floorplan level 5

Floorplan level 4
Circulation space
- Rising point (all levels)
- Rising point (for one function only)

Floorplan level 2

Circulation and routing on level 2 (1:500)
Circulation space
Rising point (all levels)
Rising point (for one function only)
Distribution and storage methods of the former grain silo will be partly kept intact in the brewery: part of the octagonal silos is reused for malt storage, half of the conveyorbelt system in the attic will be updated and reused, and the middle grain elevator will be maintained/updated to distribute malt from ships to the maassilo, and to distribute brewer’s waste to ships for reuse elsewhere.
THEATRE
Cross-section showing the theatre in phase 2 in relation to the new urban interventions outside of the building (1:500)
The two biggest sound sources in the building, the theatre and dance studios, are located on top of each other. Heavy sound insulation is needed in the floor system between these functions. Additional sound insulation will be placed on the walls of the theatre hall to achieve the desired reverberation time.
Sound reflecting panels in the ceiling of the theatre hall are angled in a way that sound emanating from the stage in all directions, will always reflect to the audience.
The rows of seats on the main level of the theatre are placed under a slight angle that allows free sight from all rows towards the point of sight at the front of the stage. The rows of seats on the balcony are placed under a steeper angle and the solid part of the balustrade on the balcony is kept low to allow free sight above.
The theatre hall has a separate ventilation system from the rest of the theatre and other functions in the building. This is necessary because of the large amount of people that are in this space at the same time. The ventilation system has to be able to react quickly to changes in temperature and has to be able to produce fresh air at the required ventilation rate.
PERFORMING ARTS SCHOOL
INTERVENTIONS IN LOAD-BEARING STRUCTURE
Big scale interventions, large open spaces

Small scale interventions, smaller cutouts in silos
Sketched detail of new floors connected to an existing silo wall.

Horizontal section: silo walls extended outward from the columns to preserve the structural integrity.
Location of the entrance between the central hall and the brewery + bakery.
The opening on this new main public level cuts through the outer walls of both phase 1 and 2. Both structures have to be structurally sound, separate from each other.

The research model, scale 1:50, made it possible to check the dimensions of the cut outs and to check if both structures (phase 1 and 2) would still be structurally sound after removing several wall parts to create the entrance to the brewery.
The biggest open space is the theatre hall. With a span that covers five rows of silos.

It is unknown how exactly the concrete silo walls are reinforced. It is possible that the reinforcement steel does not continue across the connecting points (columns) of the silos. This forms a structural risk.
Vertical and horizontal detail (1:20) of the relation and connection between the existing silo walls and the new steel truss.
DAYLIGHT
The Maassilo was never meant as a public building, the functional design led to closed-off monolithic facades causing a lack of daylight inside.

In the original situation, daylight penetrated the concrete mass, in order to provide a more pleasant working environment for the workers. Obviously, the silos were completely dark on the inside, in order to protect the grain from growing into little plants. The bundled rays of light, together with the rigid lines of columns must have been a powerful spatial interplay. Unfortunately, little historic photos can be found to verify this. However, an impression can still be found on the seventh floor in the Stok building part, see image to the right.

In the current situation, many of the openings in the facade have been closed off, mainly in order to prevent noise pollution coming from the disco. This disco completely inverts the system of light penetrating the building. In the current situation, artificial coloured light and laserbeams come from the very center of the building and shine on the inner surfaces of the building.
Daylight approach: the theatre doesn’t need daylight, the brewery only a little. The performing arts school does need daylight. Most of the required light will be brought in through the roof (silos as lighttubes) and through the less prominent west facade.
Phase 1: Bringing in daylight (see red arrows) from the northwest, while still preserving the concealed character of the building from the other directions (see blue arrows).
North facade

Elevation 1:500
Phase 3: Adding windows and insulating on the outside. Adding a second skin of perforated concrete elements to preserve the monolithic character of the original façade. The right facade of phase 3 remains the same.
South facade

Elevation 1:500
CLIMATE
Phase 1 has thermal insulation on the inside of the facade, preserving the characteristic and more detailed façade on the outside.
MATERIALIZATION AND DETAILING
The Maassilo consists of a lot of concrete, but this material is applied in different ways in the various building phases, each with their own character. I am carrying on this concrete tradition by introducing new types of concrete in the new interventions, and by leaving many interior silo walls exposed.
Examples of openings cut out of reinforced concrete silo walls by using a circular saw (photos taken in the Heineken Experience, Amsterdam). The exposed concrete gives the space an industrial feeling.
3D cast fibre reinforced concrete facade element, with a pattern resembling silos.

Typical floorplan of silos in phase 2.

View on perforated concrete facade from the outside

View on perforated concrete facade from inside
**Detail 6**

- Acoustic wall panel with perforated surface
- Existing concrete silo wall (185 mm)
- Wooden mounting frame
- Aluminum doorframe
- Insulated sound-repelling theatre door

**Detail 5**

- 3 mm PU casting floor
- 50 mm screed
- Floor heating
- Dovetail floor
- Wooden beam
- Acoustic ceiling panel with perforated surface

- LED light strip in aluminum profile
- Extended steel plate, fixed to UNP profile
- Elevation of black metal balustrade

**Detail 4**

- In-situ reinforced concrete floor (200 mm)
- Steel rebar floor anchor
- 100 mm rigid foam insulation (Rd = 5.0)
- Lost formwork

- Spotlight aimed at silo wall
- Light box embedded in the floor
- Existing aerocrete Insulation (70 mm)
- Existing concrete silo wall (185 mm)
Reference project ‘Le Silo’, Marseille. With exposed concrete and industrial-look floors and glass walls

Textured black PU cast floor

Coloured spotlights illuminating silo walls

Aluminum plinth

In-situ reinforced concrete floor (200 mm)
3 mm PU cast floor
50 mm screed
Floor heating
Water repellant foil
50 mm rigid foam insulation
In-situ reinforced concrete floor (200 mm)
100 mm rigid foam insulation (Rd = 5.0)
Lost formwork

Steel rebar floor anchor

Spotlight aimed at silo wall
Light box embedded in the floor
Existing aerocrete Insulation (70 mm)
Existing concrete silo wall (185 mm)
Aluminium profile for LED light strips, embedded in the floor

Reference project 'Ruhrmuseum' in Essen, with contouring lighting on stairs and walkways

A similar walkway with exposed steel beams and a black balustrade

Detail 5

3 mm PU cast floor
30 mm screed
Floor heating
Dovetail floor
Wooden beam
Acoustic ceiling panel with perforated surface

LED light strip in aluminum profile
Extended steel plate, fixed to UNP profile
Elevation of black metal balustrade

LED light strip in aluminum profile
Steel UNP 220 profile

3D sketch of elevated walkway
Examples of additional lighting to emphasize and contour the silo structure.
CIRCULAR SYSTEMS
(sustainable connections)
Circular economy system with cascading streams for organic and inorganic materials as designed by the Ellen MacArthur Foundation.
Fig. 2: Overview of four main sustainability topics / systems in the new sustainable design for the Maasiló.

Fig. 3: EPA’s Recovery Hierarchy for maximum value reuse of organic materials.
Circular system for water streams in and around the Maassilo.

Green-blue extensive roof with water retention and “drossel” system.

Example of constructed wetland with multiple basins for different levels of natural filtration.
Circular system for organic materials / waste streams in the beer brewery.

Examples of various spent grain recipes.

Spent grain reused as food for livestock.

Brewer’s yeast reused in cosmetic and pharmaceutical products.

Legend:

High quality, mechanically filtered water (stored in silos)
Water for cleaning tanks, pipes and bottles (stored in silos)

Malts (stored in silos)
Hops
Yeast

Fermentation and lagering
Filtration
Bottling
Storage

Consume in Maassilo (club, theatre, and restaurant)
Sell in Maassilo
Export to businesses and consumers in Rotterdam

Legend:

Highly filtered drinking water
Beer
Grey wastewater to natural filtration system / constructed wetland

5th generation yeast cells to pharmaceutical industry for use in shampoo, skincare products, and brewer’s yeast tablets

Heat (distributed by water)
Lukewarm water
Cold (distributed by water)

Cool air
Hot air
Lukewarm air
Examples of one-on-one reuse of cut-out silo walls as large pavement panels. Horizontal subsurface flow constructed wetland. Gravel in the distribution and collection zone can be replaced by reused concrete aggregate.

Scheme for reuse of the main inorganic material: cut-out concrete silo walls.
Solar panels placed on an extensive green roof with additional water-cooling system.

Circular system for (thermal) energy during the summer.
Circular system for (thermal) energy during the summer.

Legend:
- Solar energy
- Heat (distribbuted by water)
- Lukewarm water
- Cool (distribbuted by water)
- Hot air
- Lukewarm air
- Cool air
QUESTIONS?
Connecting the Maassilo