

# New pre-treatment Andijk

*Pumping station Andijk (PWN)*

Drinking Water Treatment 2 | CT5520

Wouter Bakker and Harmen van der Laan

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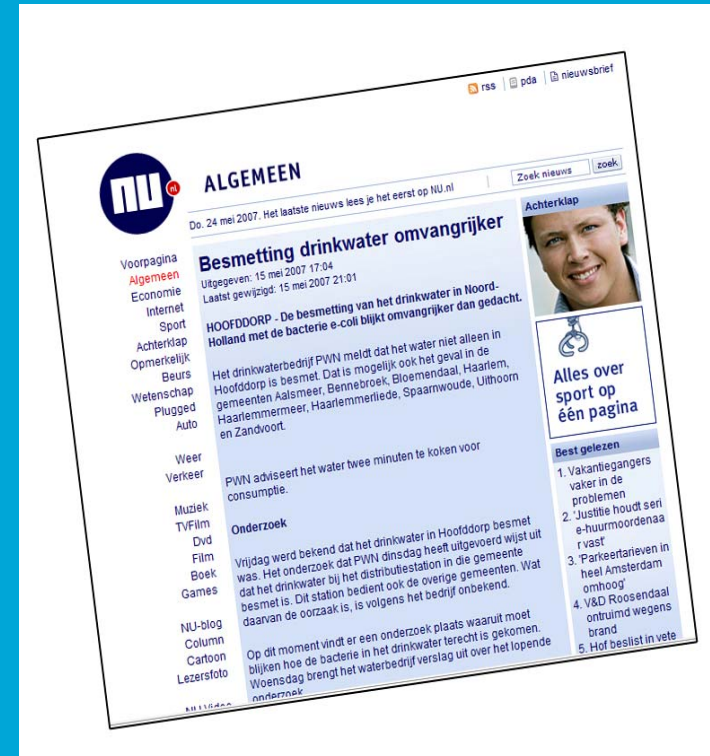
# Capacity

Total design capacity:  
three streets of 2000 m<sup>3</sup>/h  
as the UV/H<sub>2</sub>O<sub>2</sub> is designed

But, PWN can choose:  
two streets UF and/or MIEX  
especially UF is really good  
not the whole street has to be taken  
out of order in case of maintenance

Why 3 streets ?

- Same strategy as for the UV/H<sub>2</sub>O<sub>2</sub> : 3 streets
- Multi barrier approach, in case of problems
- There is capacity left for a larger future demand



# Optimization MLEX

## - Contactor:

During mixing the blades of the mixer destroy the resin particles.

Since the resin particles are positively charged and the membrane is negatively charged, the resin particles will settle at the membrane surface.

The resin particles on the membrane surface are very difficult to remove.

## - Possible solutions:

- A water jet that "shoots" the water tangentially into the contactor. Because of the high velocity the resin will mix with the water.

- Make an optimum design for the mixing blades.

- By using air jets, to "shoot" the air through the contactor and mix the resin with the water"

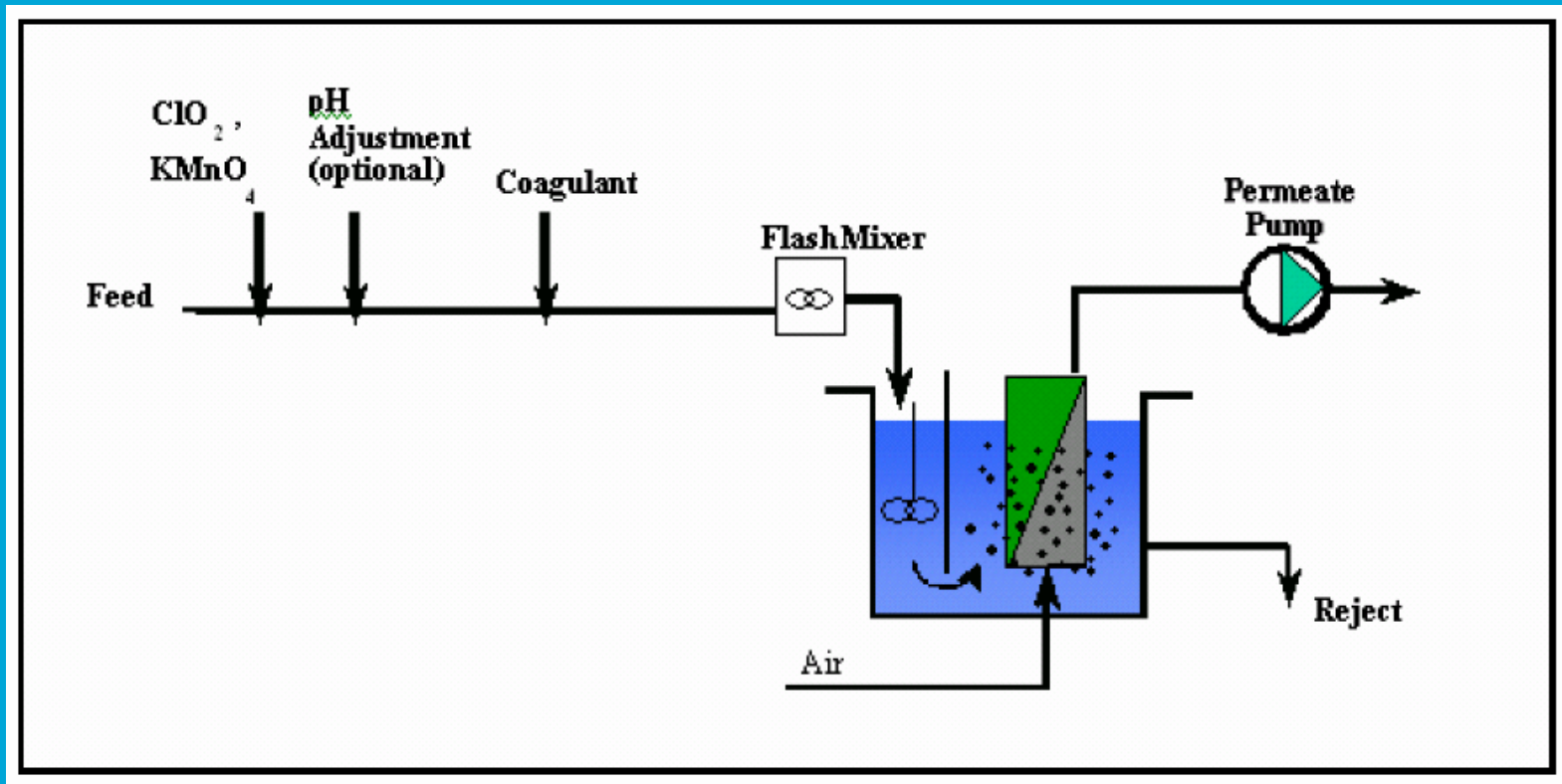
## -The resin separator

-There has been some discussion on the design of the separator.

Since it is necessary to have an on going resin flow, this design is the easiest to operate and built.



# Ultrafiltration - coagulation



# Ultrafiltration - backwash

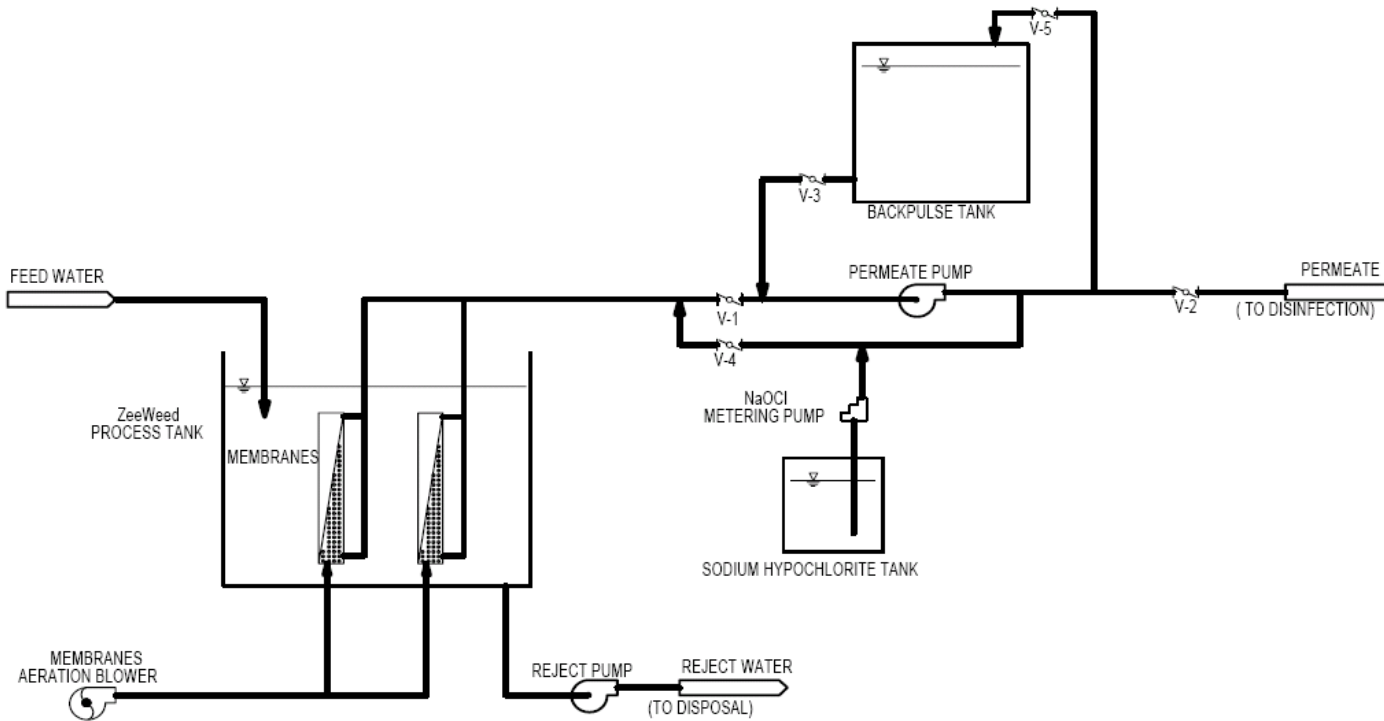
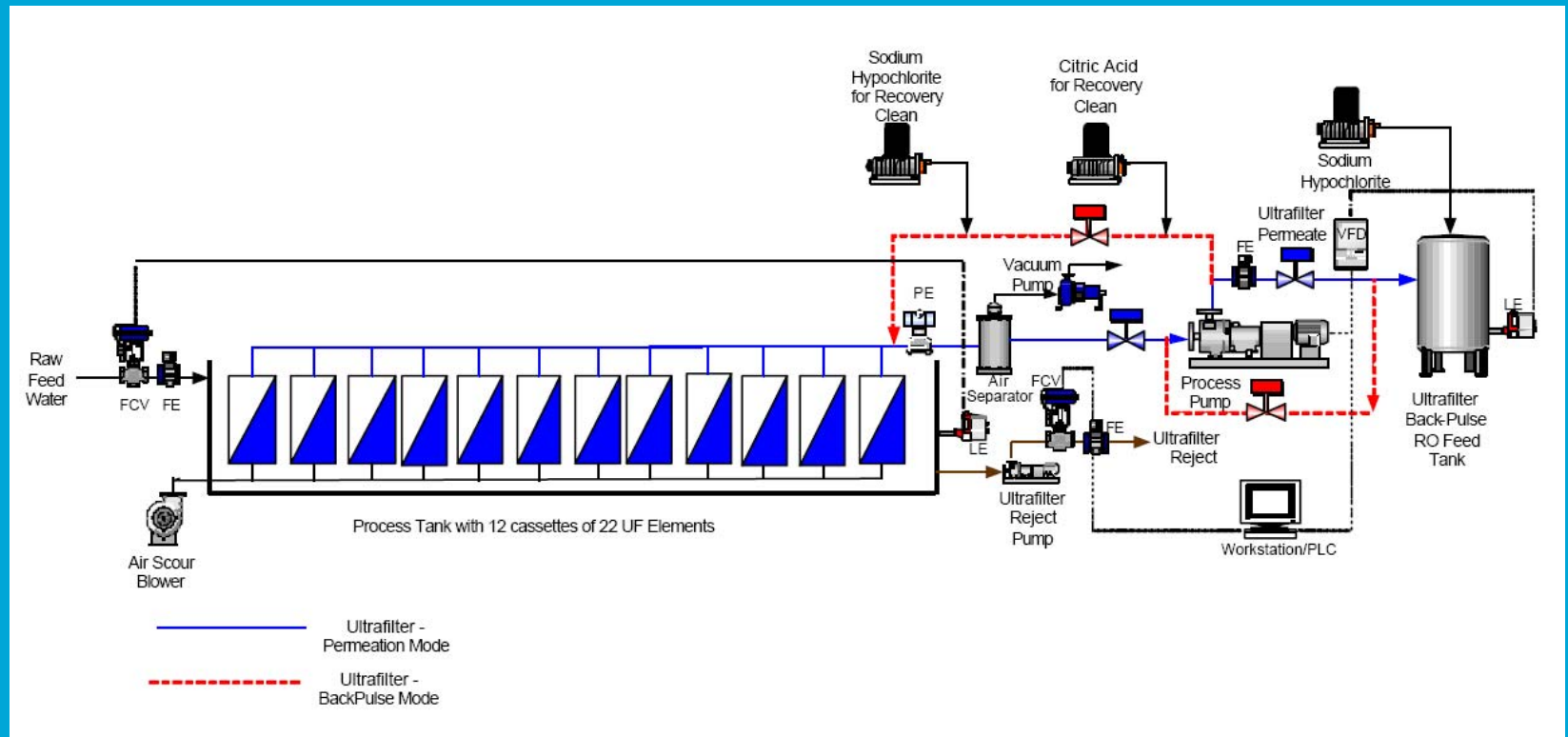







FIGURE 3. STANDARD SMALL PLANT DESIGN

# Ultrafiltration - backwash

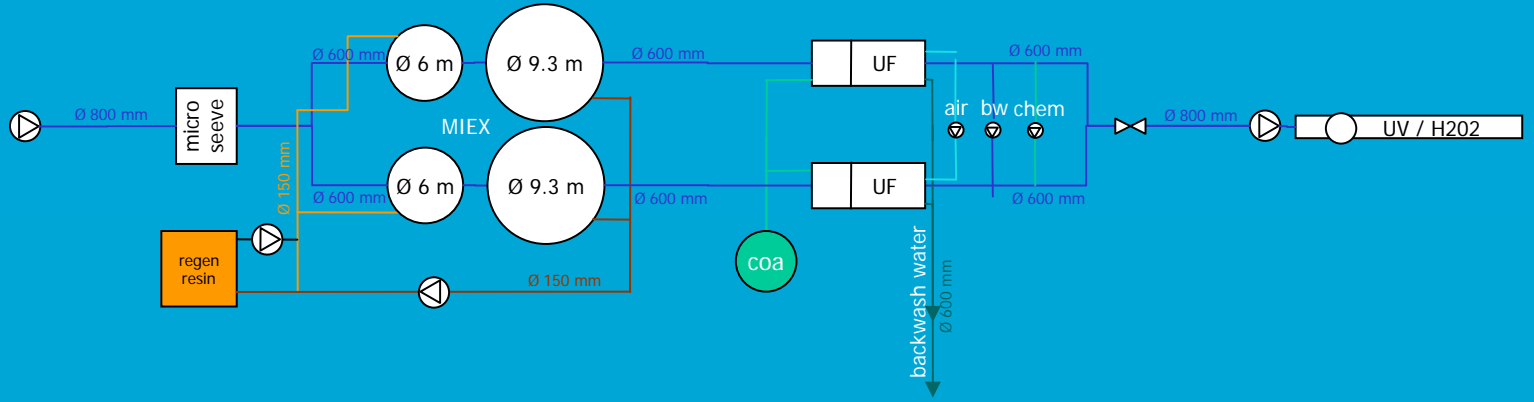
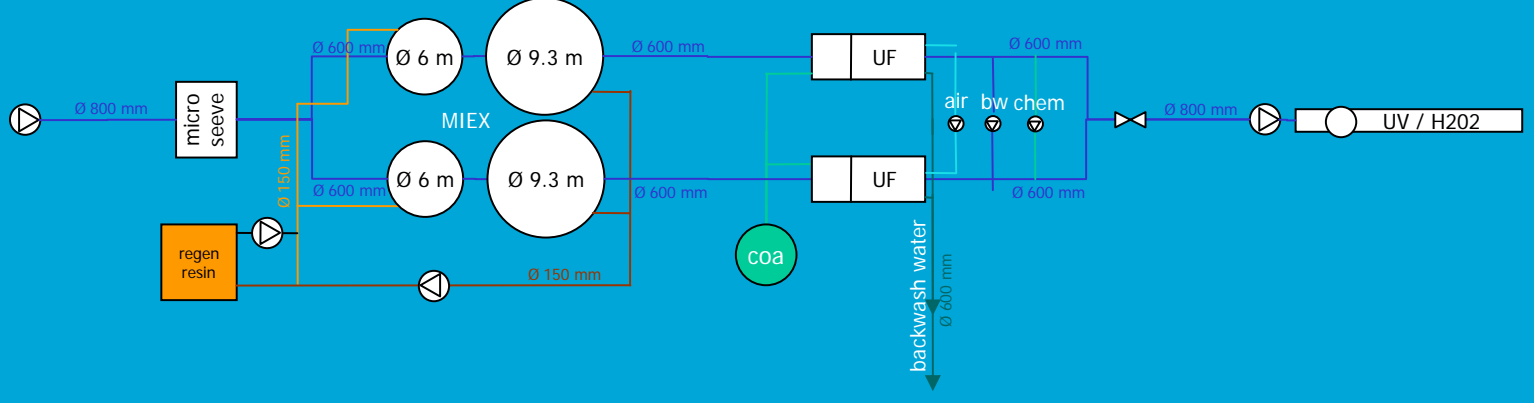
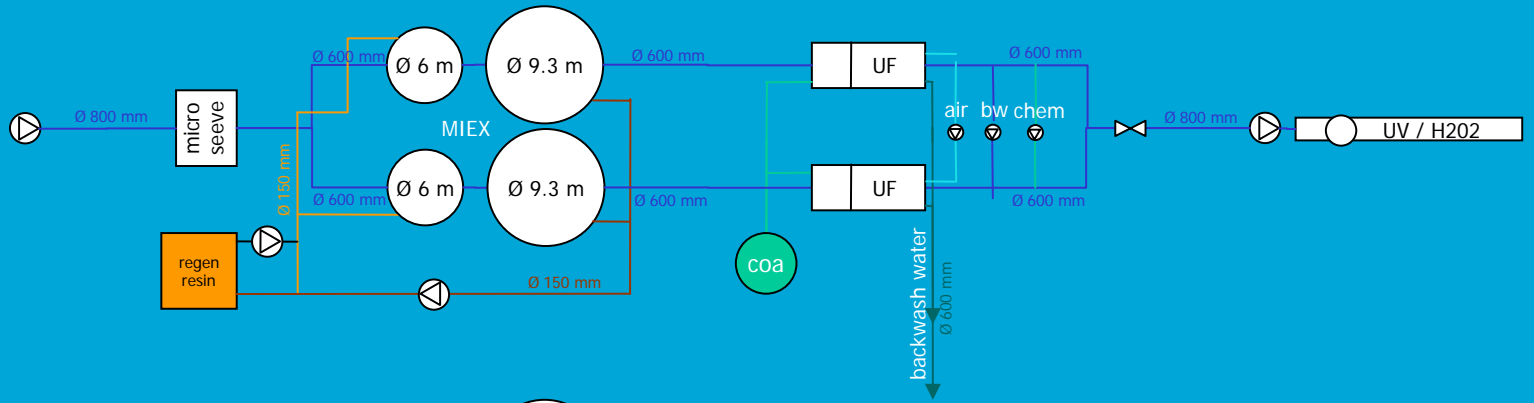


# PID

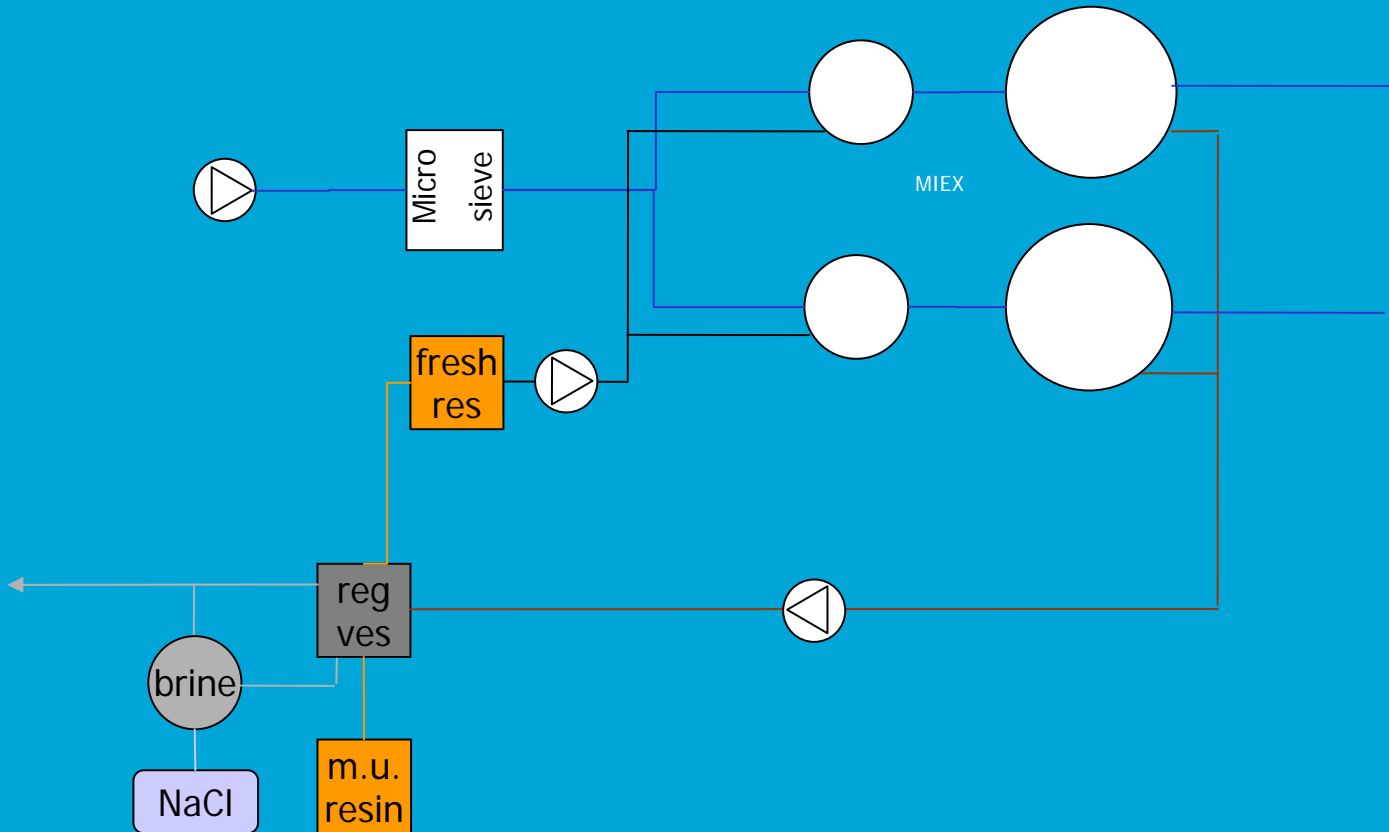
-  = resin
-  = water
-  = backwash water
-  = coagulant
-  = used resin

Only the treatment till the UV/H<sub>2</sub>O<sub>2</sub> in flow scheme





# Process regeneration Resin



# Use of chemicals for 4000 m<sup>3</sup>/h

## Resin

0.24 m<sup>3</sup> resin / day

that is a loss of 0,02% resin

## Regeneration salt (NaCl)

11.5 kg NaCl / day

## KMnO<sub>4</sub>

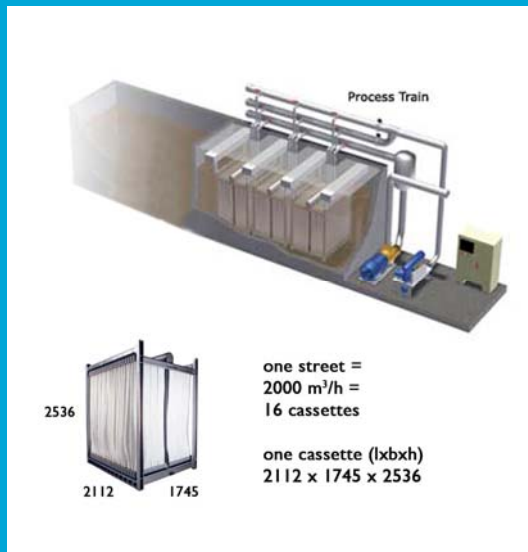
13.9 kg KMnO<sub>4</sub> / day based on the water quality

## Backwash chemicals (Sodium hypochlorite NaOCl)

34,6 kg NaOCl / cycle (cycle = once every 4 to 7 days)

# Drawings UF

Base idea: fit in the existing construction of RSF  
stripping the building, a new roof, same infrastructure

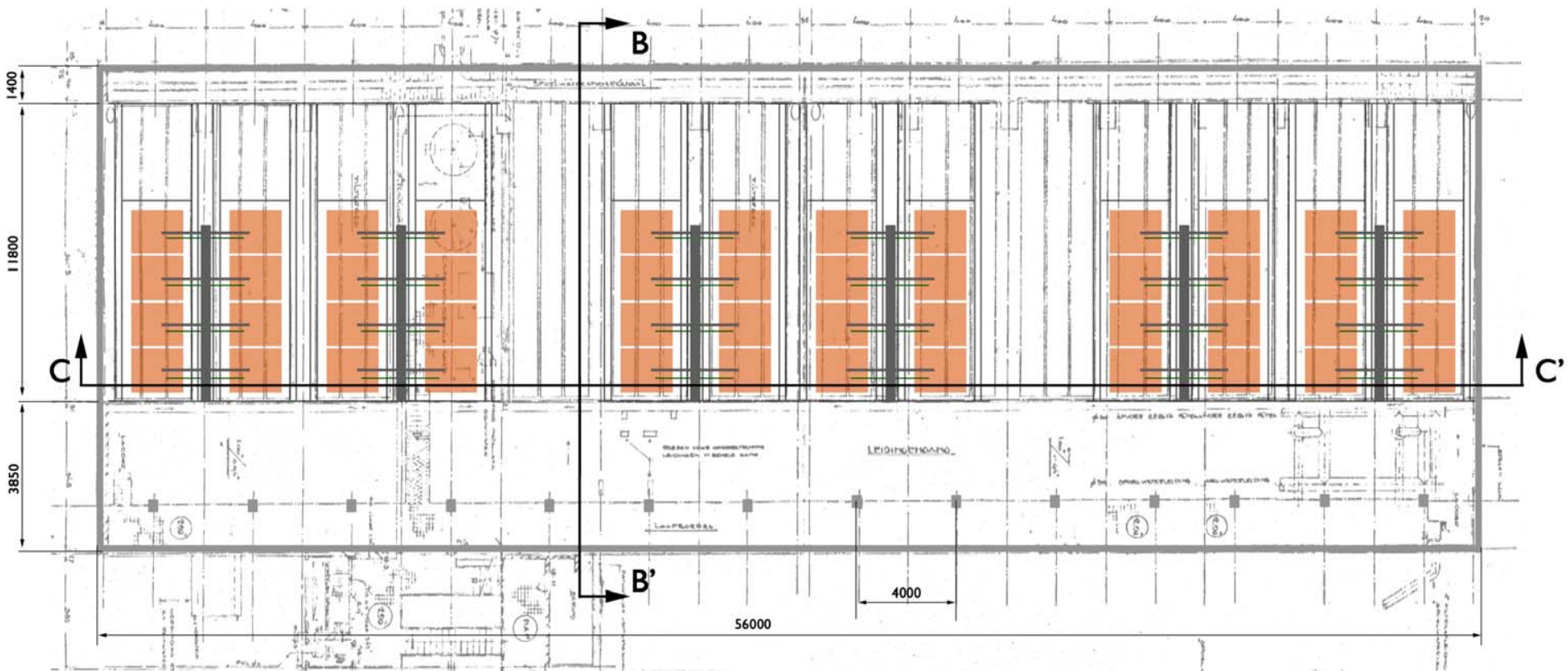


before

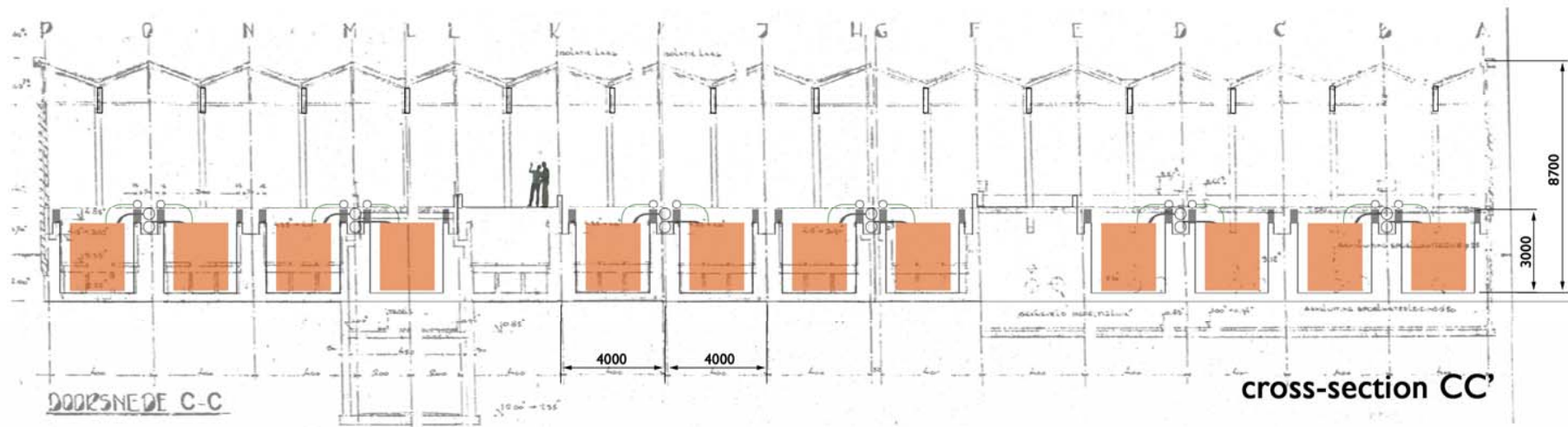


after

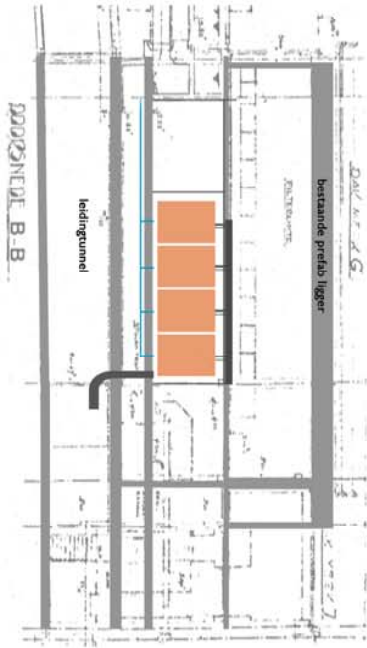




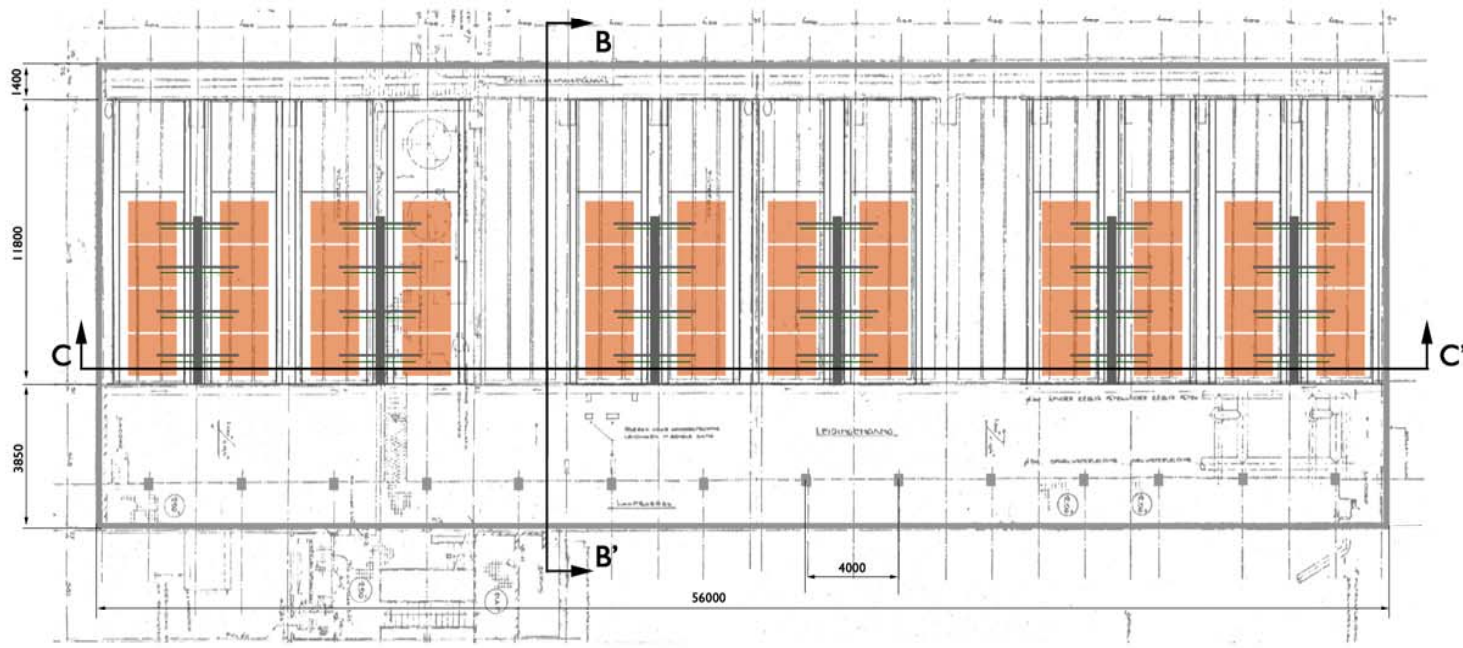
layout



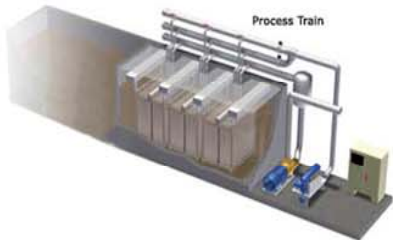
# DESIGN ULTRAFILTRATION | NEW PRETREATMENT ANDIJK



cross-section BB'



layout

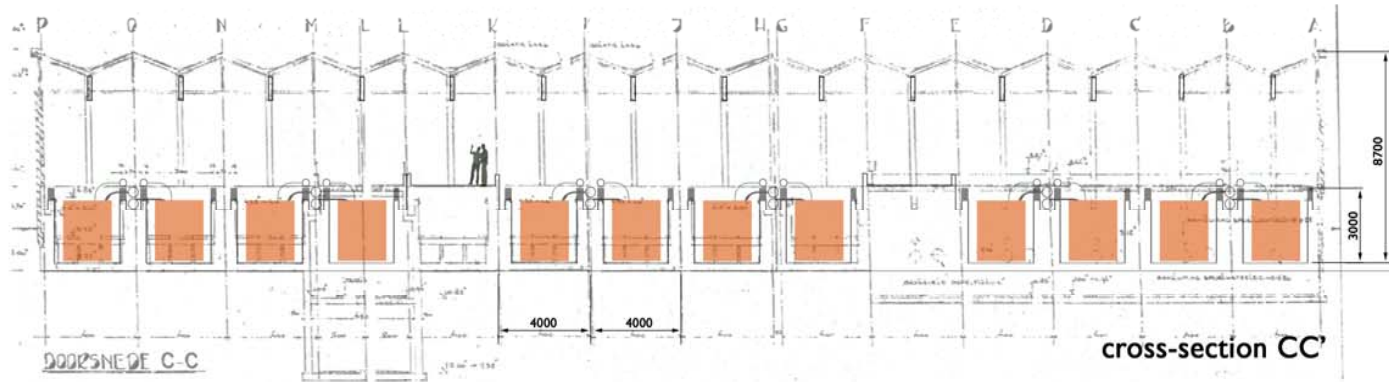


Process Train



one street =  
2000 m<sup>2</sup>/h =  
16 cassettes

one cassette (lxbxh)  
2112 x 1745 x 2536



DOORSNEDE C-C

cross-section CC'

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Course: CTS520 Drinking water treatment 2  
Sanitary Engineering, Civil Engineering,  
University of Technology Delft

Scale 1:200  
dimension: mm



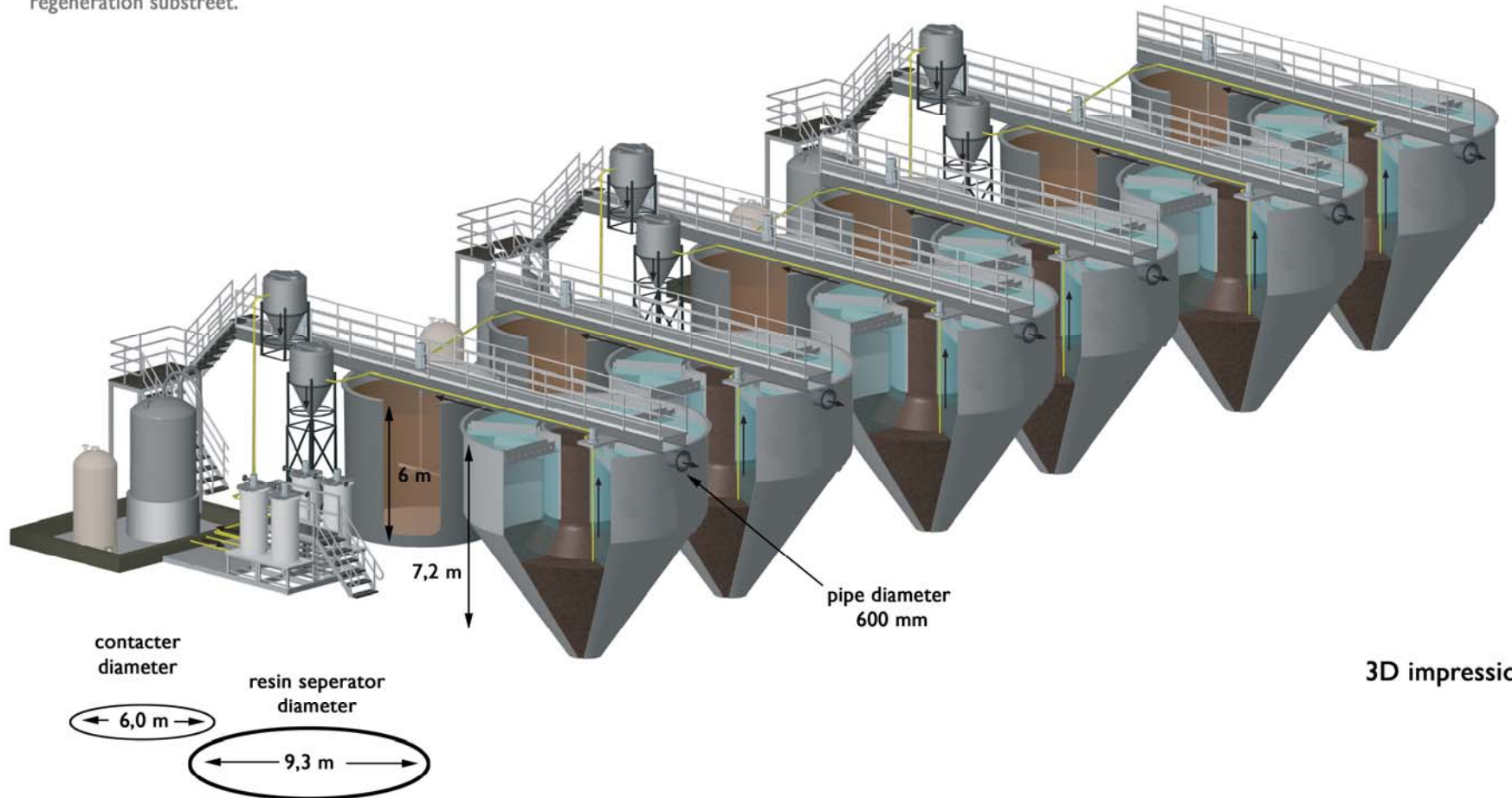
# Drawings MIEX

No extra building structure necessary.  
Contact and sedimentation tank 'stand-alone'

# DESIGN MIEX | NEW PRETREATMENT ANDIJK

3 streets of 2000 m<sup>3</sup>/h each.

each independent street  
consists of two contacters and  
two seperators with a resin  
regeneration substreet.



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