

Test Cover instrumentation

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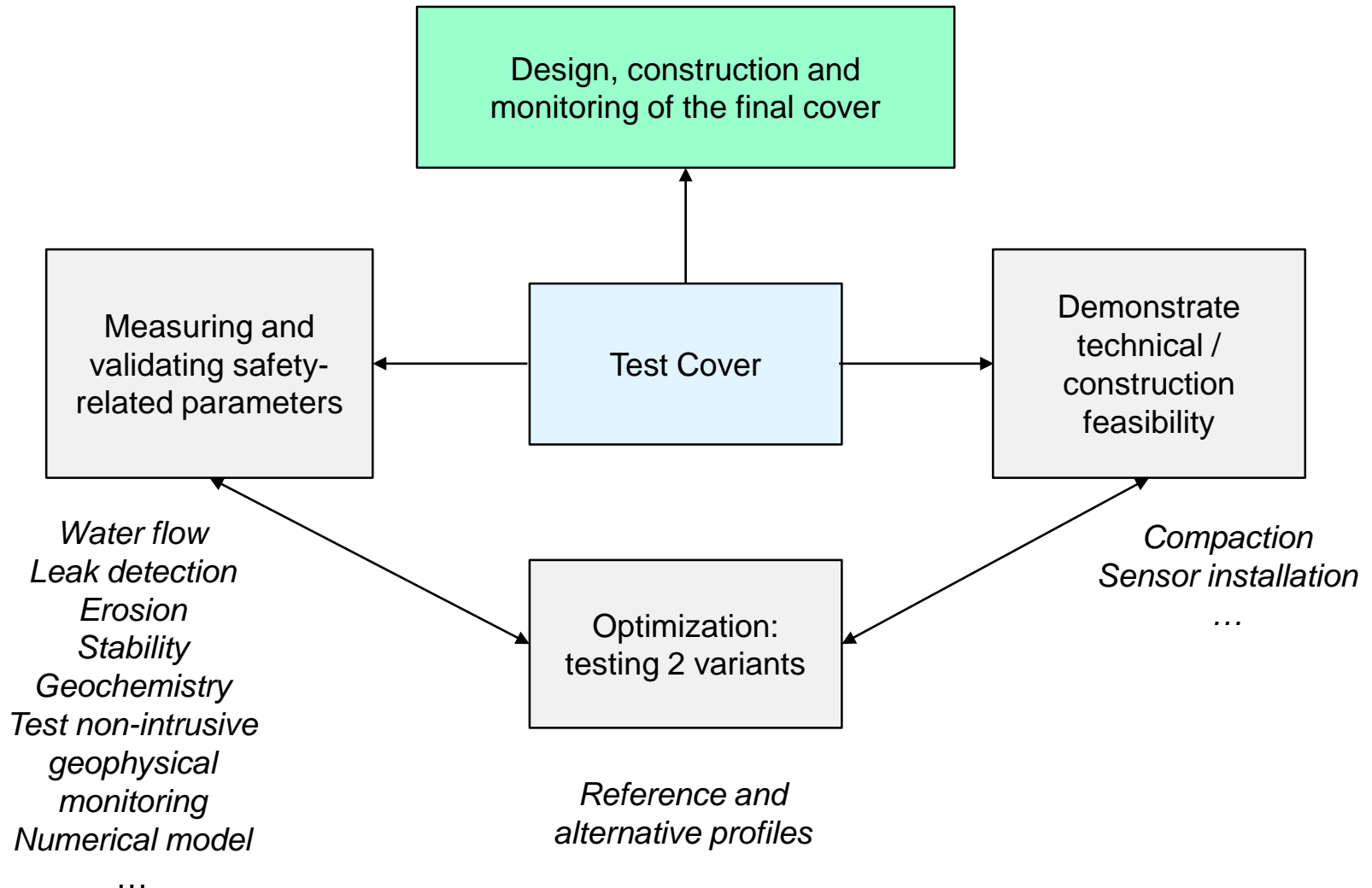
STUDIECENTRUM VOOR KERNENERGIE
CENTRE D'ETUDE DE L'ENERGIE NUCLEAIRE

- Objectives
- Instrumentation
 - Experimental layout
 - 3D model of instrumentation
 - Example devices
- Conclusions

Earth cover for the Category A waste disposal

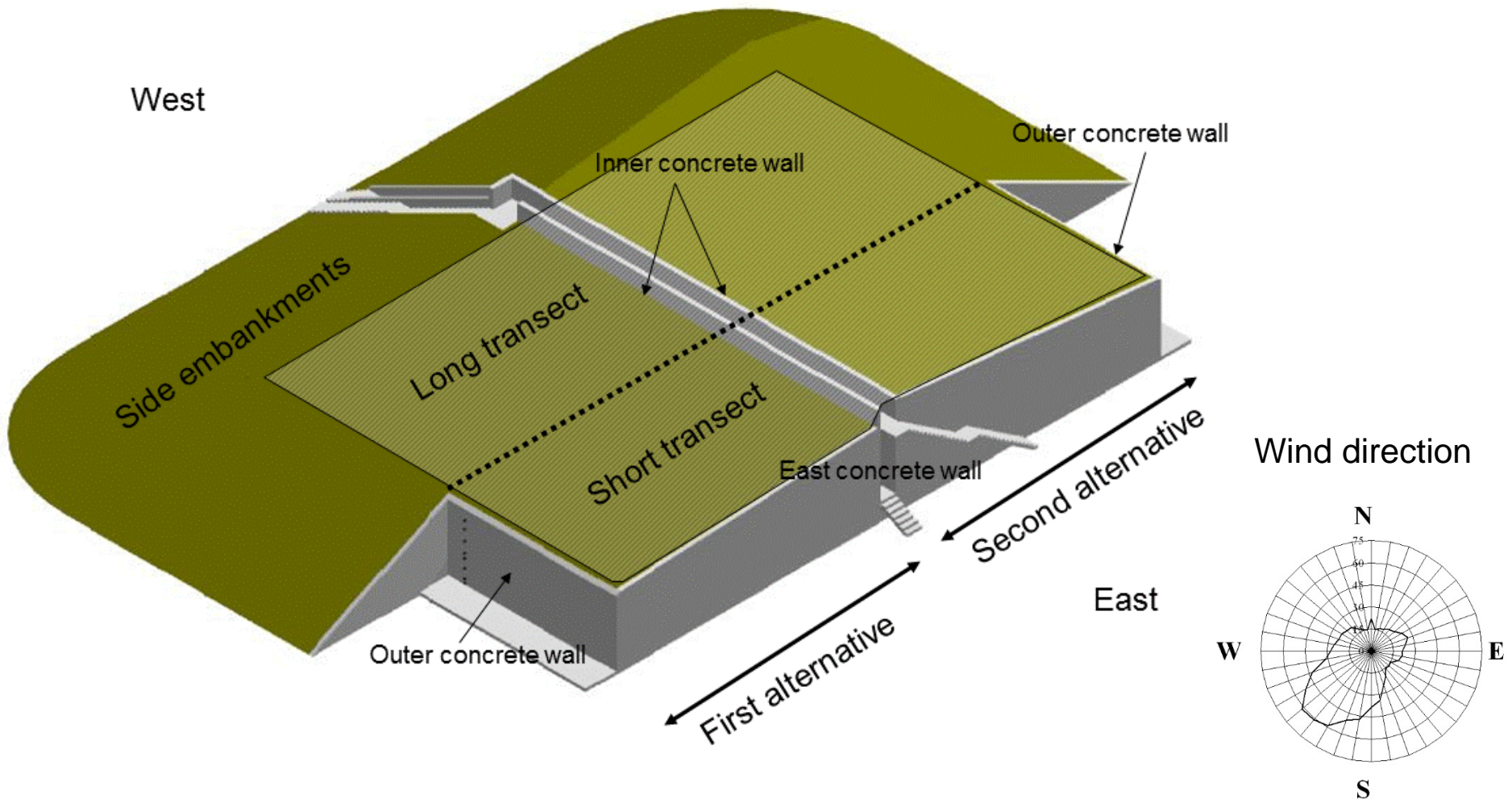


Objectives

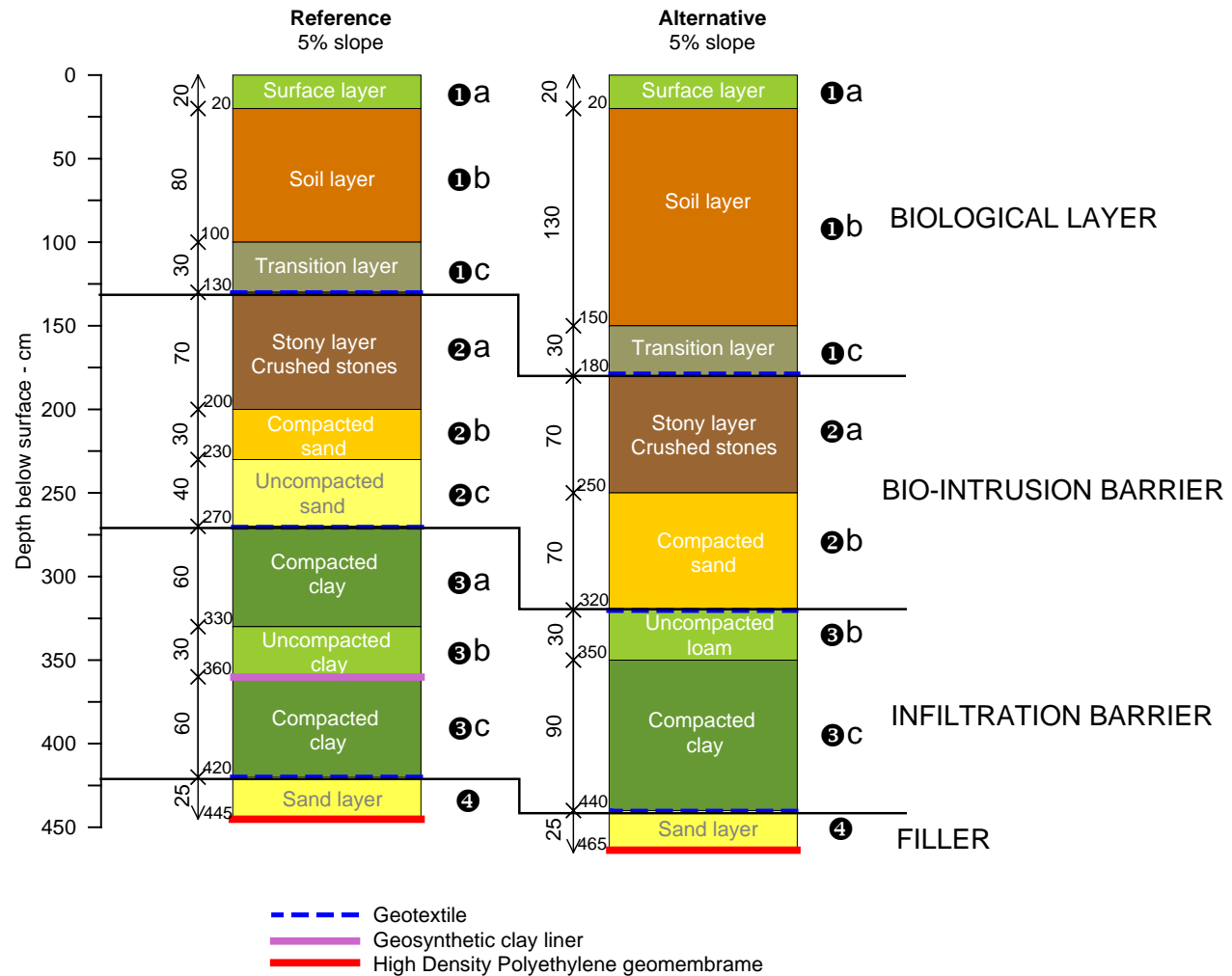


Instrumentation

Experimental layout



Layering





Measurement devices (1)

- Micrometeorology
 - 2 stations: rainfall, radiation budget, air and surface temperature, barometric pressure, wind speed and direction, relative humidity
- Water balance
 - Vol. water content by TDR (278 probes among which 34 long, vertically oriented “spatial” TDR probes)
 - Soil water potential by pF-meters (48 sensors)
 - Runoff and lateral drainage and vertical percolation (gutter and pipe network, 16 storage and measuring tanks)
 - Deep percolation (pipe network, 8 tipping buckets + small storage tanks)
- Erosion
 - Manual emptying and quantification of sediments in runoff gutters and storage tanks
- Settlements and displacements
 - Horizontal displacements by inclinometry (series of inclinometer casings)
 - Vertical displacements by inclinometry (4 vertical casings)
 - Settlement by external topographic survey

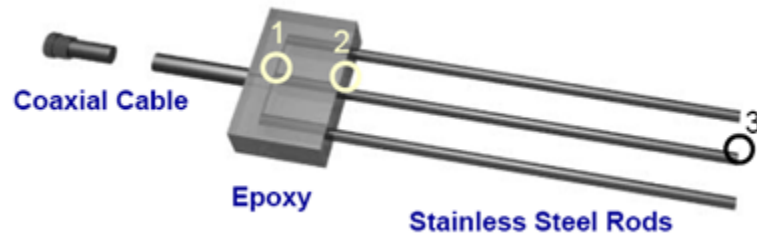
Measurement devices (2)

- Chemistry
 - In situ pore water sampling for pore water composition (56 pore water samplers)
 - Gaseous CO₂ and O₂ sampling (30 sampling systems)
- Non- or lowly invasive geophysical measurements
 - Ground Penetrating Radar for larger scale water content monitoring (series of horizontal tubes = inclinometer casings)
- Biology
 - Visual assessment of vegetation dynamics, destructive sampling for root development
- Material characterization
 - Reservation tubes for online destructive sampling
- Concrete
 - 3 small concrete chambers equipped with T, RH and CO₂/O₂ sampling probes
 - Top slab: T, RH, TDR
 - Base plate: T, RH, TDR

Examples of tested devices

TDR for water content monitoring

Classical three rod probe



Long probe for spatial application



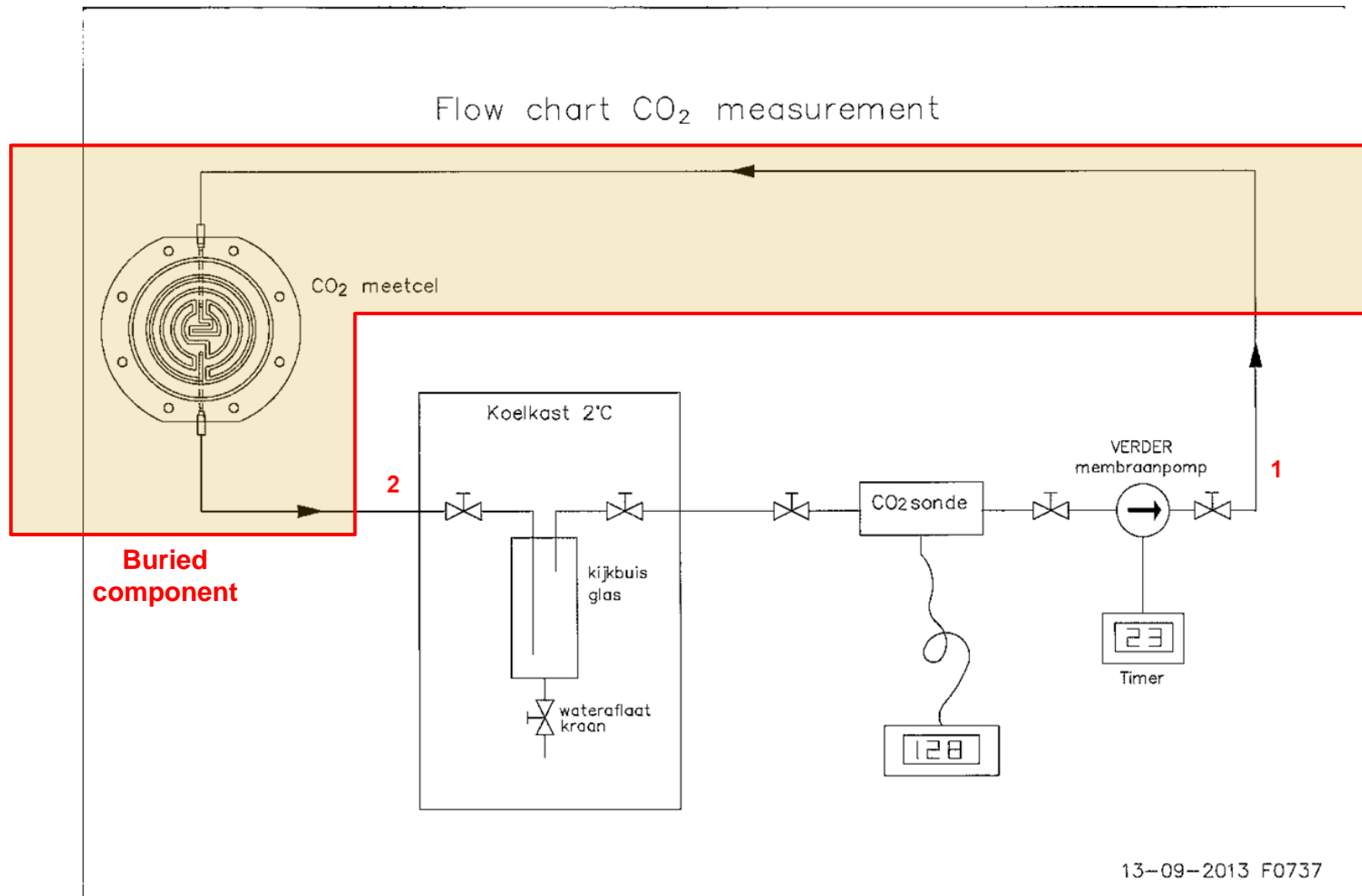
Sensor survival to compaction



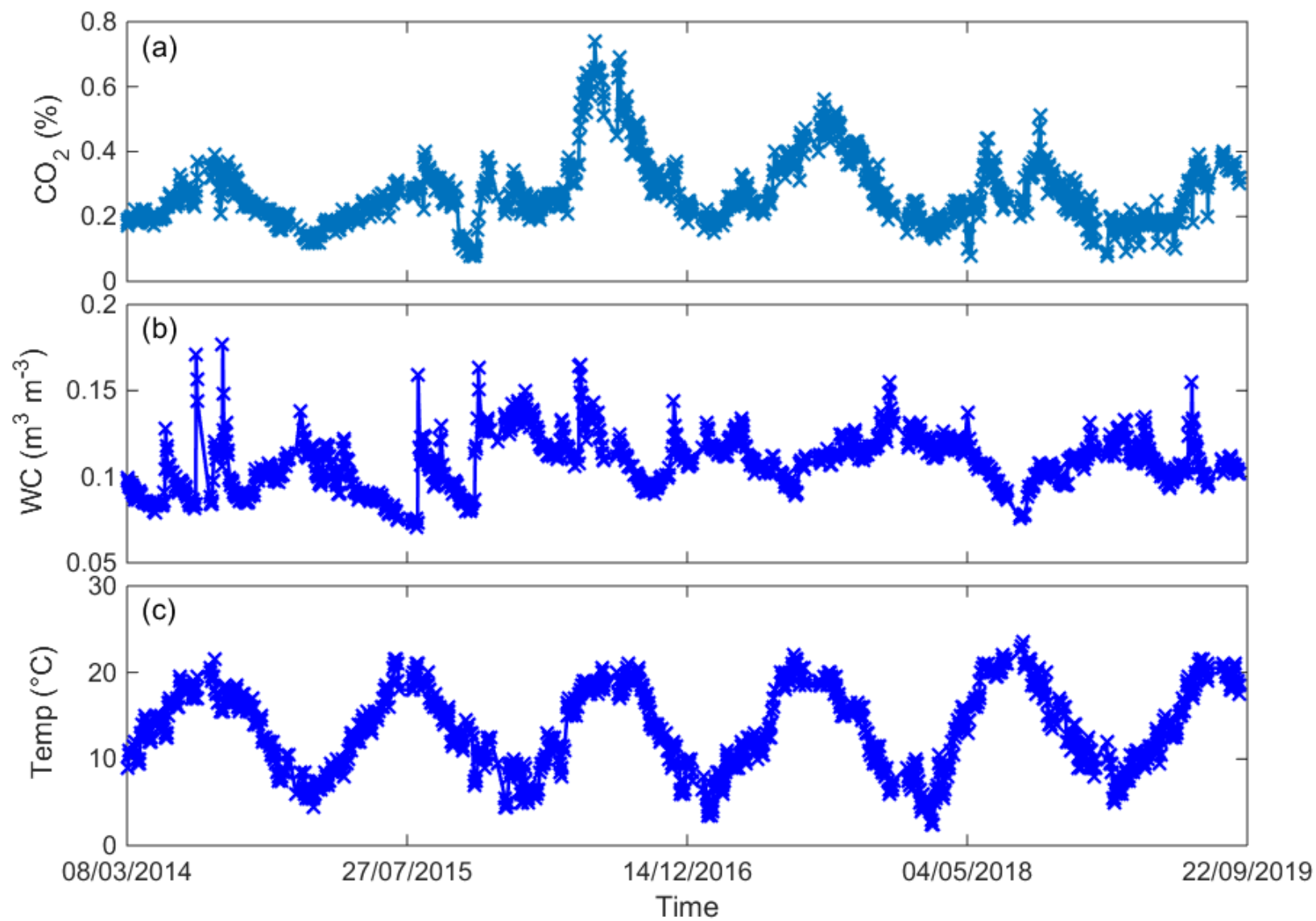
Gaseous CO₂ sampling



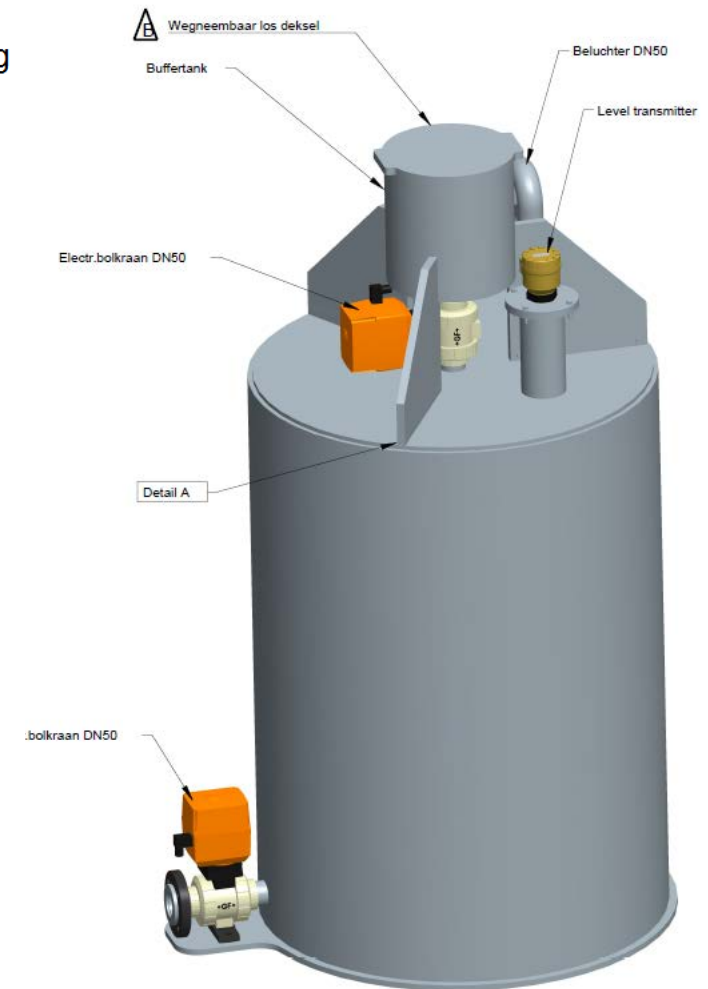
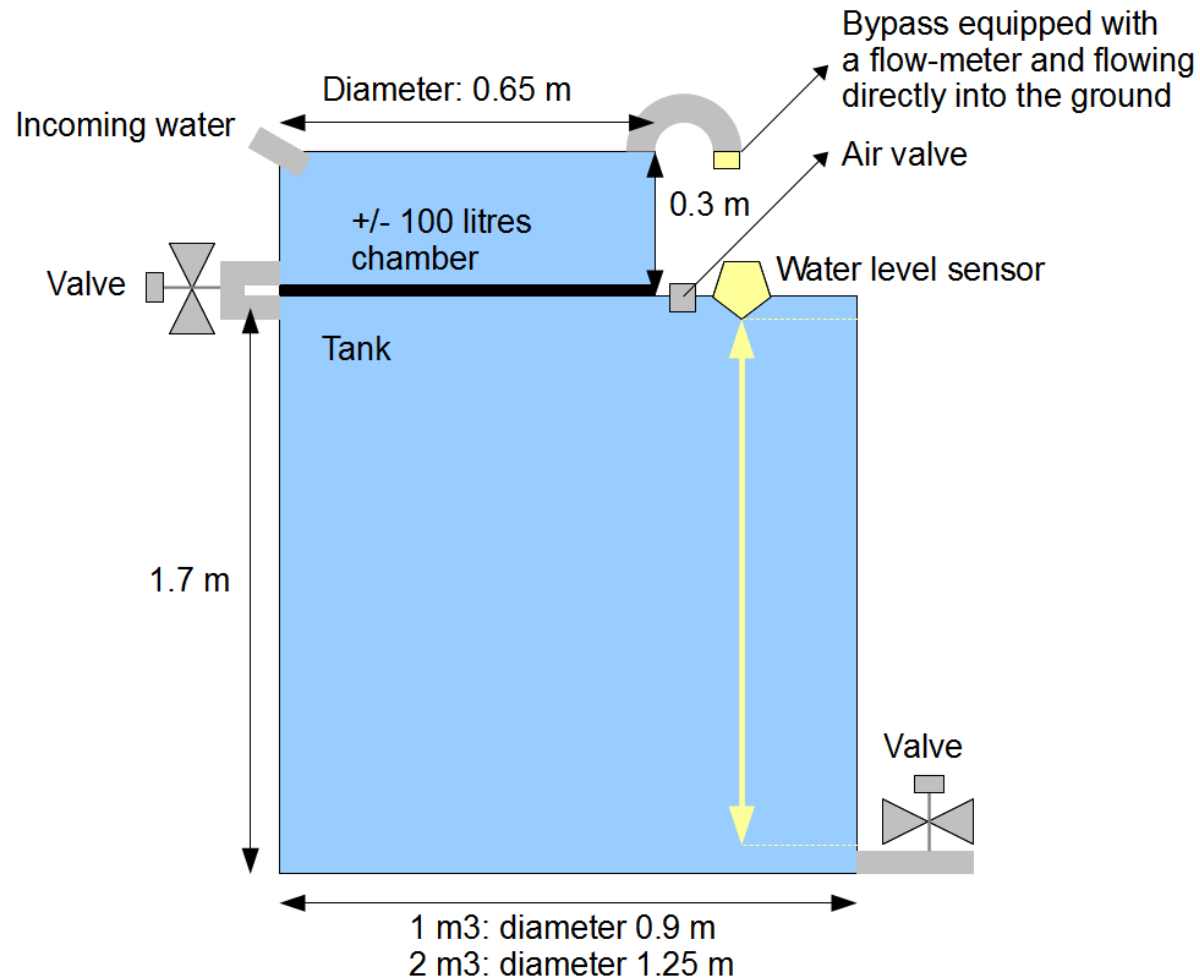
Design of CO₂ measurement system



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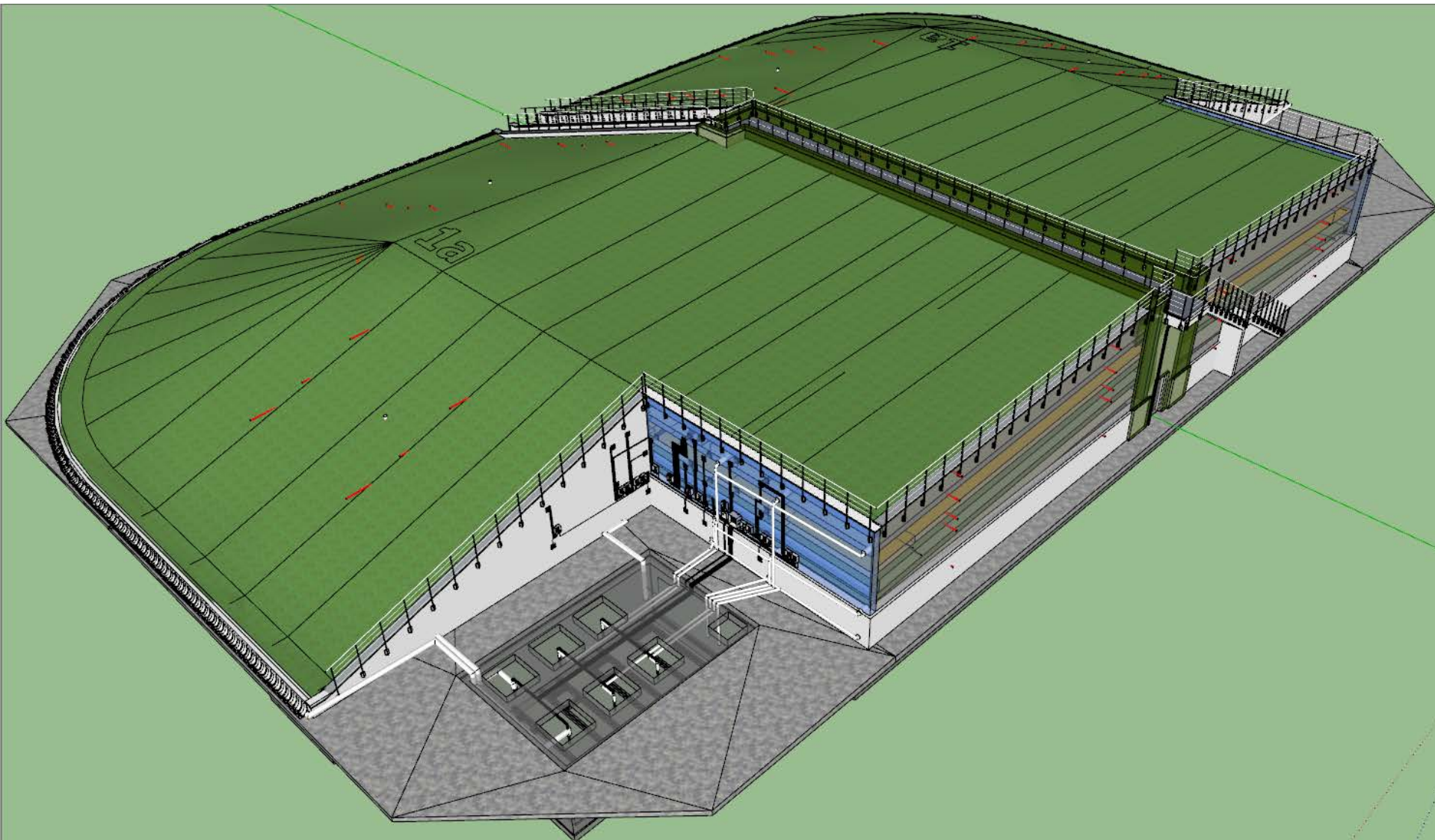


Storage and measuring tank

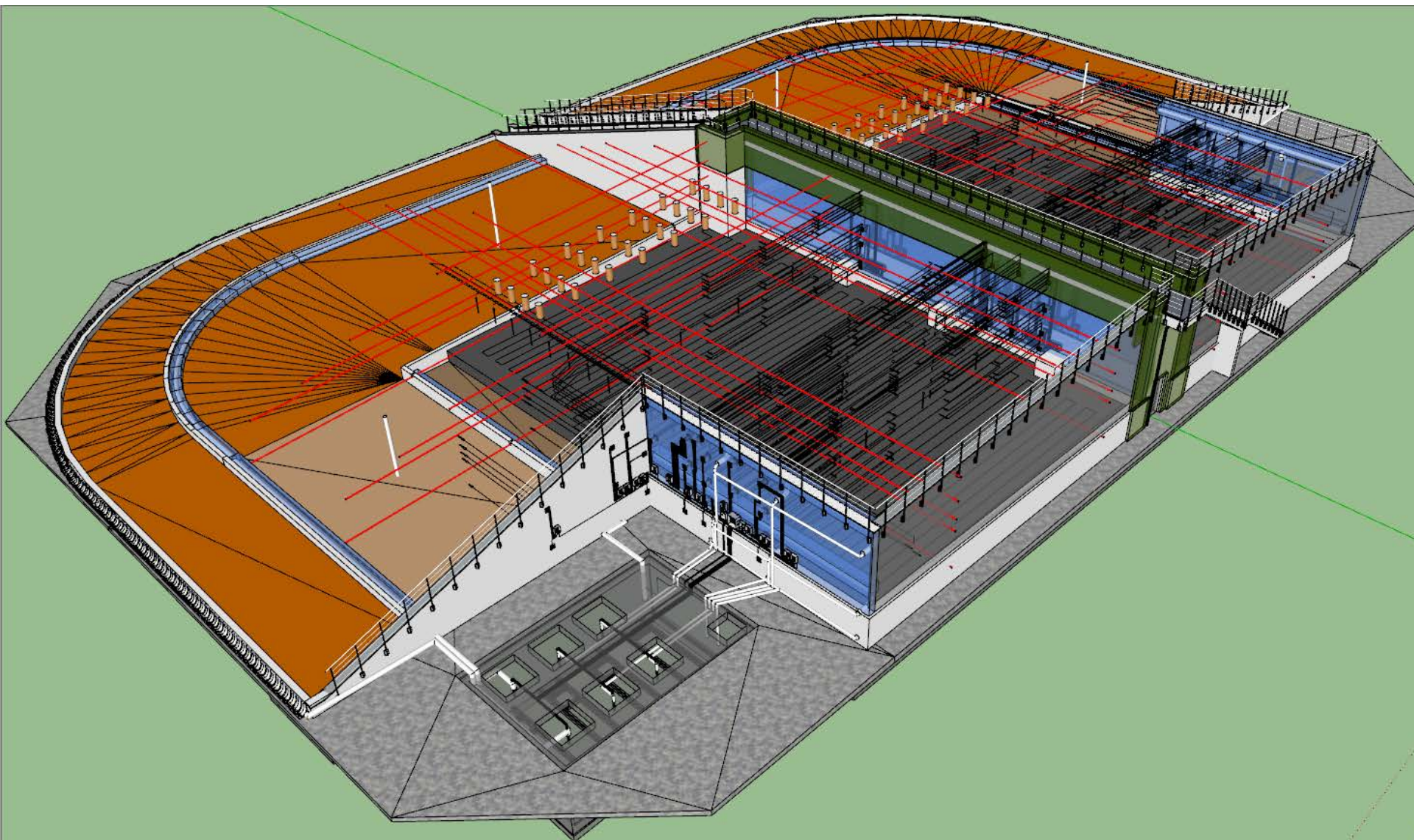


3D model of instrumentation

View from top



Instruments



Conclusions

- Instrumentation plan 90% ready – should be finished in the next months
- Still need to work on data transfer and storage
- Construction will probably start in fall 2020?