



Vispassage Doesburg

Ontwerp

**CDM
Smith**

Marq Redeker



IMPACT ON WATER NATURE PARKS

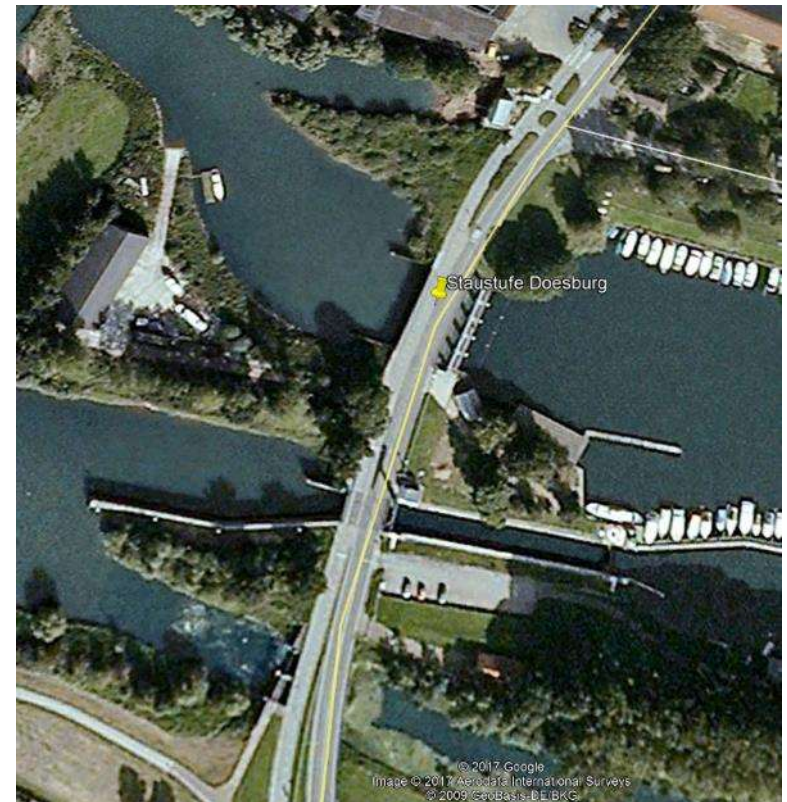
Wilco de Bruijne

27.09.2019



Locatie

- Monding Oude IJssel in Gelderse IJssel ten zuiden van Doesburg
- Hoogste peilverschil voor een vispassage in NL, $\Delta H \sim 5\text{m}$



Foto's: GoogleEarth

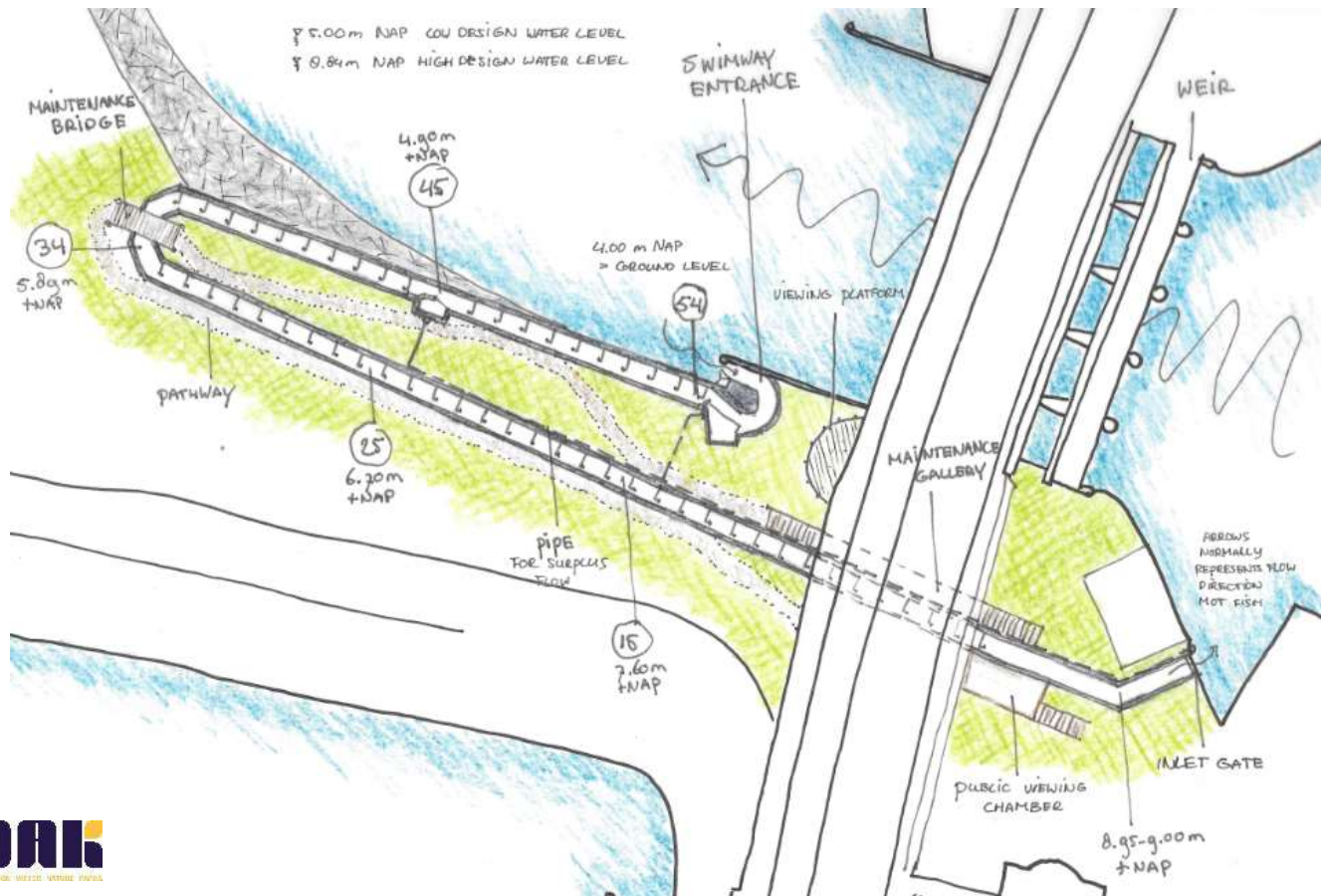
Doelstelling

- Herstellen van de vismigratieroute Gelderse IJssel - Oude IJssel (in Duitsland: Issel). *KRW maatregel / blauwe knooppunt*
- Doelsoorten: **rheofiele soorten** (stromingsminnend) waaronder **Winde** -> maatgevend!
- Andere soorten (eurytoop en limnofiel) profiteren mee.



Voorontwerp

- Eerste ontwerp mei 2017 o.b.v. veldbezoek en datanalyse.
- Vindbaarheid \Rightarrow Lokstroom van ingang sluit aan op stroming van de stuw, zuidkant i.v.m. preferente stroming en ruimte.
- Passeerbaarheid \Rightarrow Type: **vertical slot passage**



Voorontwerp

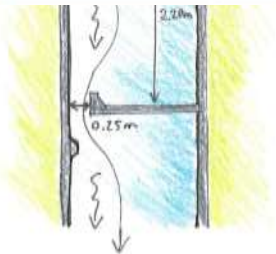
- Vertical slot passage:
 - **Dimensies:** Bekken- en slot maatvoering volgens Duitse *Merkblatt DWA-M 509* voor *Fisch-/Zielarten Brachsenregion* (Winde).
 - **Hydraulica:** Δh 9cm; compromis tussen volgens DWA M 509 maximaal toelaatbaar en Nederlandse standaard.

TOP VIEW

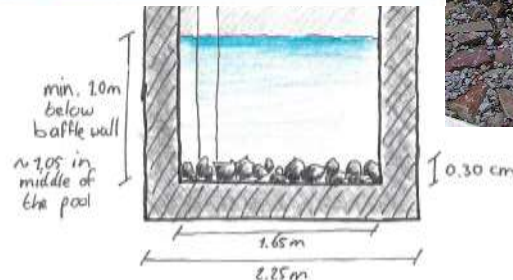


Tabel 2 Hoogteverschil tussen de bekken, aantal bekken en totale lengte.

ΔH	5cm	6cm	7cm	8cm	9cm	10cm	11 cm	12 cm
Aantal bekken	98	82	70	61	54	49	44	40
Totale lengte	246m	204m	175m	153m	135m	122m	110m	101m



1:50

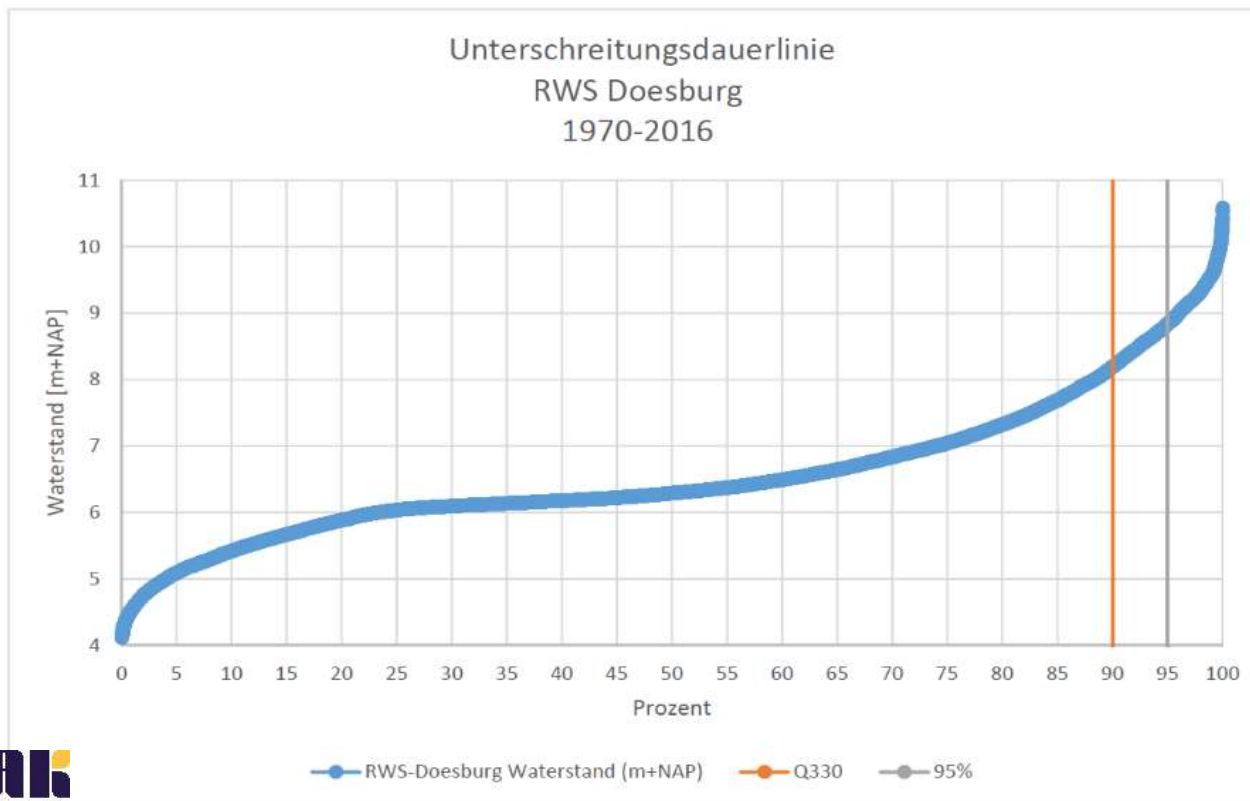


Foto's: Redeker



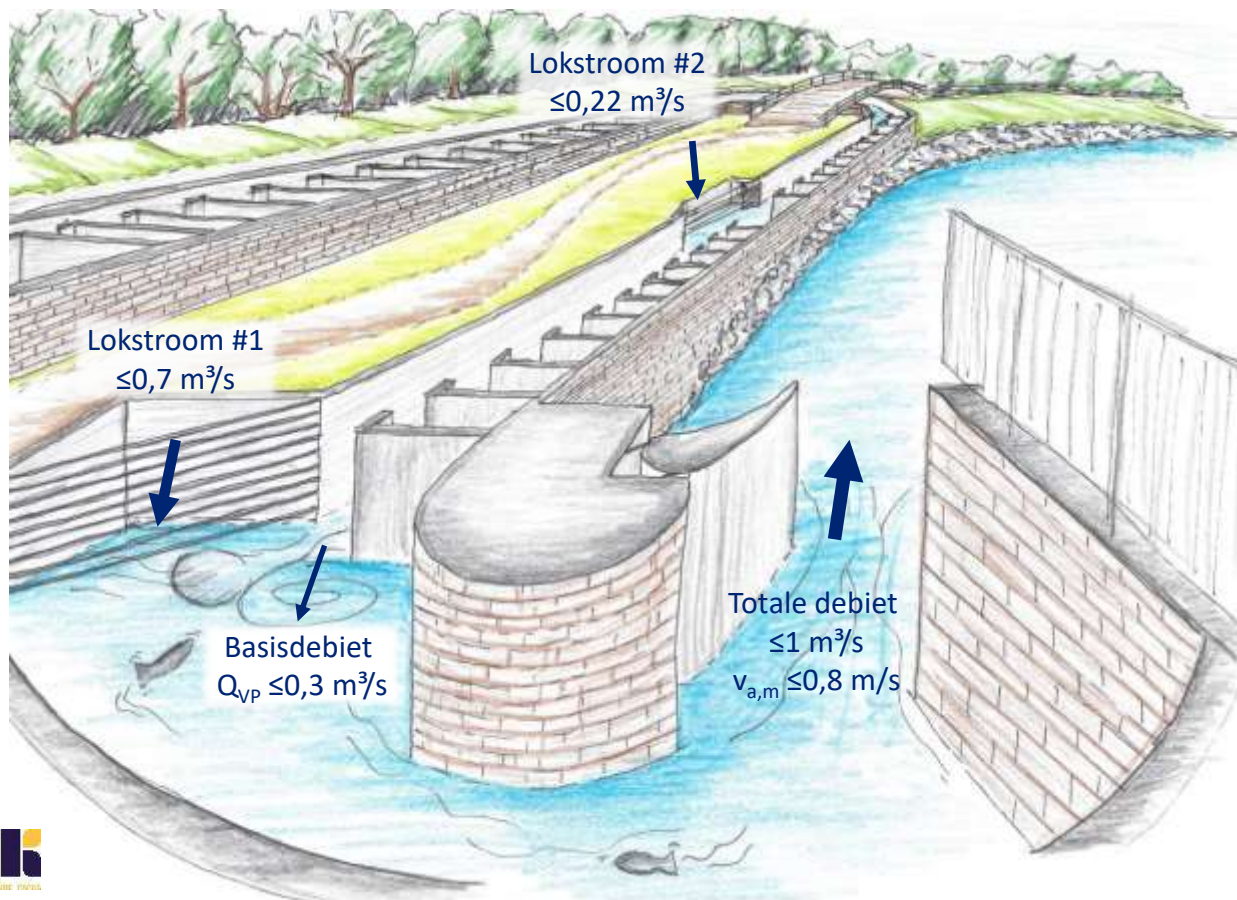
Voorontwerp - Peilsituatie

- Bovenstrooms peil Oude IJssel: **10,00 m+NAP vast.**
 - Benedenstrooms peil: **Zeer grote peilfluctuatie** en daarnaast bodemerosie IJssel voorzien (Prognose -0,84 m tot 2067).
 - Min. ontwerppeil Gelderse IJssel: 5,00 m+NAP
 - Max. ontwerppeil Gelderse IJssel : 8,84 m+NAP
- } $\Delta H_{gij} = 3,84\text{m}$



Voorontwerp - Extra lokstroominlaatpunten

- Vanwege de extreme peilschommelingen zijn **2 extra lokstroom inlaatpunten** ontworpen.
- Ongeacht benedenstrooms peil (GJ 5,00m - 8,84 m) altijd **$\sim 1 \text{ m}^3/\text{s}$ lokstroom**.



Extra lokstroominlaatpunten

- Extra lokstroom inlaten van andere vispassages.



Foto's:
Marq Redeker

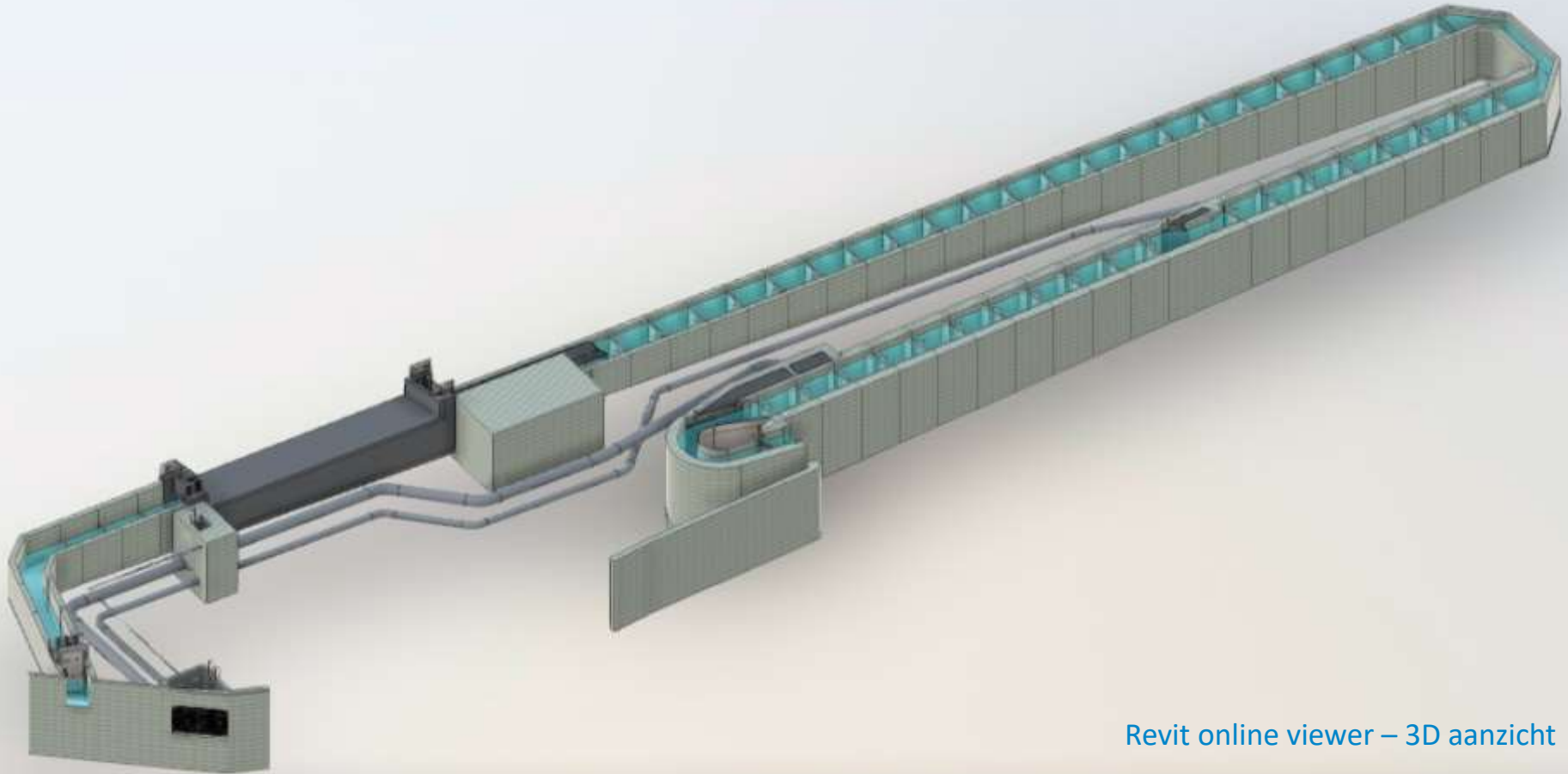


3D Definitief Ontwerp & Uitvoeringsontwerp

The screenshot displays a 3D design software interface with a fishway model on the left and a Dynamo workflow on the right. The fishway model is a long, narrow structure with a central channel and side walls, rendered in a 3D perspective view. The Dynamo workflow is a visual programming script named 'fishway_wall_heights_final.dyn*'. It includes a 'File.FromPath' node, an 'Excel.R' node, and three 'Code Block' nodes. The first 'Code Block' contains the text 'CAD_Export_20171128'; >. The second 'Code Block' contains the text 'CAD_Export_20180201'; >. The third 'Code Block' contains the text 'false'; >. The workflow is connected to a data table at the bottom right, which contains numerical data.

30	9,18	9,40	9,40	9,03	7,30
31	9,18	9,40	9,40	9,02	7,21
32	9,17	9,40	9,40	9,01	7,12

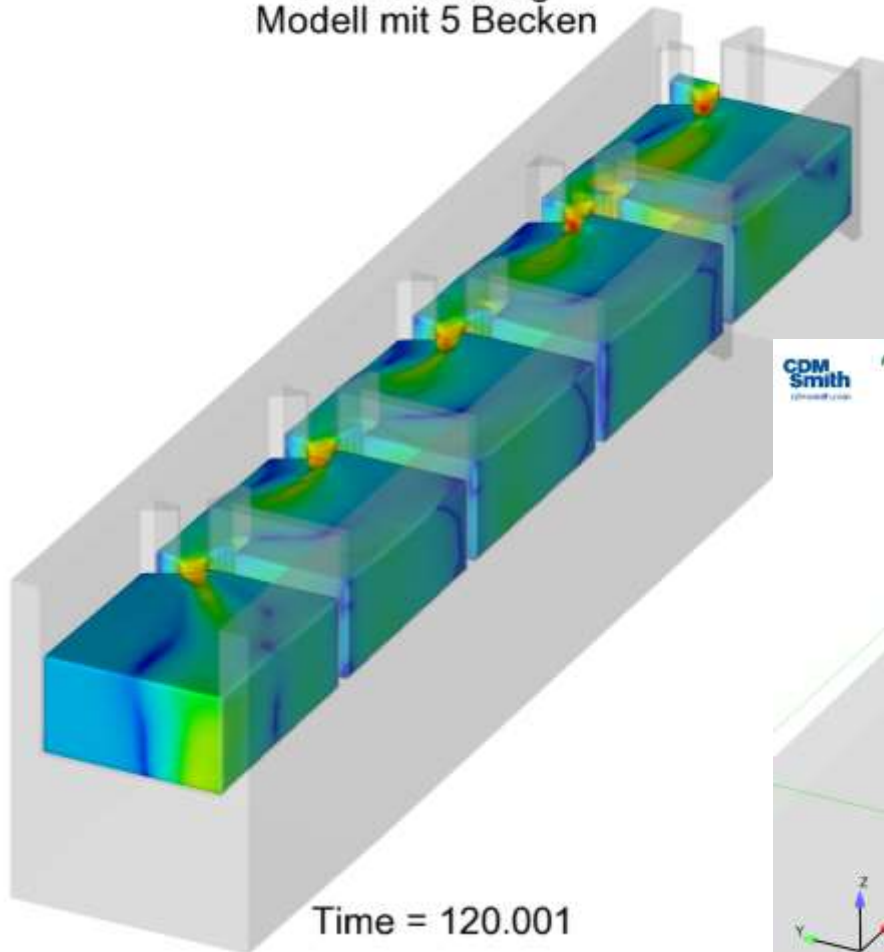
3D Definitief Ontwerp & Uitvoeringsontwerp



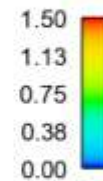
Revit online viewer – 3D aanzicht

Modelering stromingspatroon

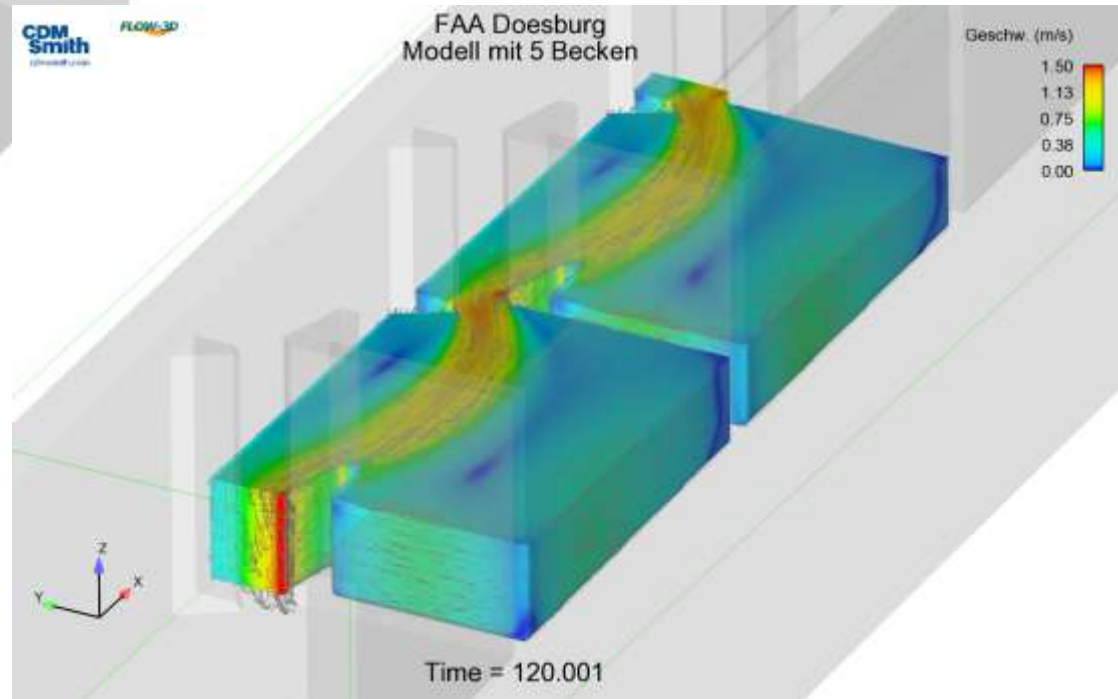
FAA Doesburg
Modell mit 5 Becken



Geschw. (m/s)



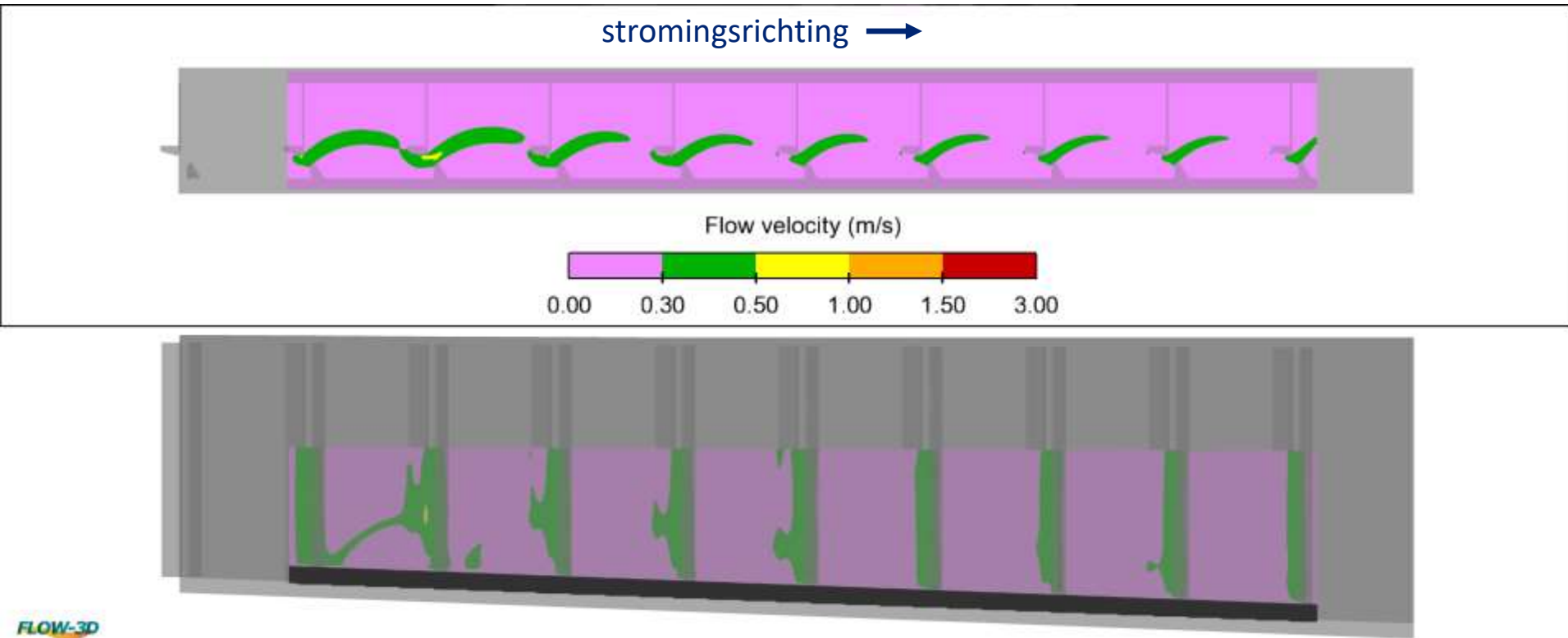
FAA Doesburg
Modell mit 5 Becken



Geschw. (m/s)

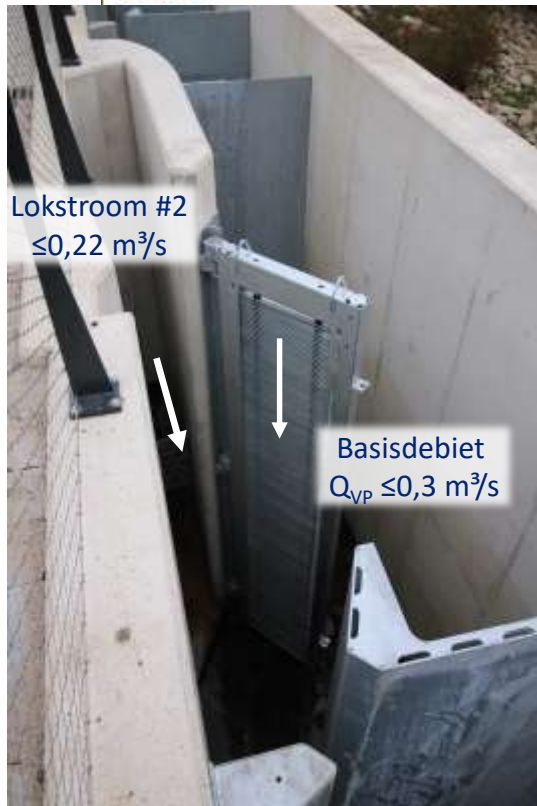


Modelering van de onderste bekken ichthyo-hydraulische schaal



Benedenstrooms peil = 7,20 m+NAP
zonder lokstroom #2

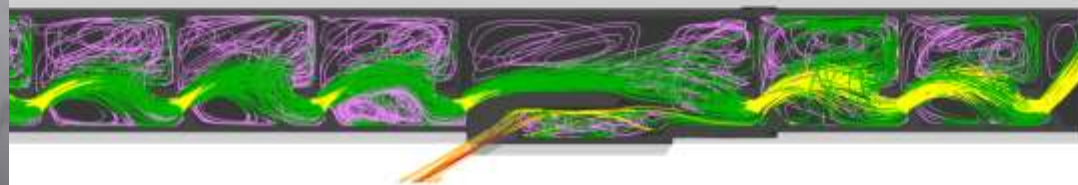
Modelering lokstroominlaatpunt #2 ichthyo-hydraulische schaal



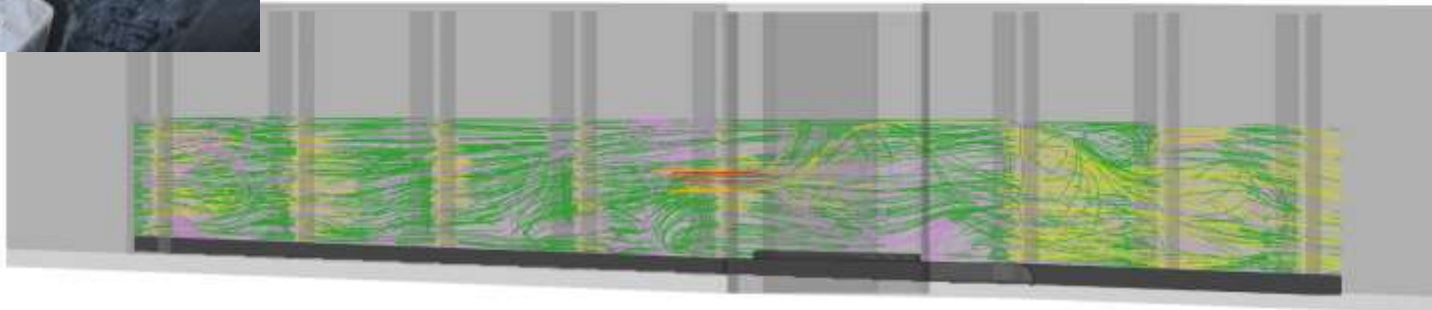
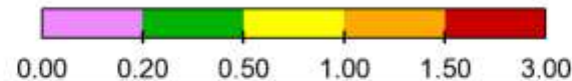
FAA Doesburg
Dotation #2



Benedenstrooms peil = 7,20 m+NAP
Extra lokstroom #2 = $0,2 \text{ m}^3/\text{s}$

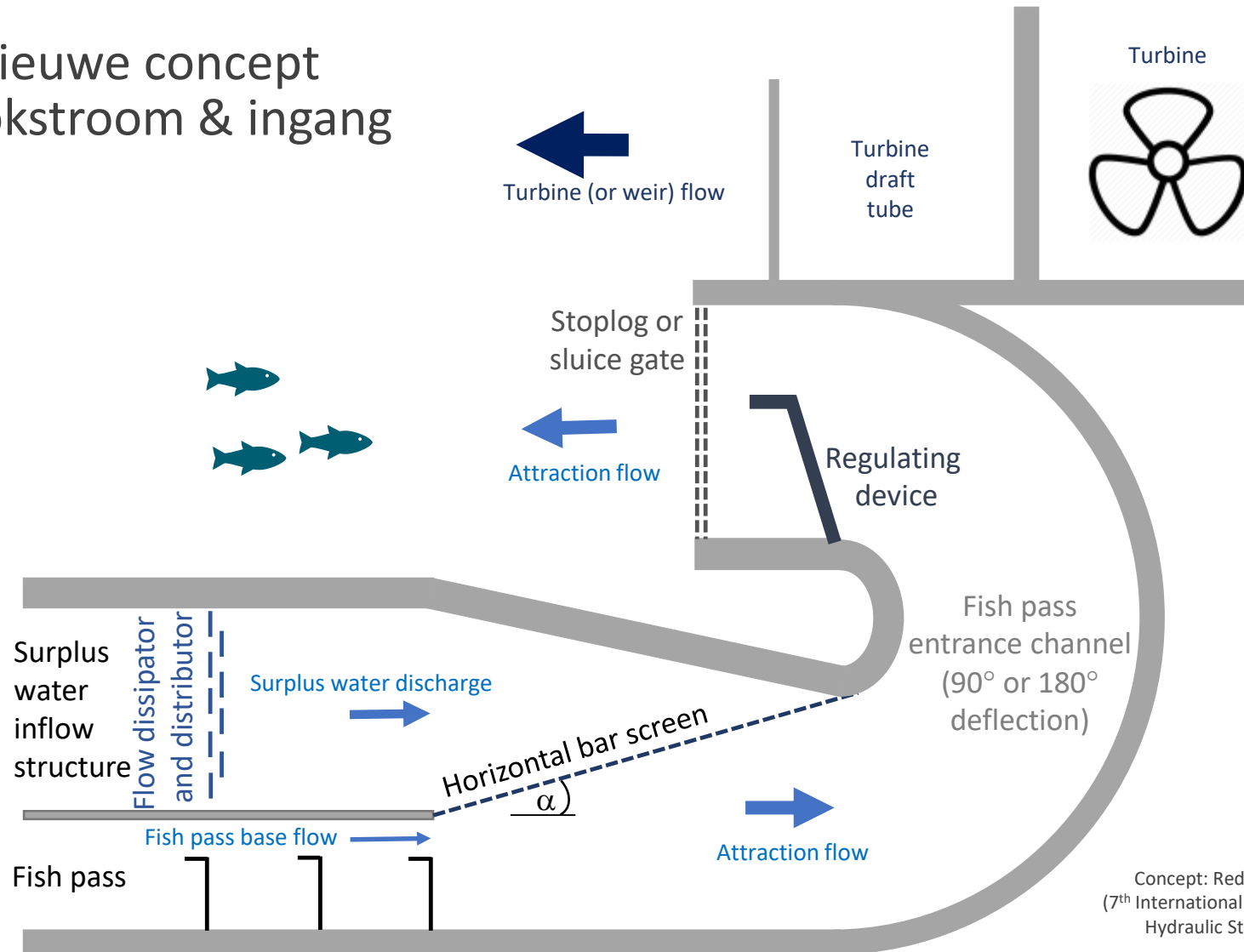


flow velocity (m/s)



Lokstroominlaatpunt #1

- Nieuwe concept lokstroom & ingang

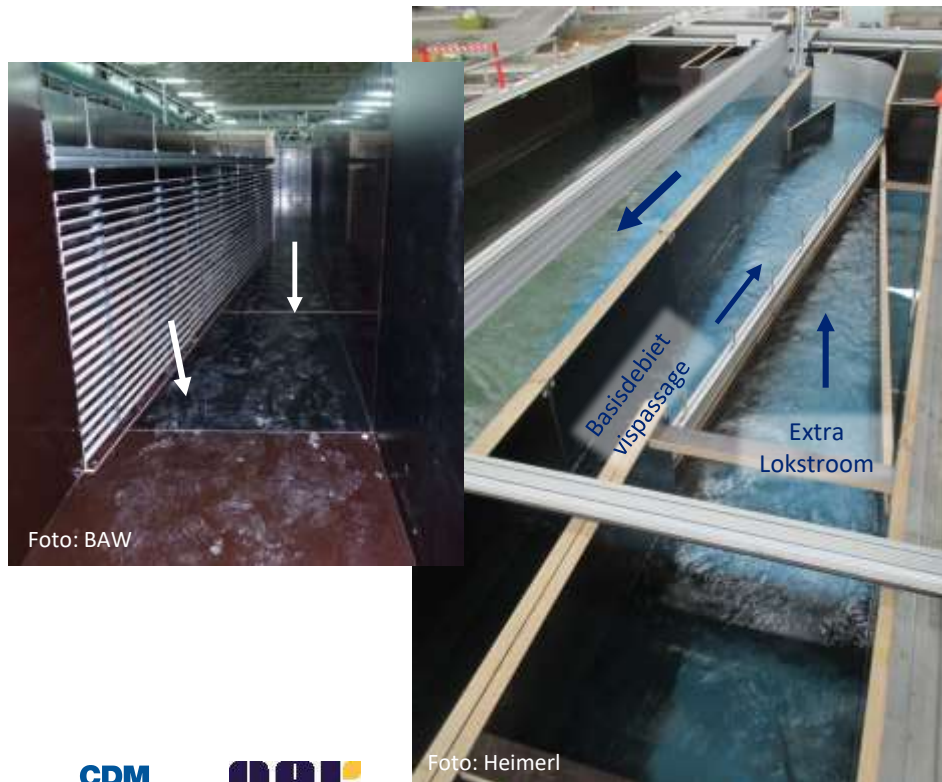


Concept: Redeker & Heimerl
(7th International Symposium on
Hydraulic Structures, 2018)

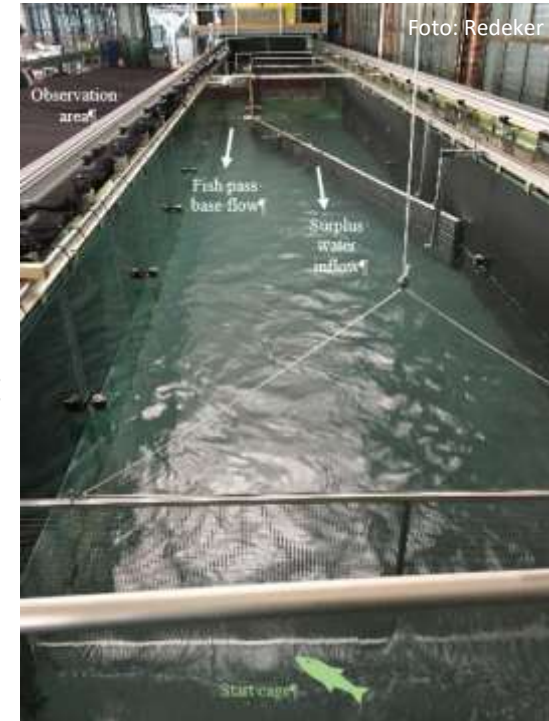
Lokstroominlaatpunt #1

- Nieuwe concept lokstroom & ingang

Fysische en hydropnumerieke modelering
in het laboratorium van het
Bundesanstalt für Wasserbau



Ethohydraulische
onderzoeken
in het
laboratorium



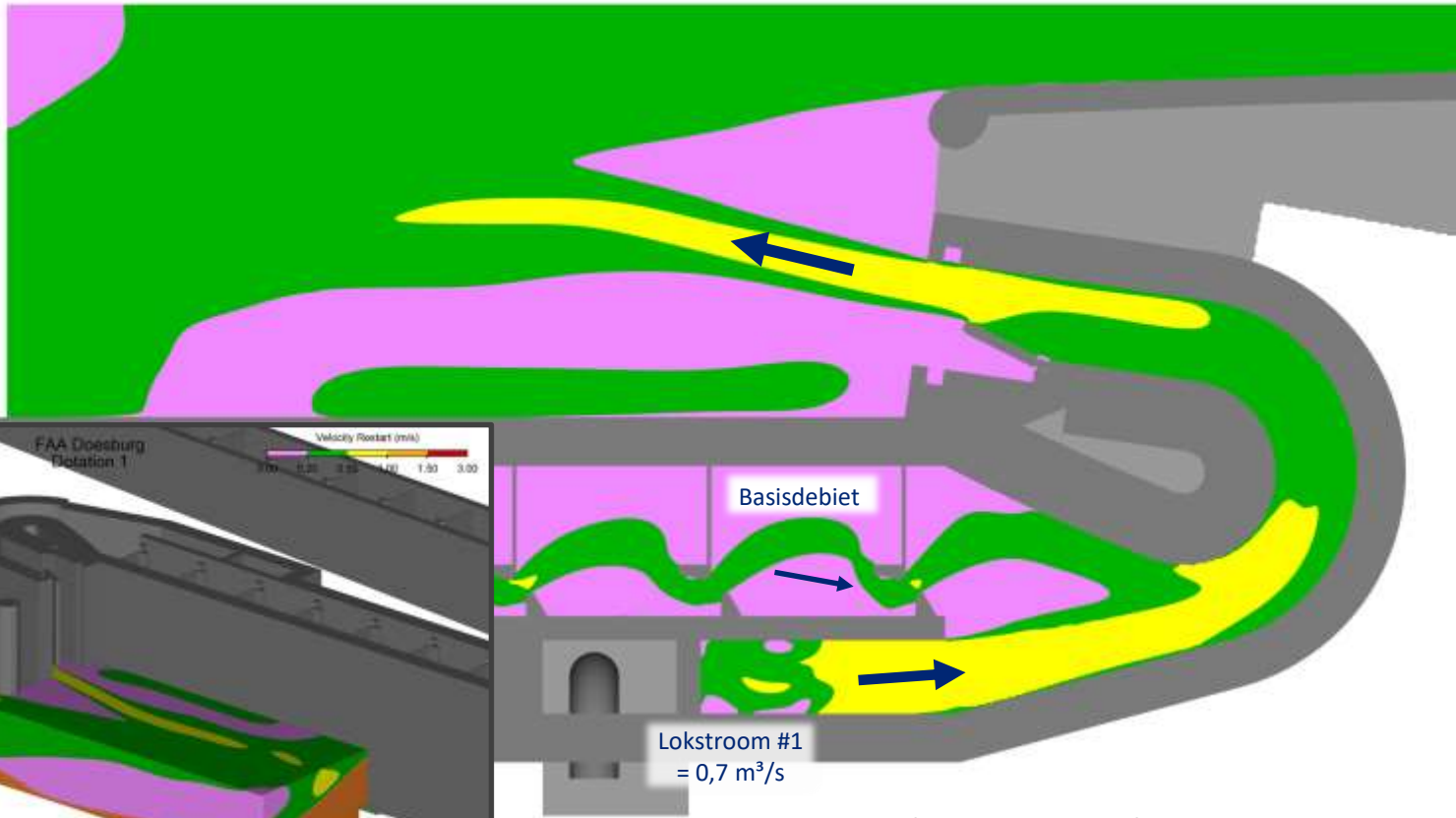
Modelering ingang ichthyo-hydraulische schaal

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Dotation 1

Velocity Restart (m/s)

0.00 0.20 0.50 1.00 1.50 3.00

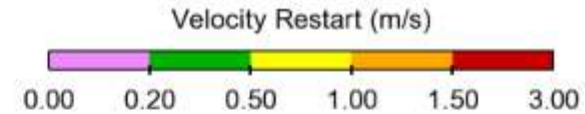


Benedenstrooms peil = 6,0 m+NAP
Uitvoering variant: Poort links

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Smith

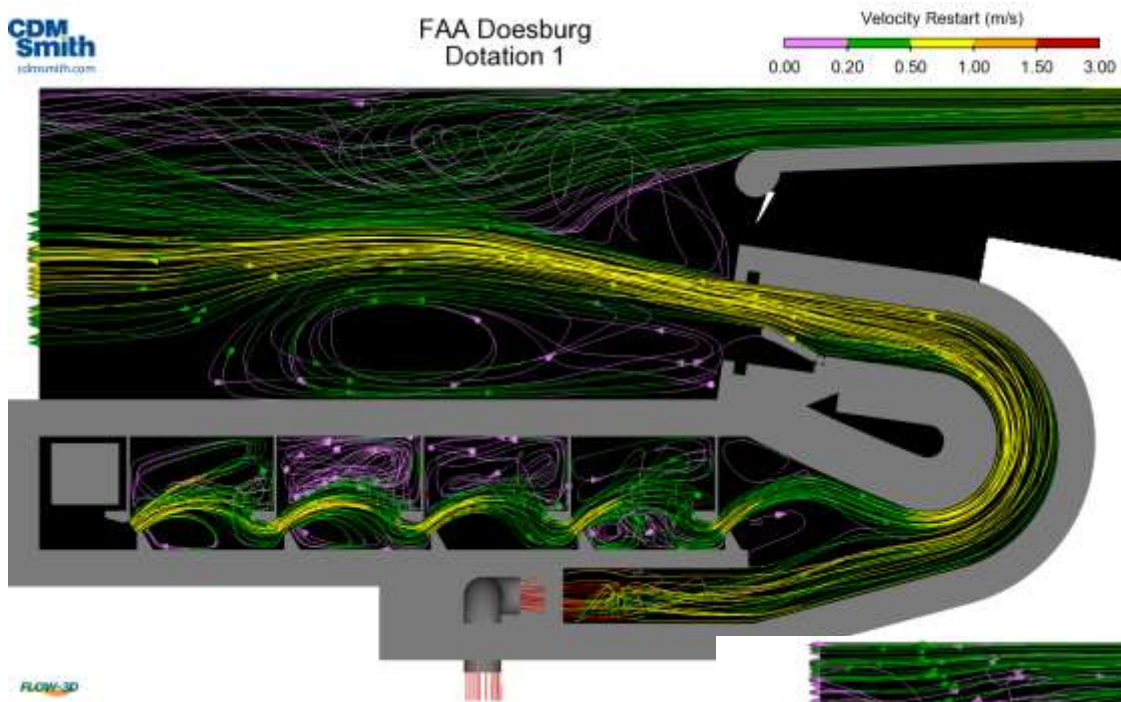
DAK
DANKBAAR WERK VOOR DE KUNST

Modelering ingang ichthyo-hydraulische schaal

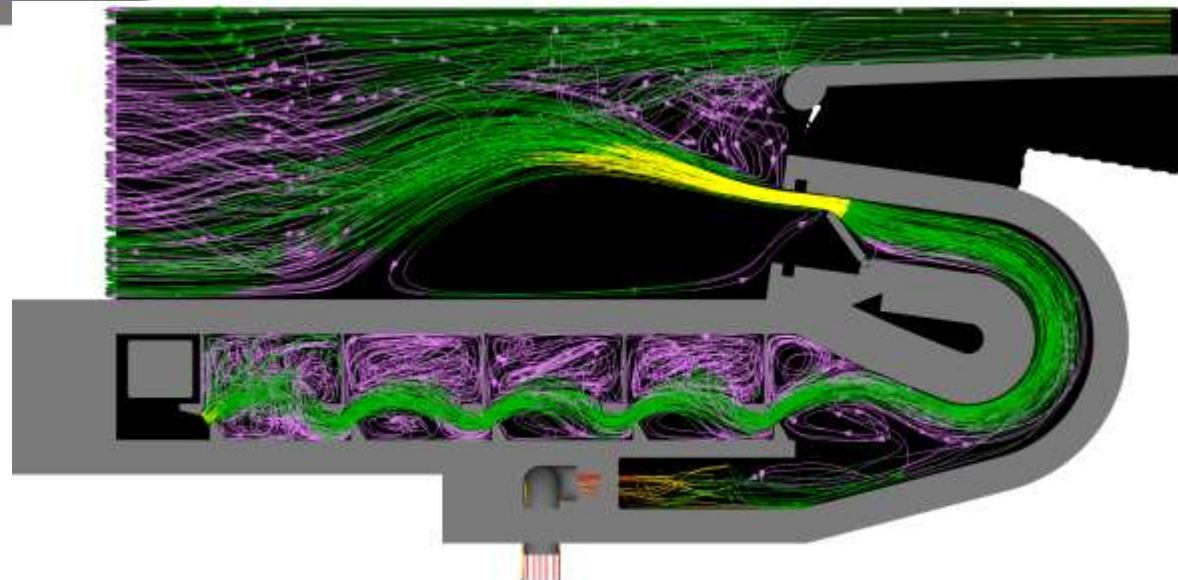


Benedenstrooms peil = 8,84 m+NAP
Uitvoering variant: Poort links

Modelering ingang stromingspatroon



Ontwerppeil: 8,84 m+NAP
Lokstroom : $v_{a,m} = 0,21$ m/s
Coupe 100 cm onder waterspiegel

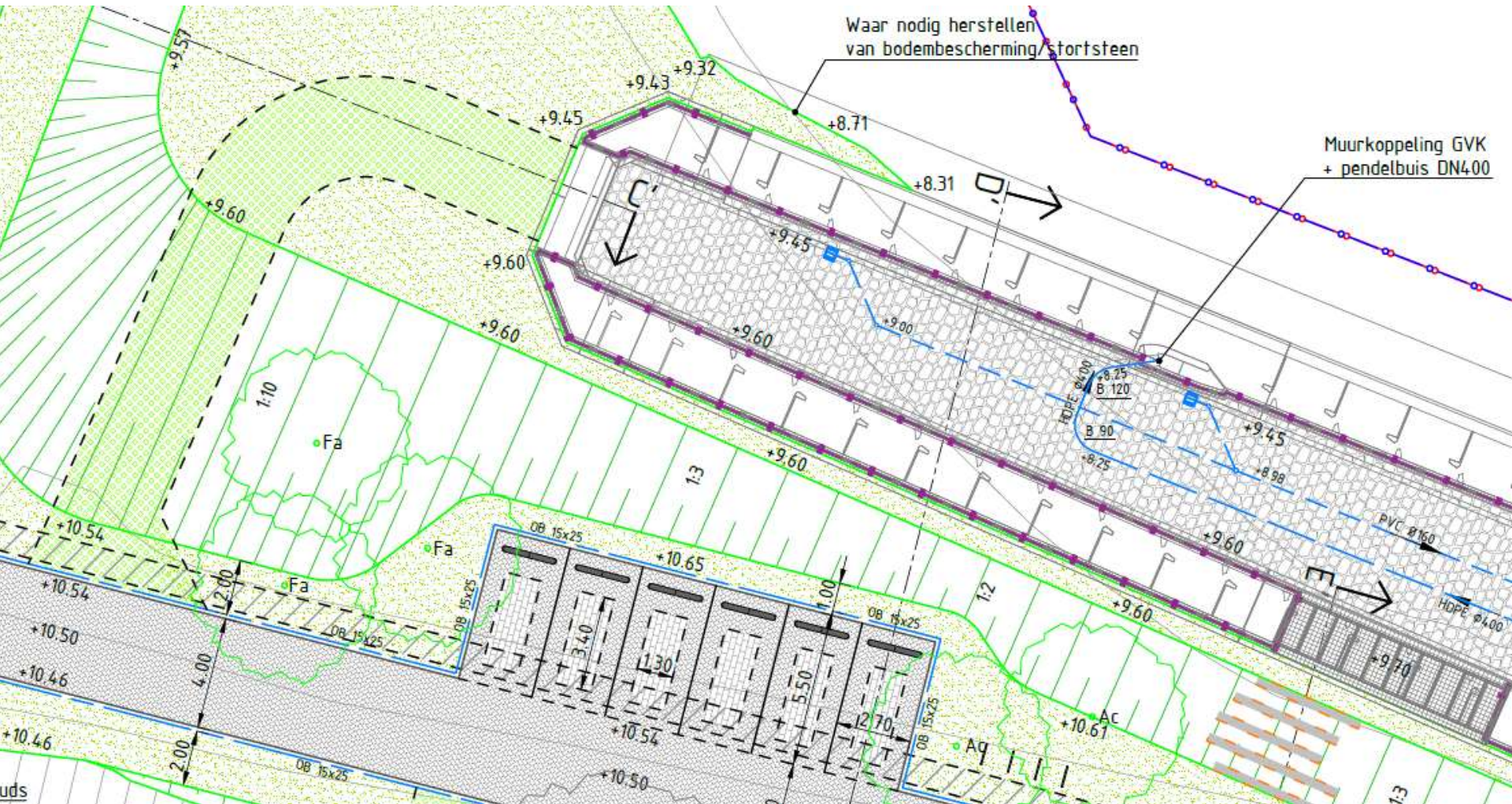


Waterstand: 6 m+NAP
Lokstroom: $v_{a,m} = 0,53$ m/s
Coupe 30 cm onder waterspiegel

Modelering ingang stromingspatroon

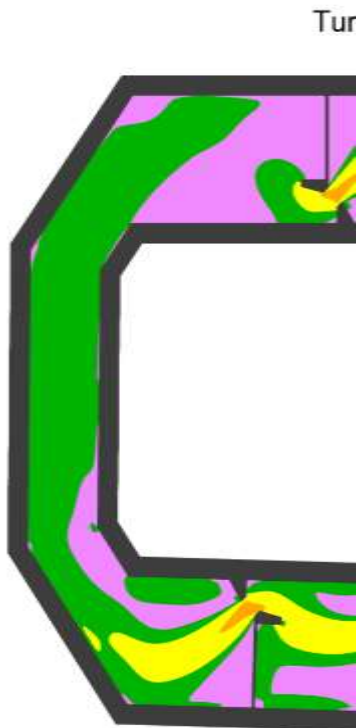


Uitvoeringsontwerp bocht

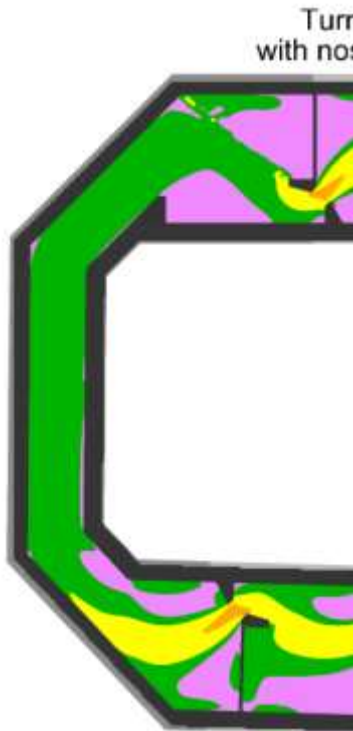


Verschillende bocht scenario's gemodelleerd

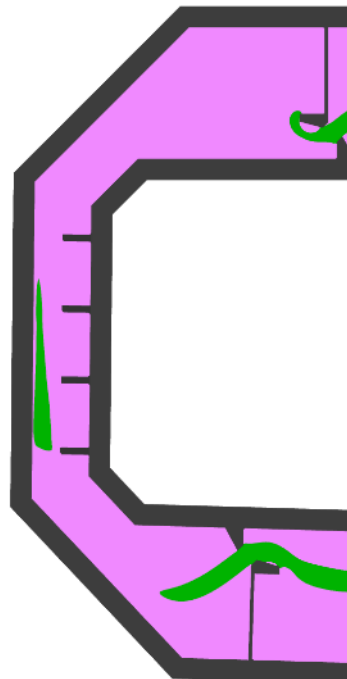
TP Design #1
initial layout



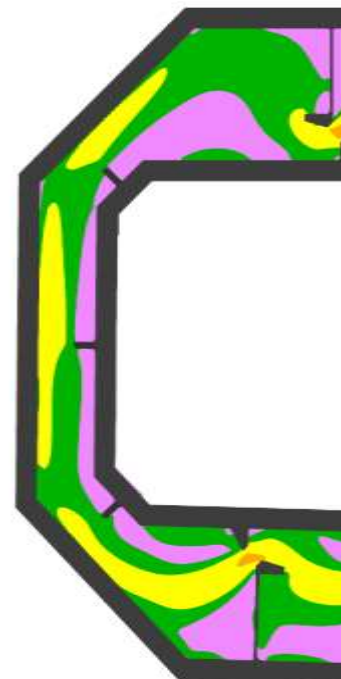
TP Design #3



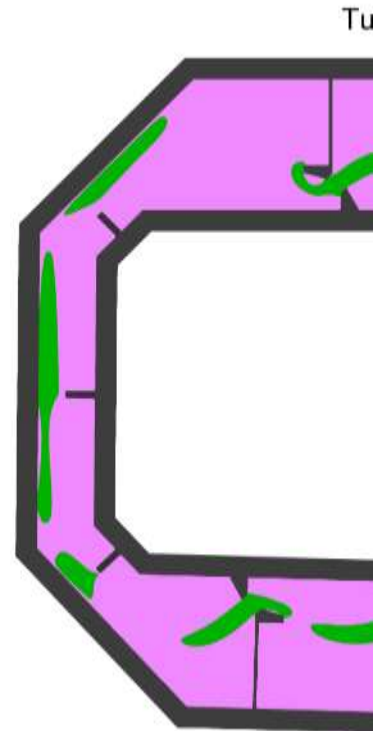
TP Design #4



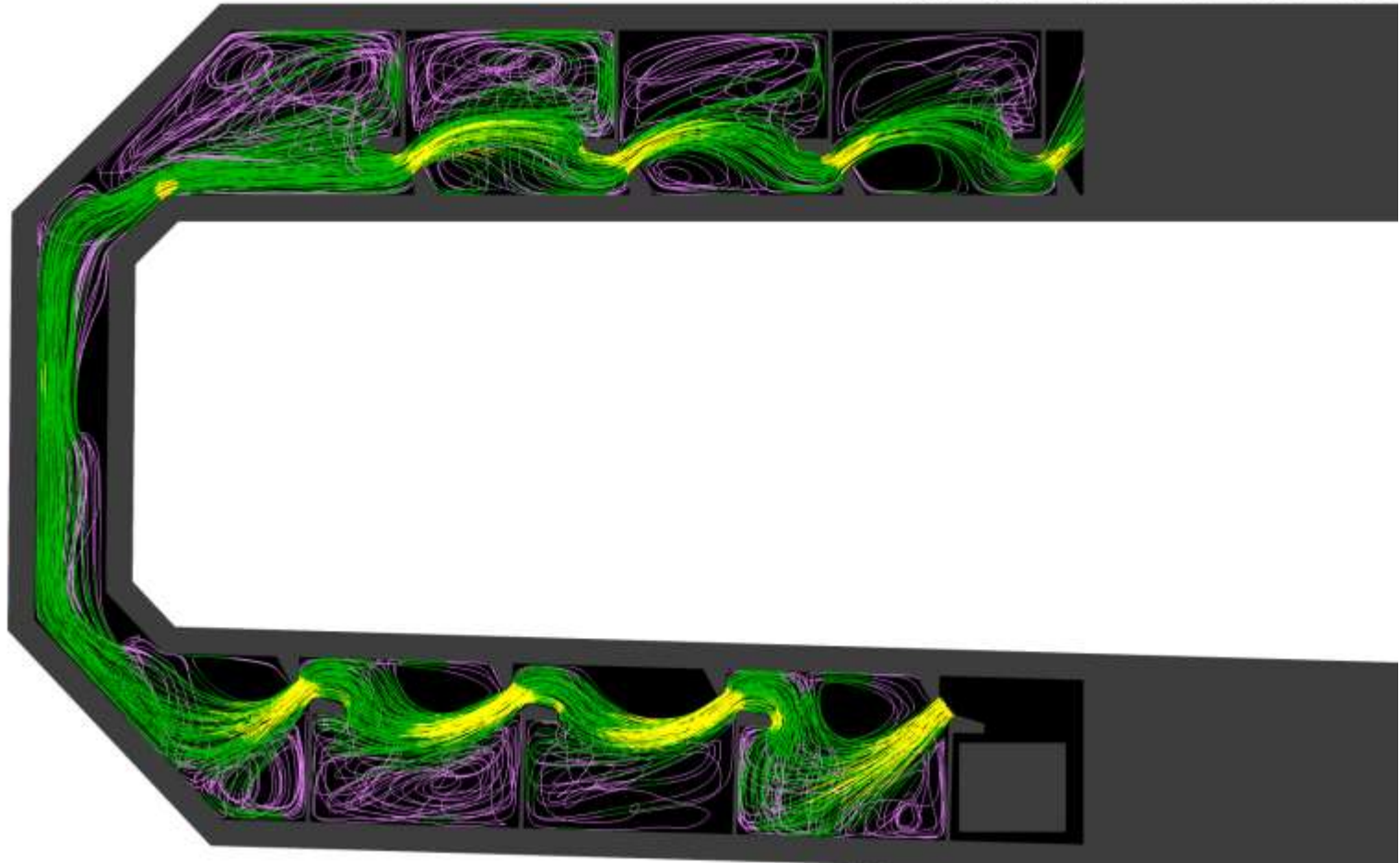
TP Design #5



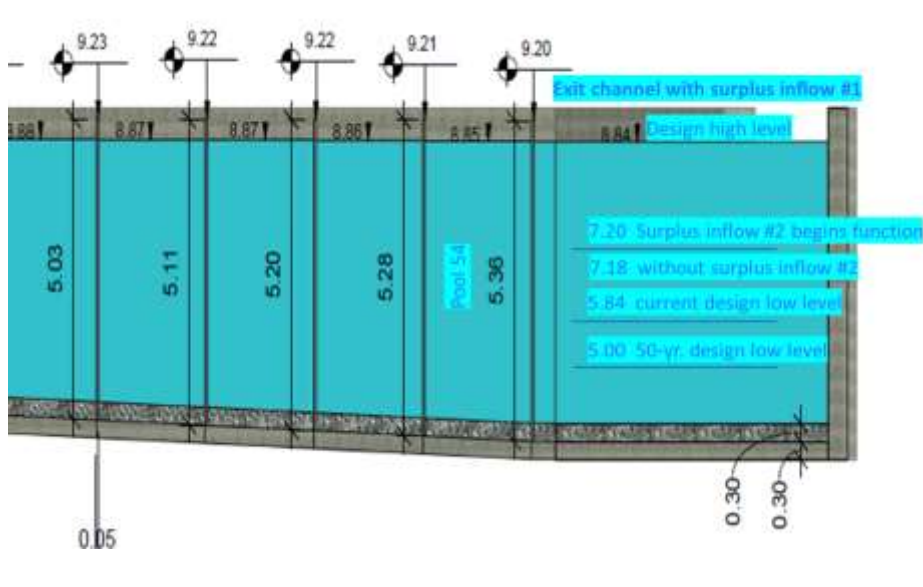
TP Design #5a



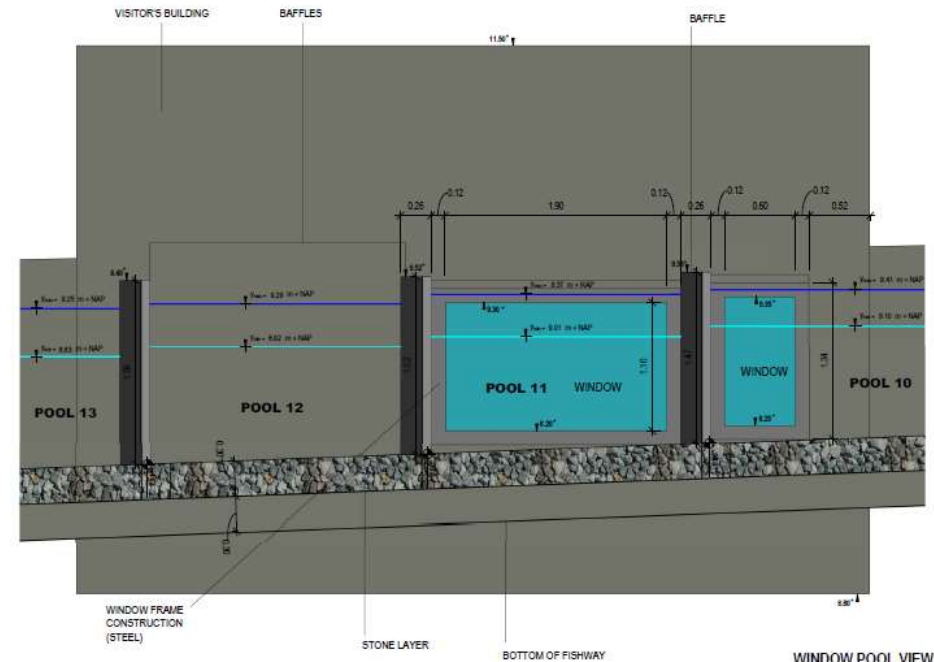
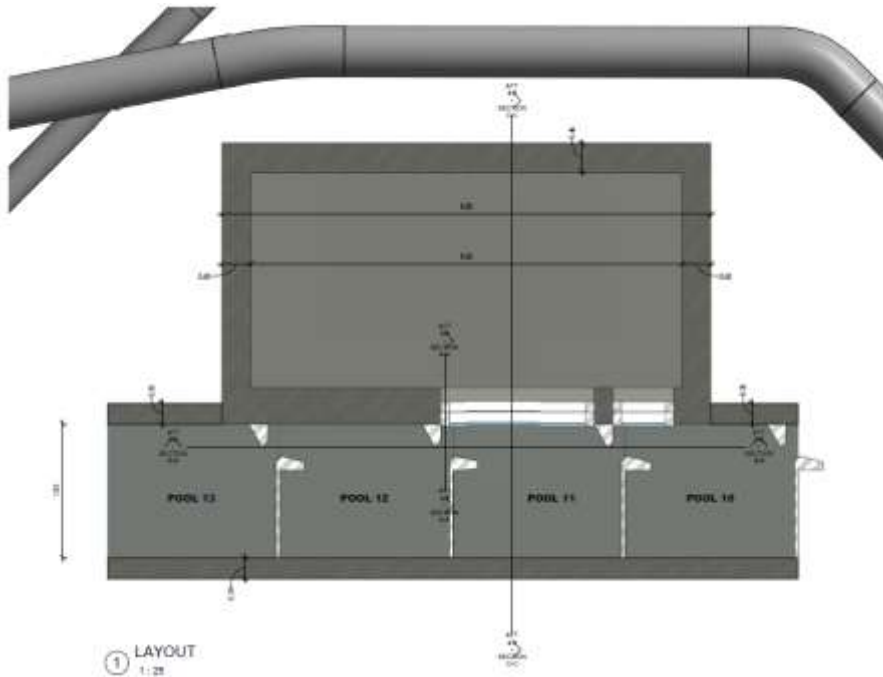
Modelering bocht #5c stromingspatroon



Modelering verschillende IJssel waterstanden



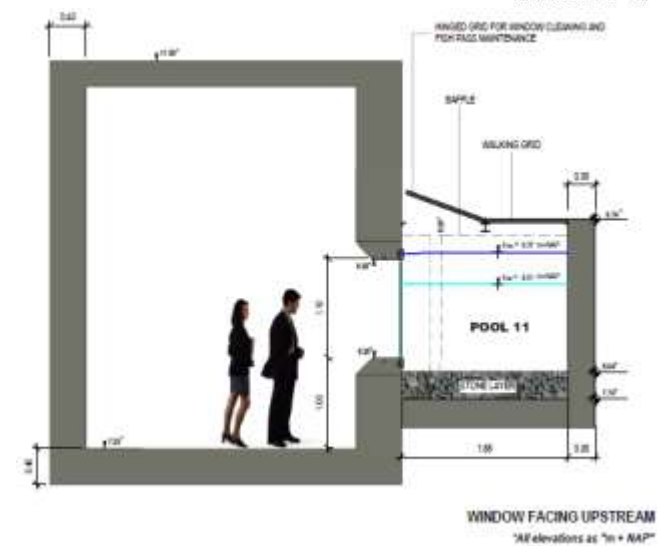
Uitvoeringsontwerp kijkramen



WINDOW POOL VIEW
"All elevations as "m + NAP"



Kijkramen vispassages Gambshheim & Koblenz
Foto's: Redeker



Bouw (21.4.2018 - WFMD)



Foto's: Redeker & WRJ





9.7.18



31.8.18



29.10.18



Foto's: Redeker



Foto: Dubbink



29.3.19

Foto: Dubbink



13.6.19

5.7.19

Foto's: Redeker





Contact:

Marq Redeker

☎ +49 173 7023510

✉ marq.redeker@cdmsmith.com

Vragen?