

# Using Computational Fluid Dynamics (CFD) to Understand & Improve Water Treatment



2013 PNWS-AWWA Conference  
May 9, 2013

CH2M HILL

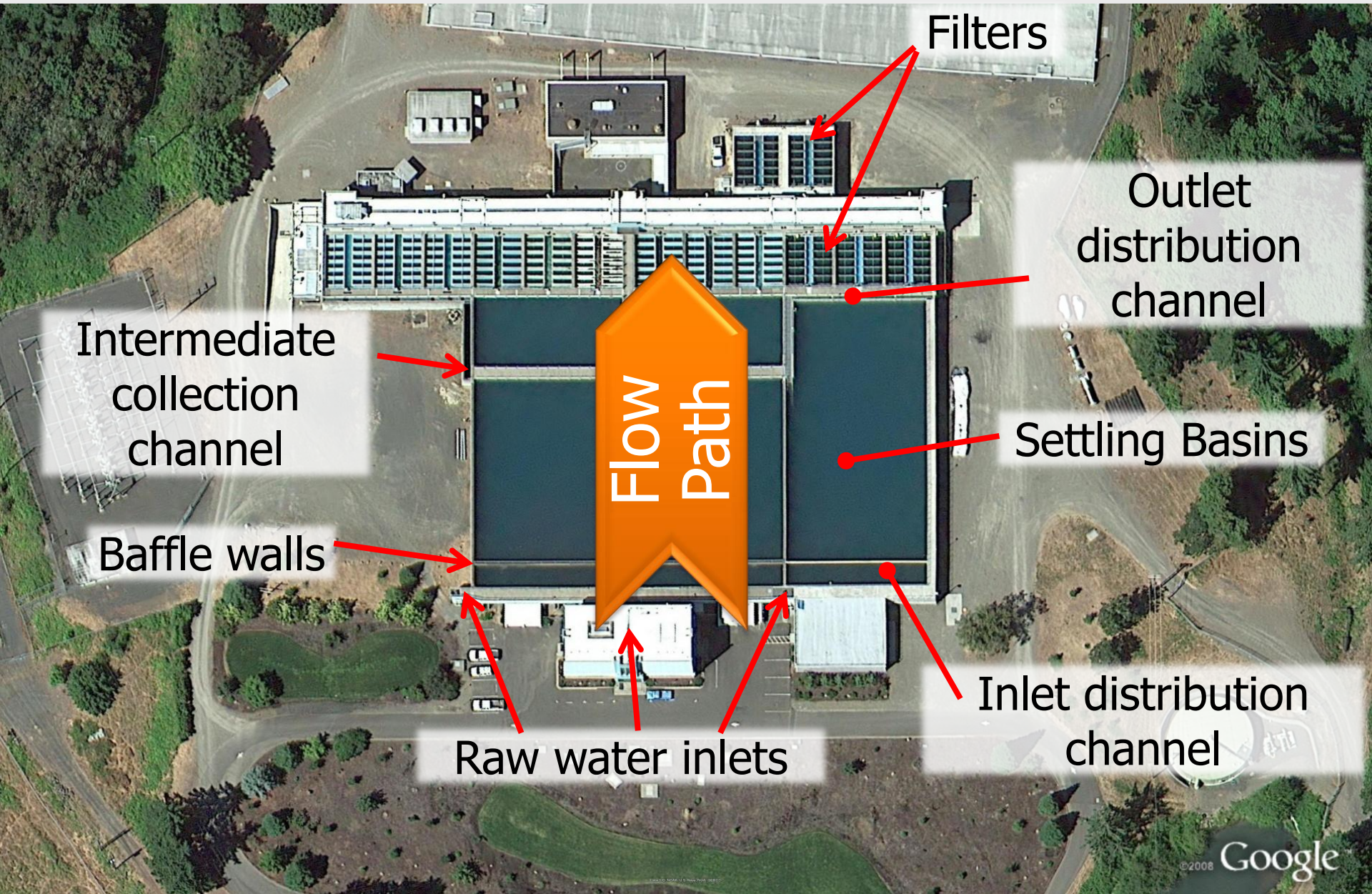
Paul Berg  
Adam Nielsen

EWEB

Wally McCullough  
Ray Leipold

EWEB Hayden  
Bridge Filtration  
Plant





Filters

Outlet distribution channel

Settling Basins

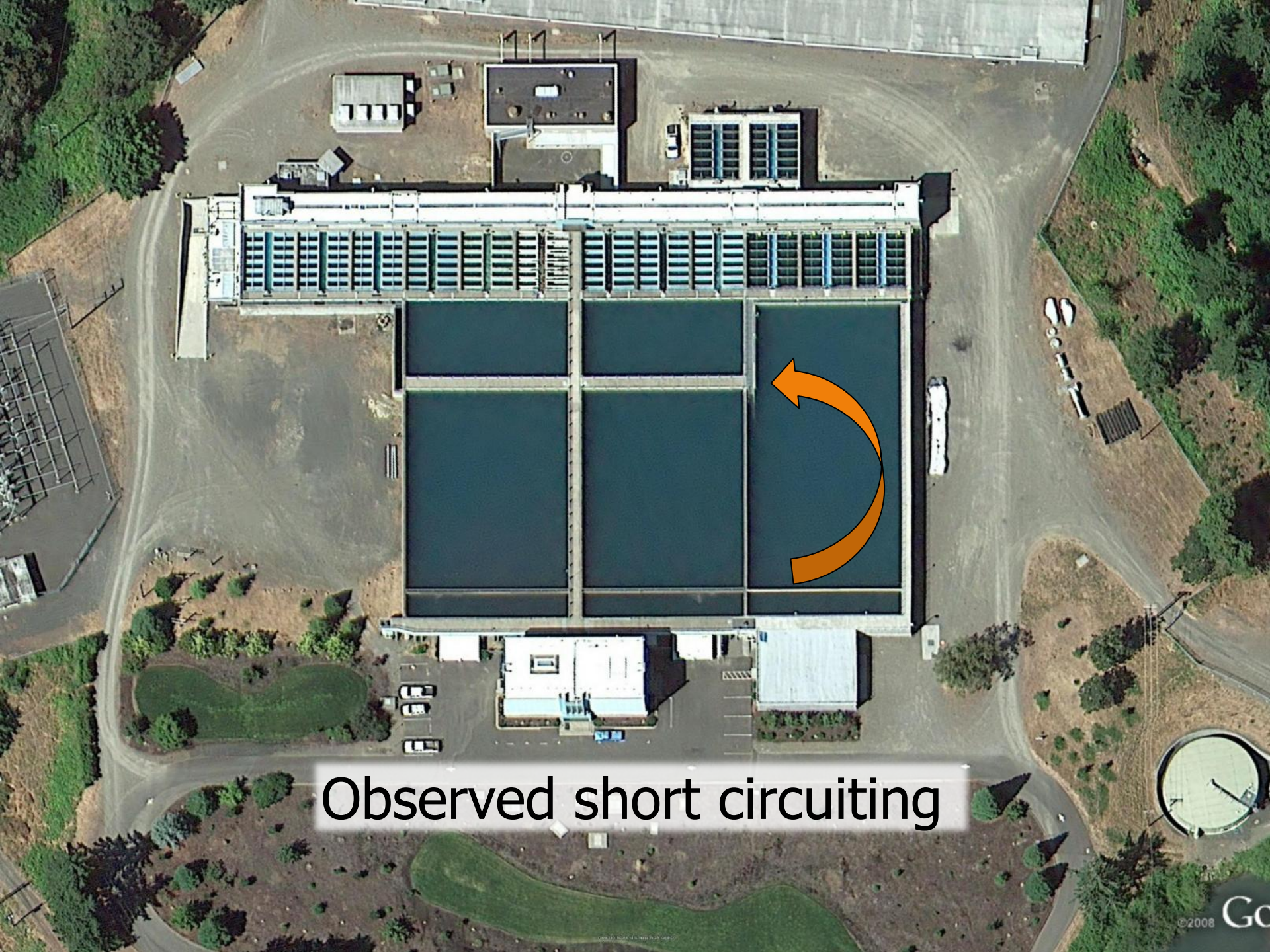
Inlet distribution channel

Raw water inlets

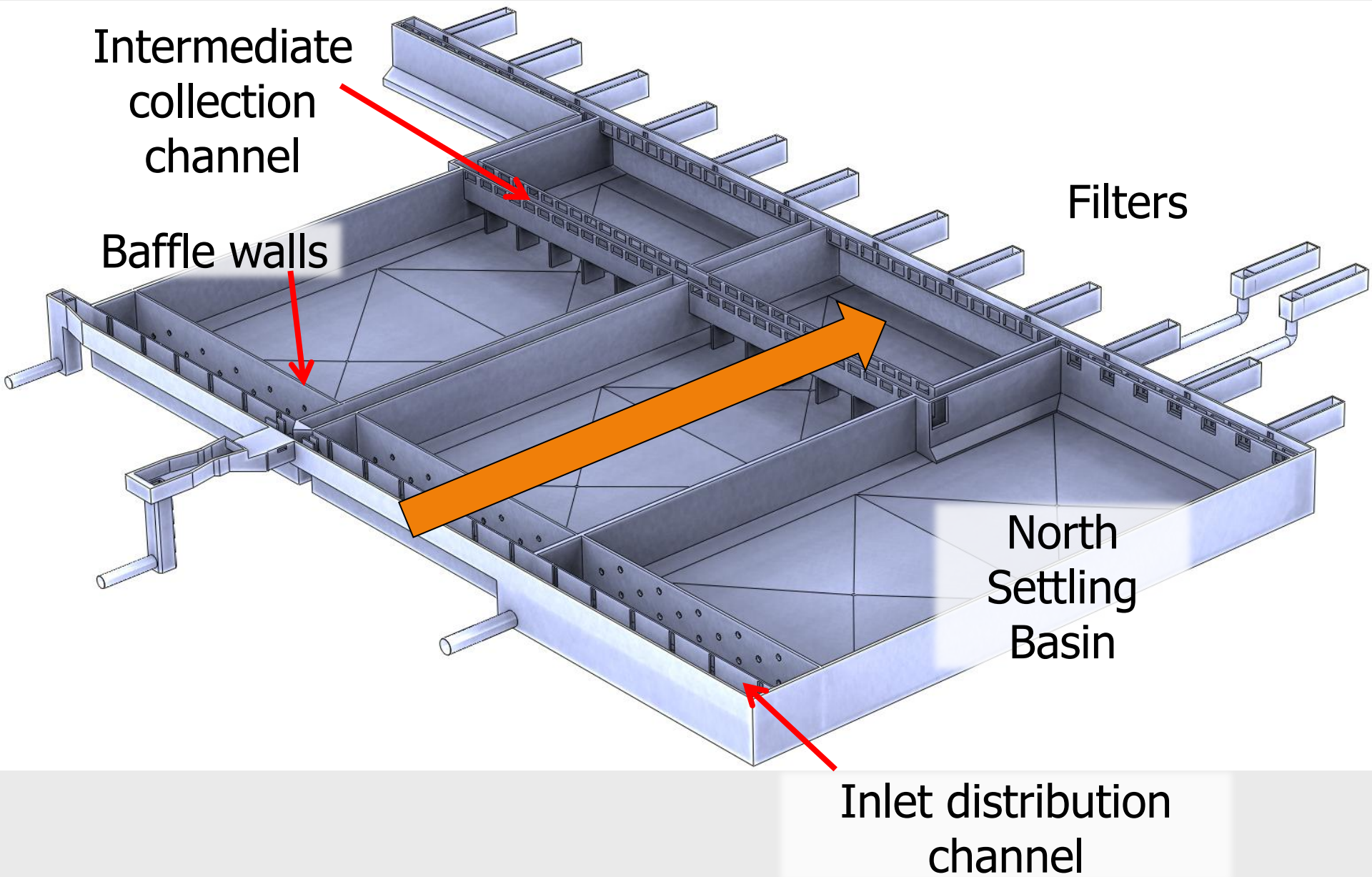
Intermediate collection channel

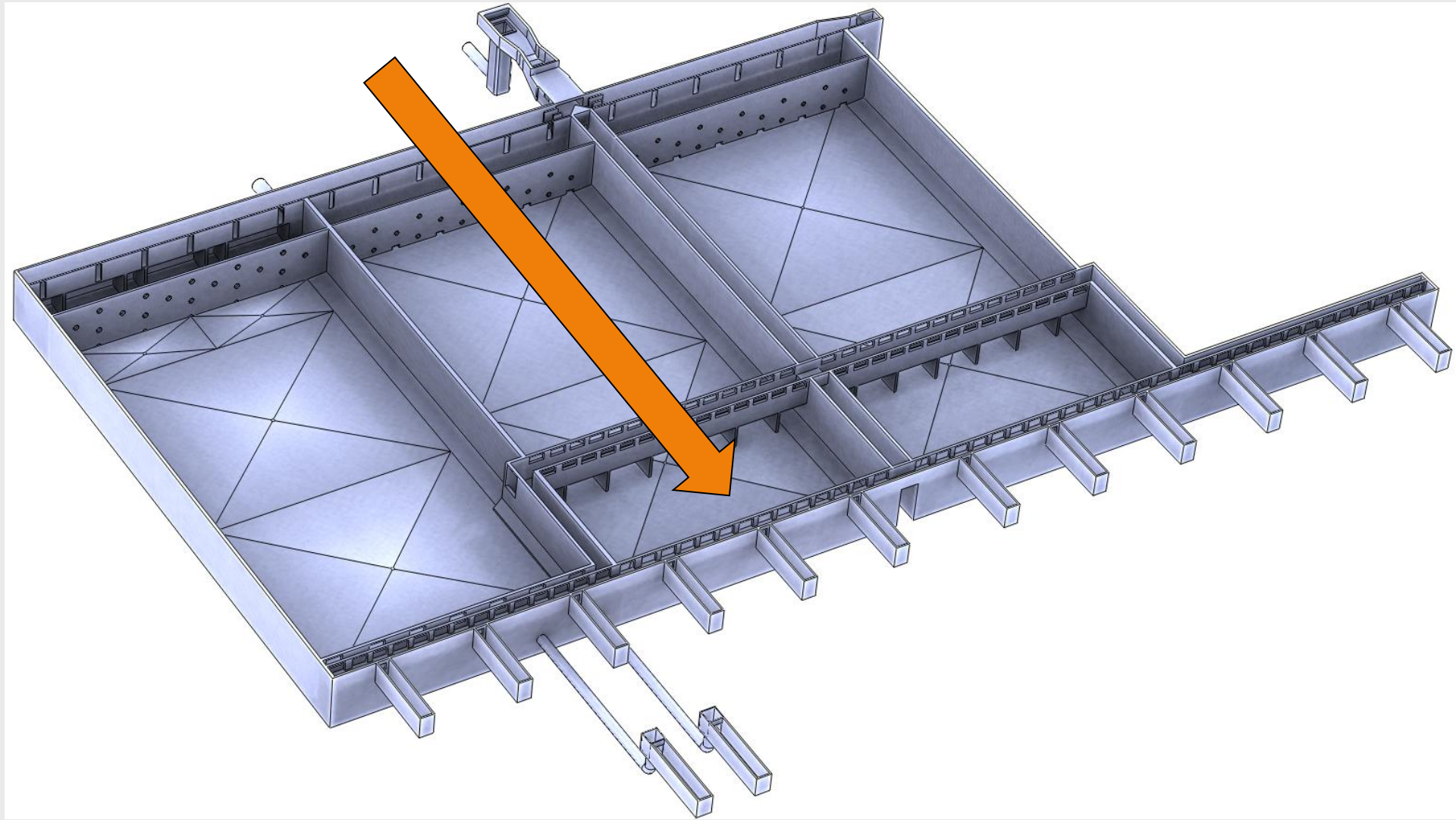
Baffle walls

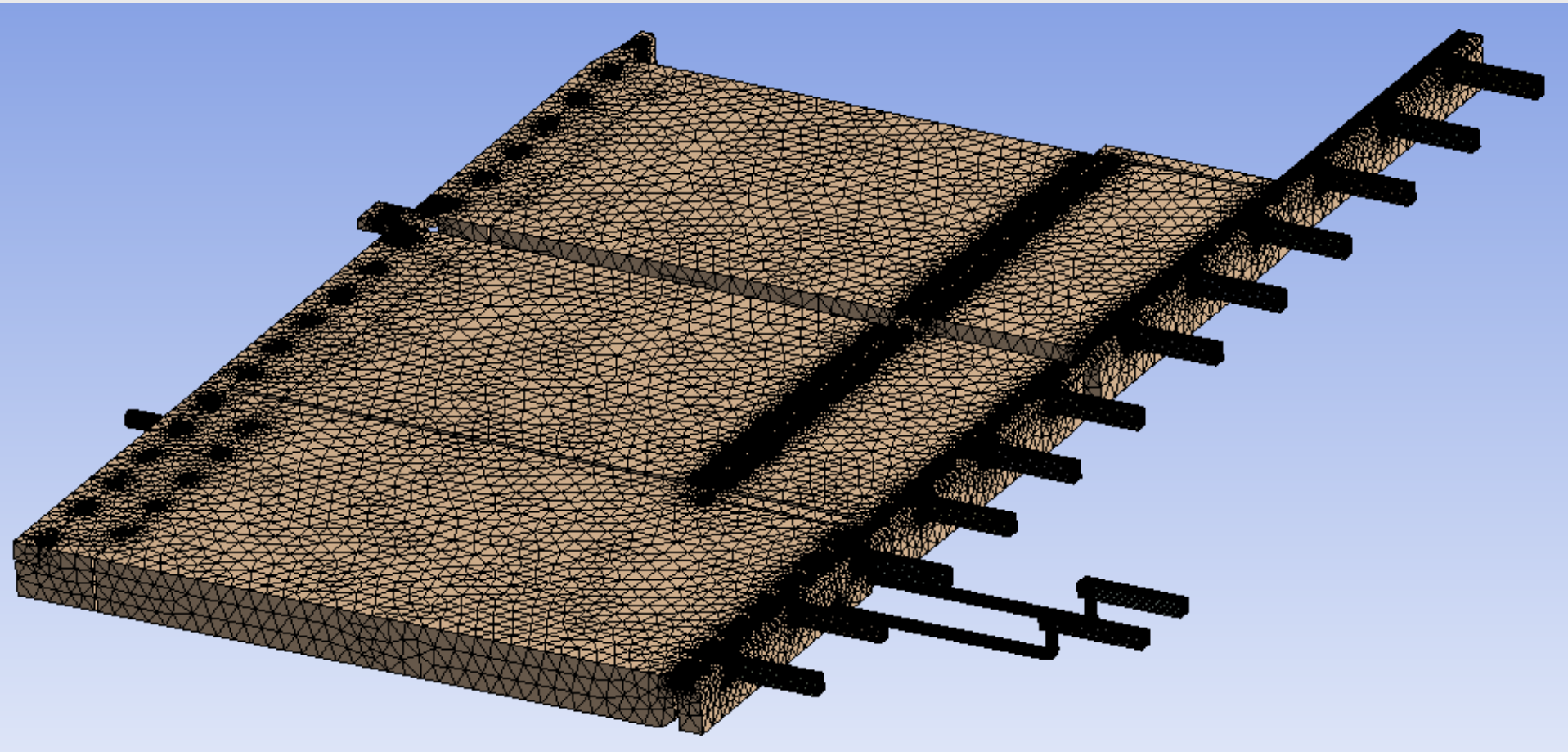
FLOW Path

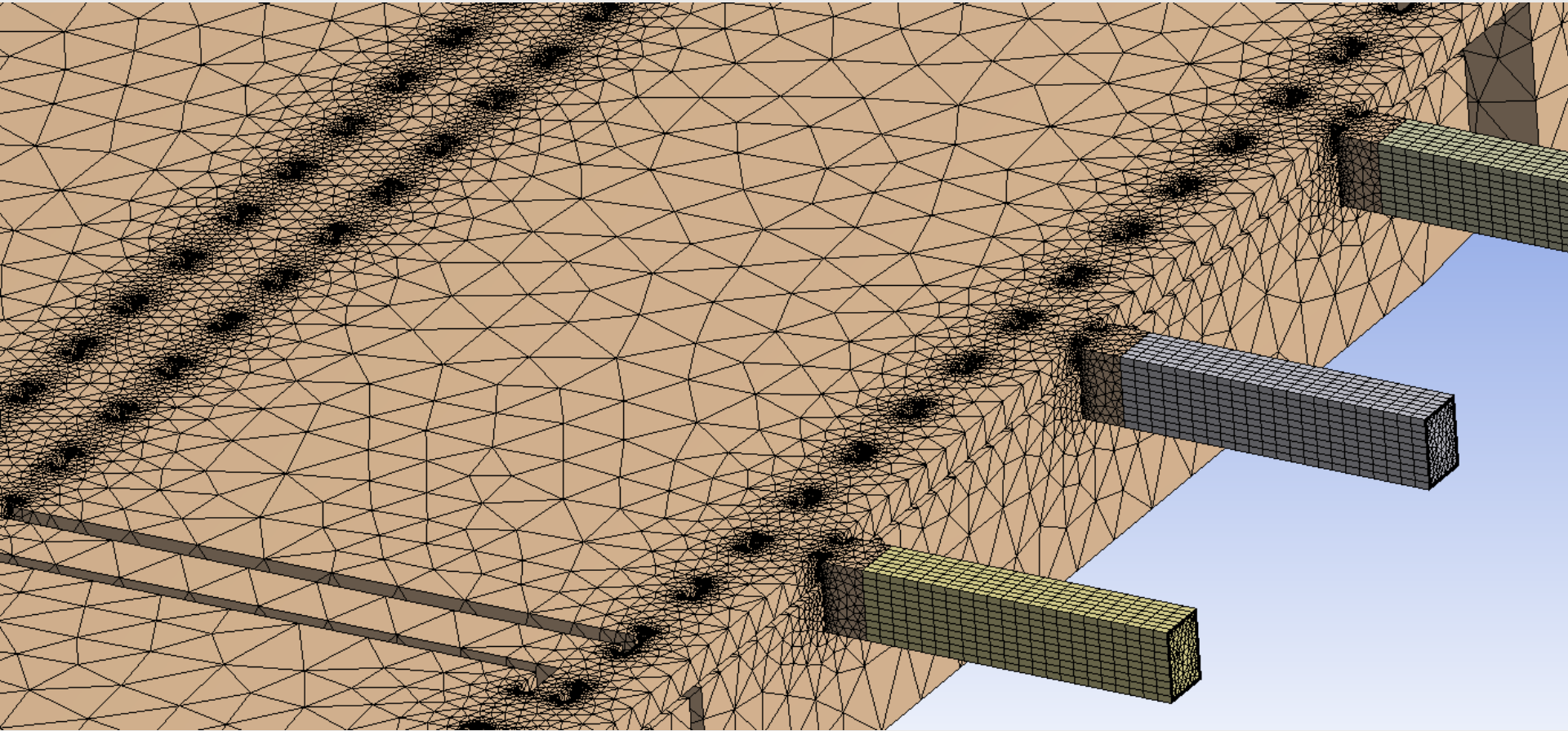


Observed short circuiting

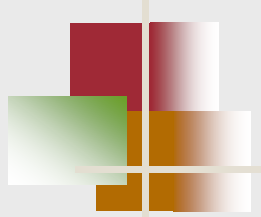




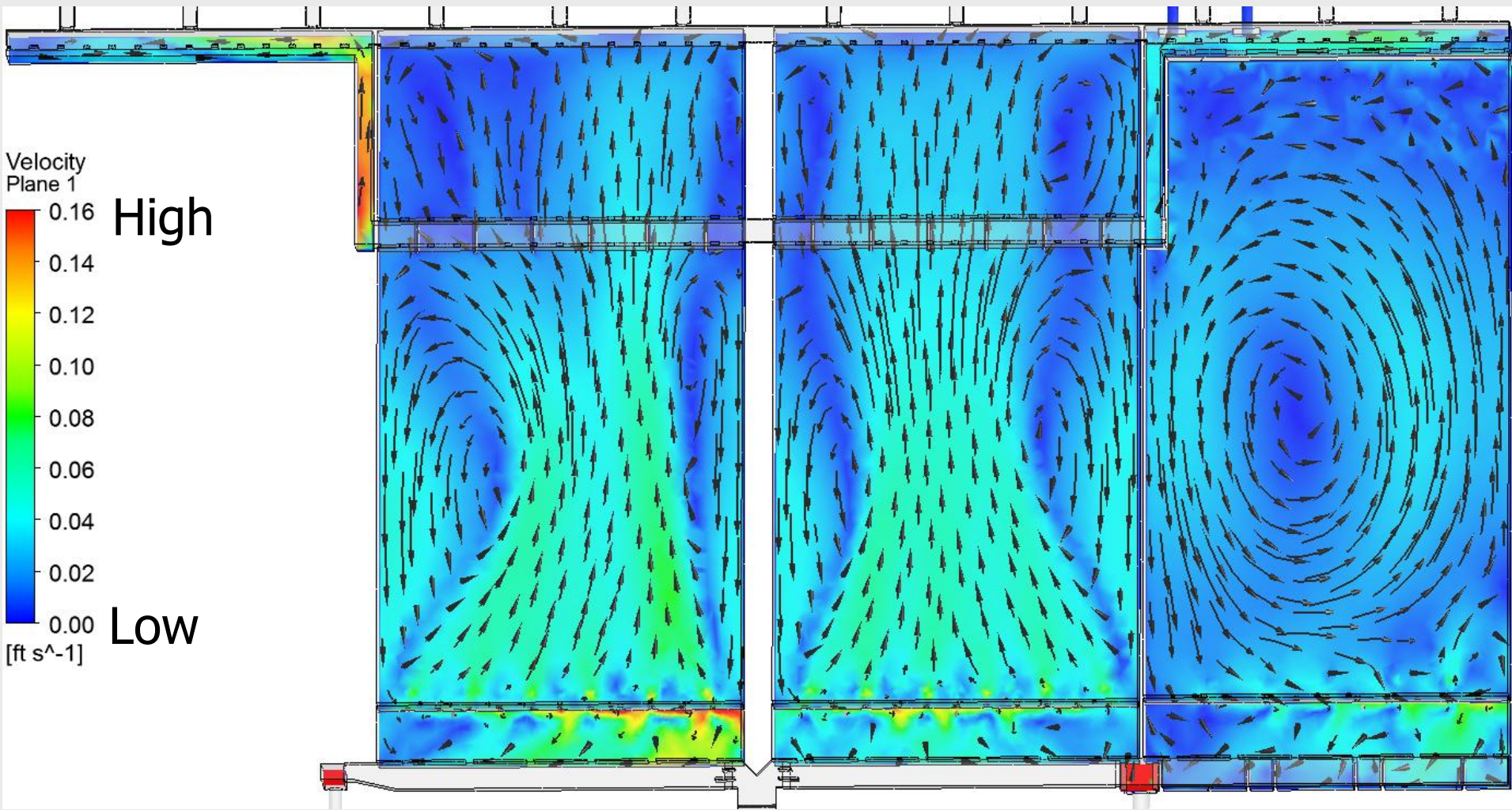


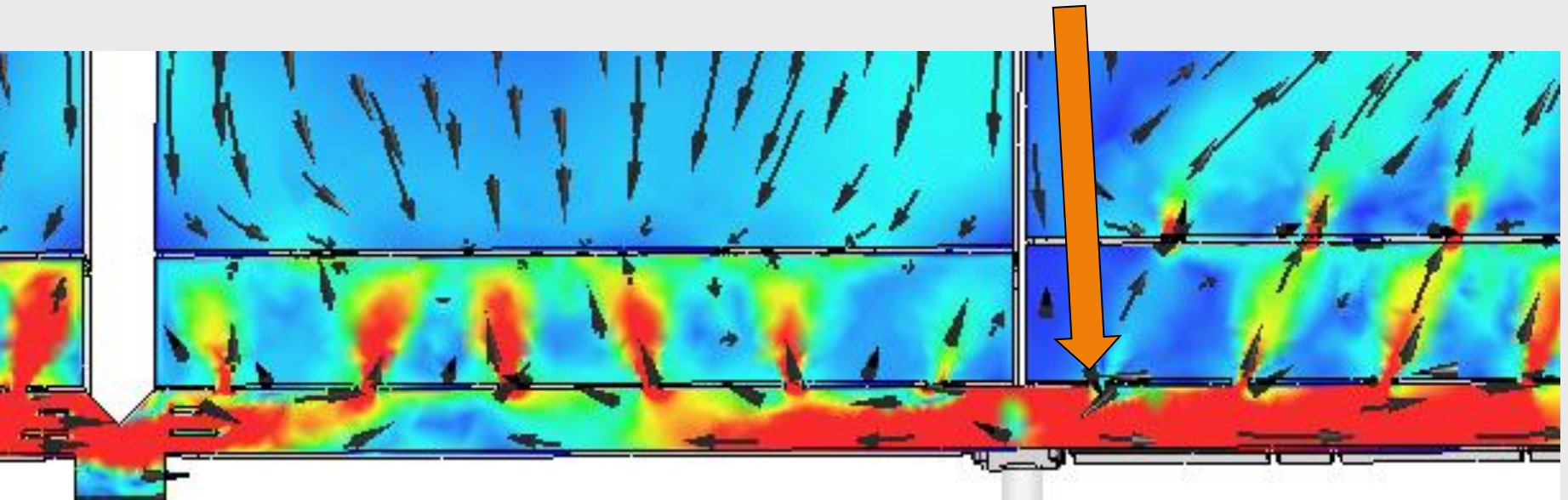






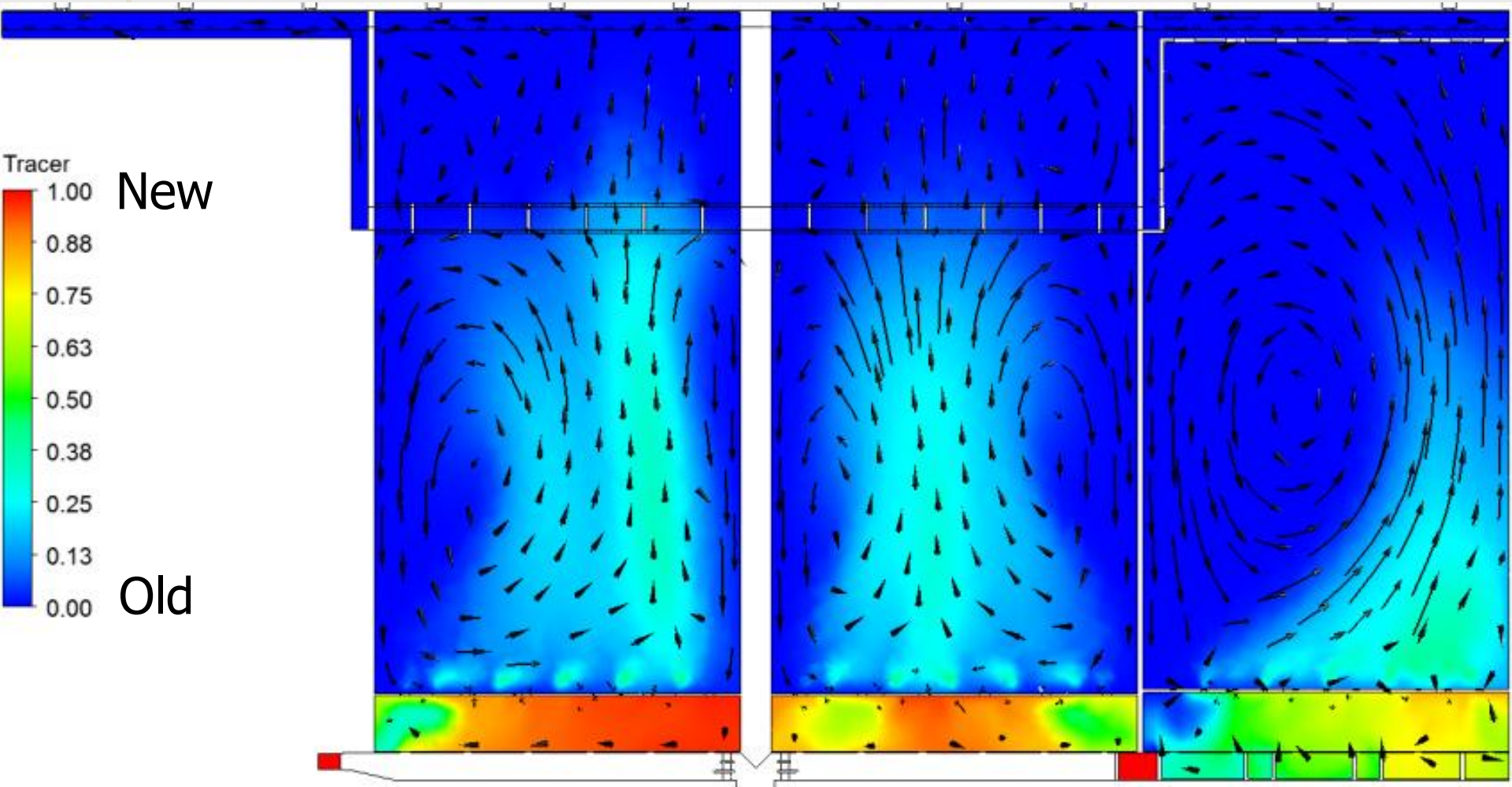
**STARTING POINT—  
MODEL EXISTING PLANT**



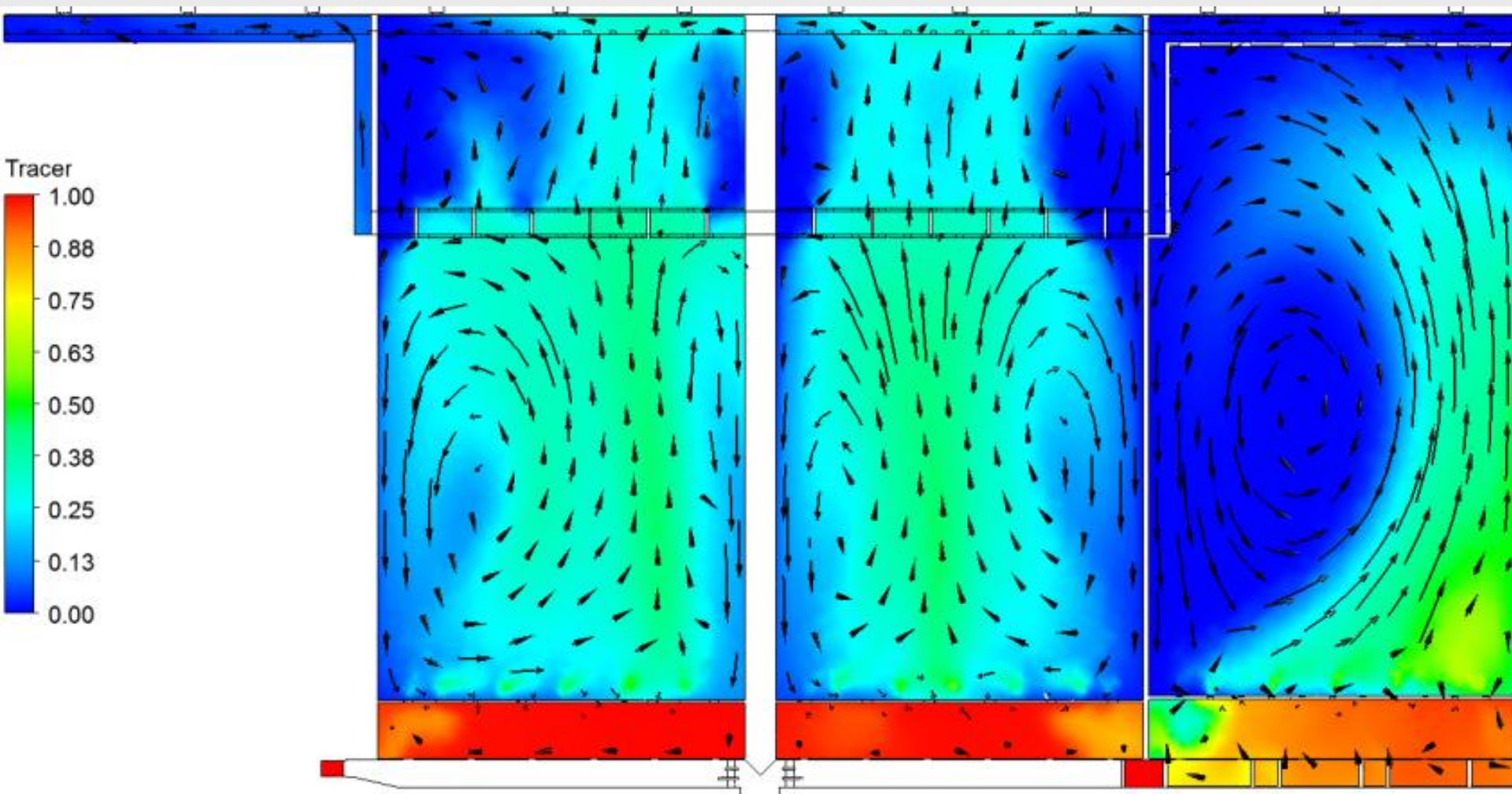


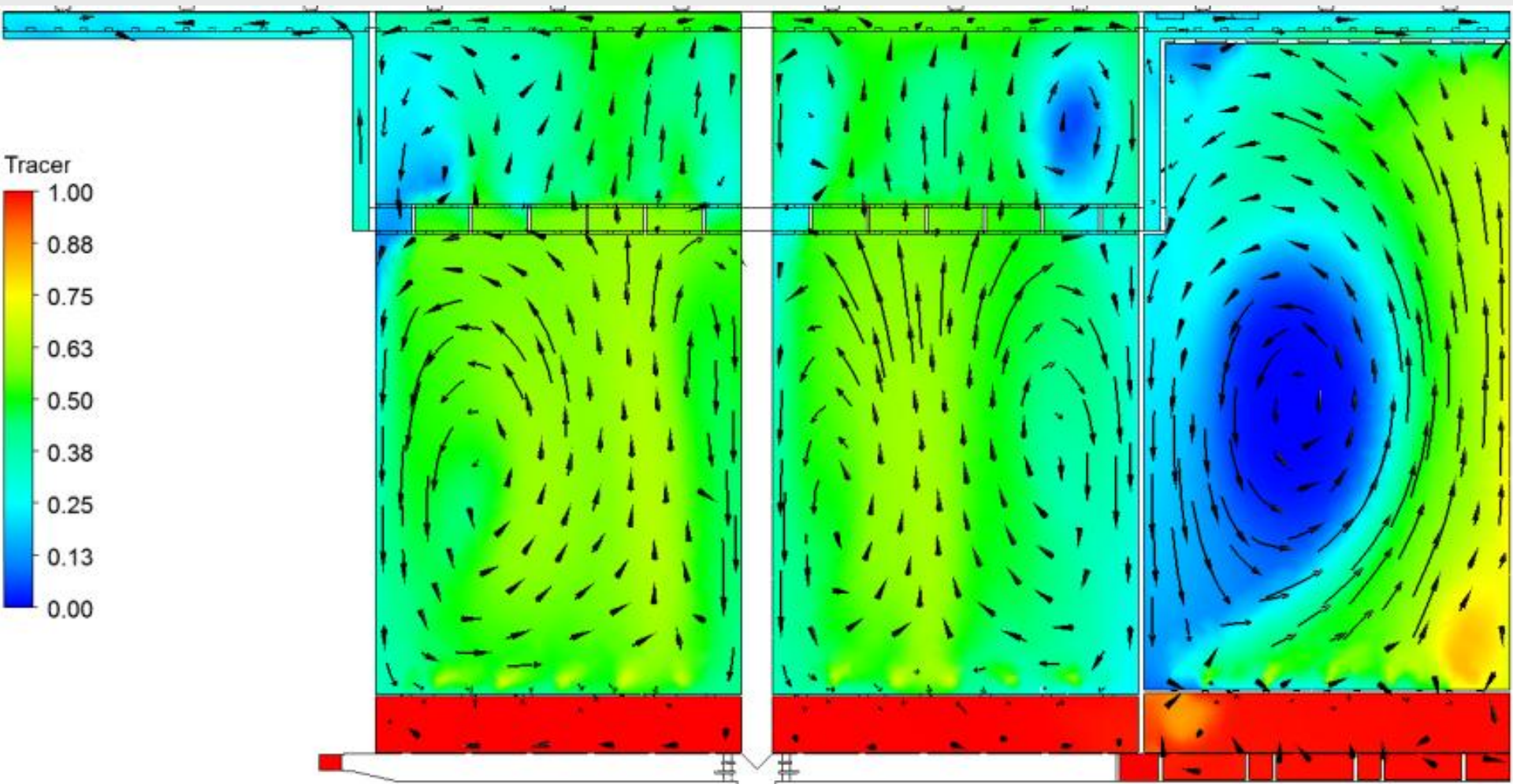
2 feet below the surface

# Tracer results

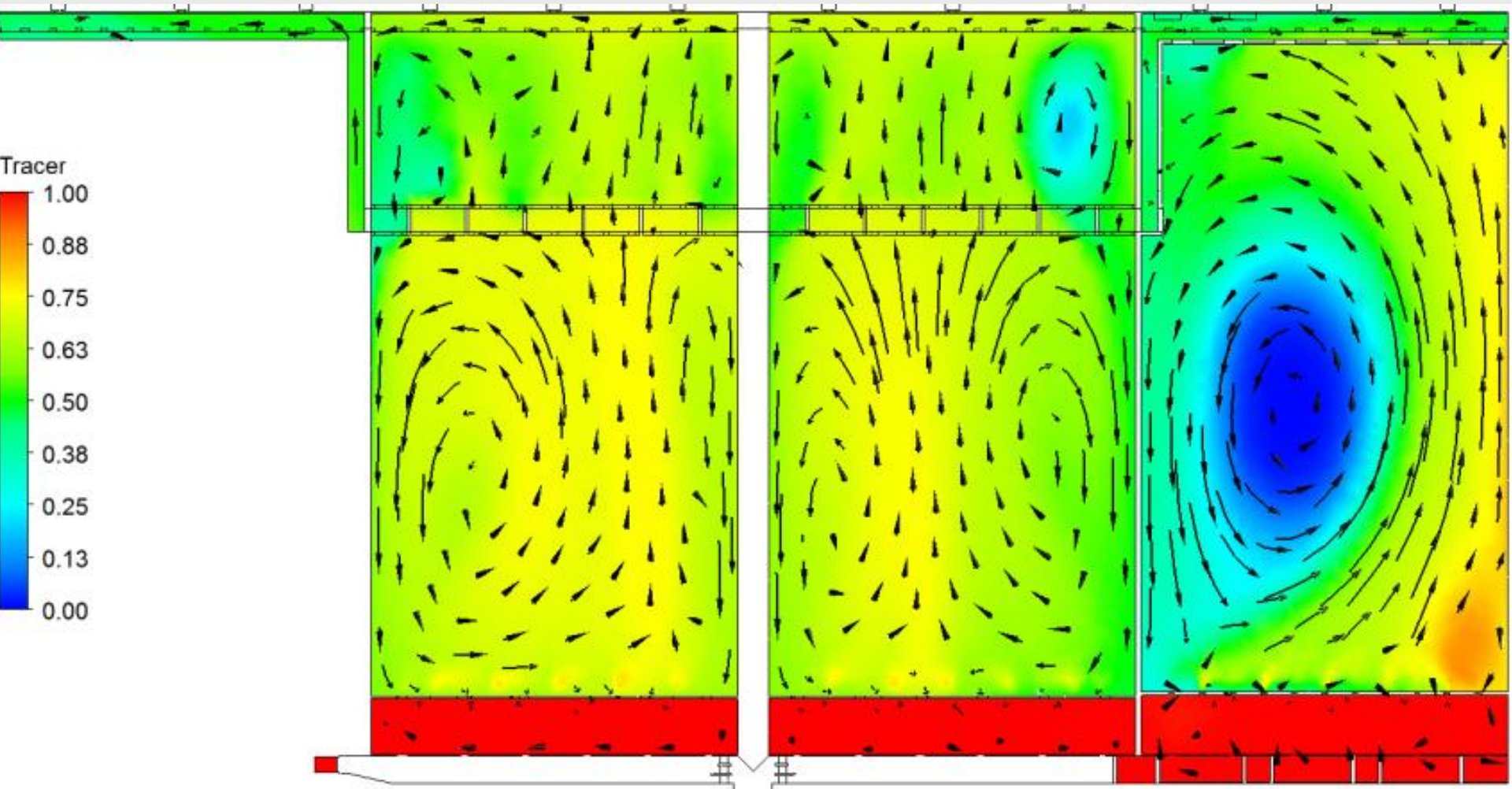


1 hour





4 hours



6 hours



# Findings

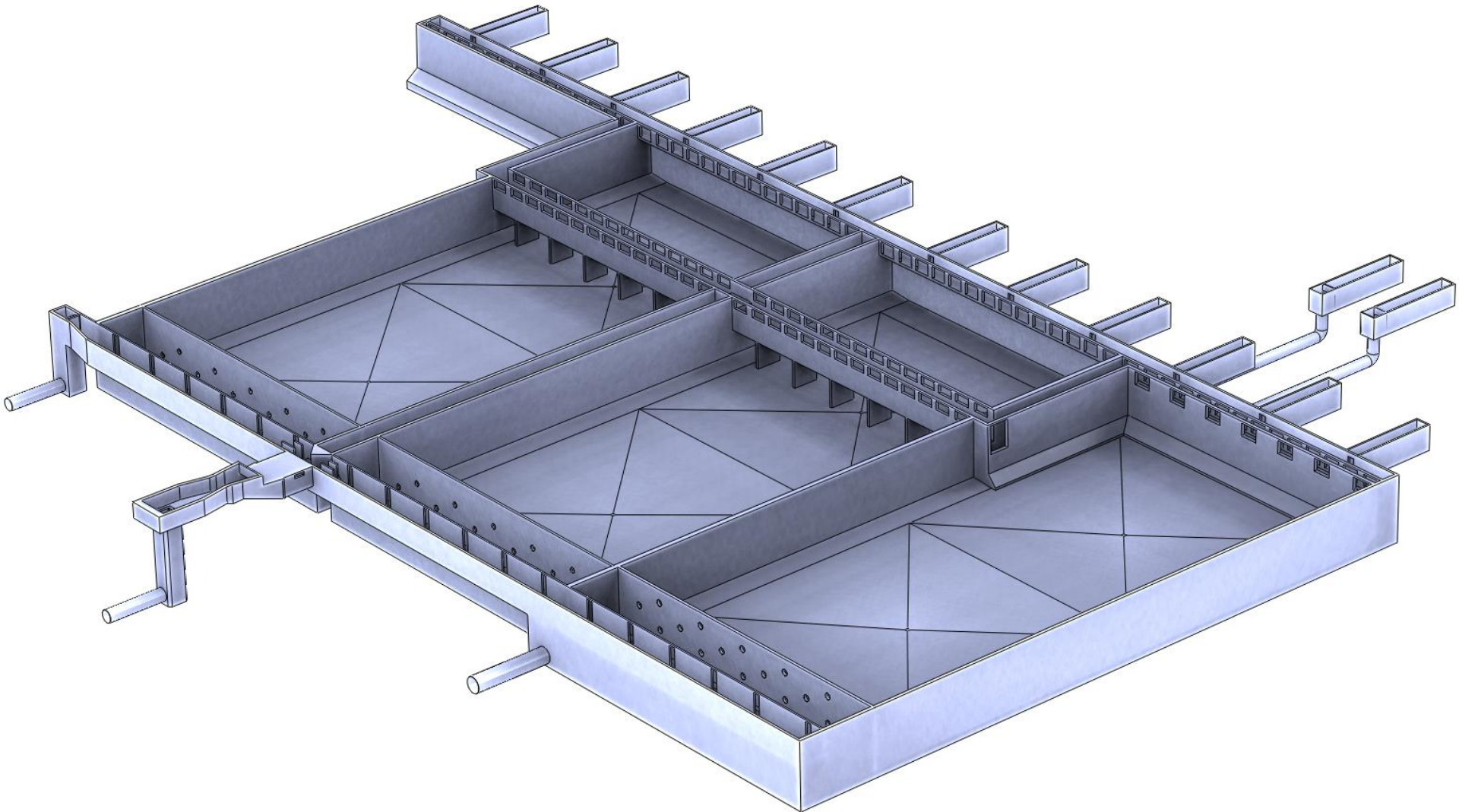
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1. Uneven distribution into the 3 basins
2. Short-circuiting within basins

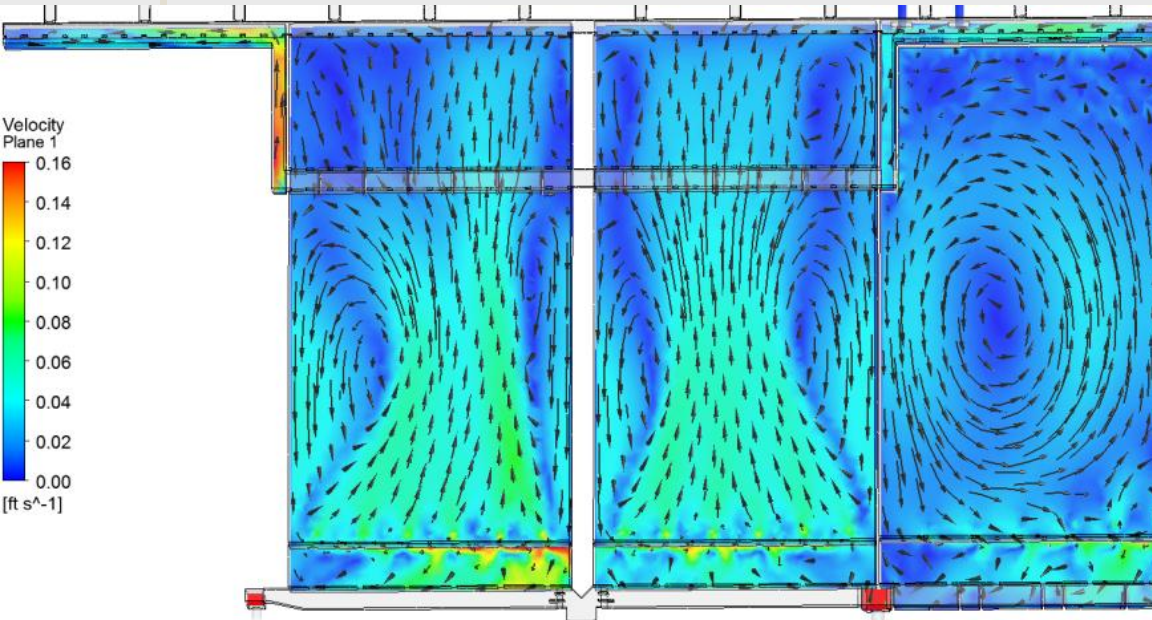


<b>No.</b>	<b>South</b>	<b>Center</b>	<b>North</b>
1	23%	33%	45%
2	59%	10%	31%
3	40%	20%	39%
4	55%	15%	30%
5	60%	19%	21%

# What's the answer?

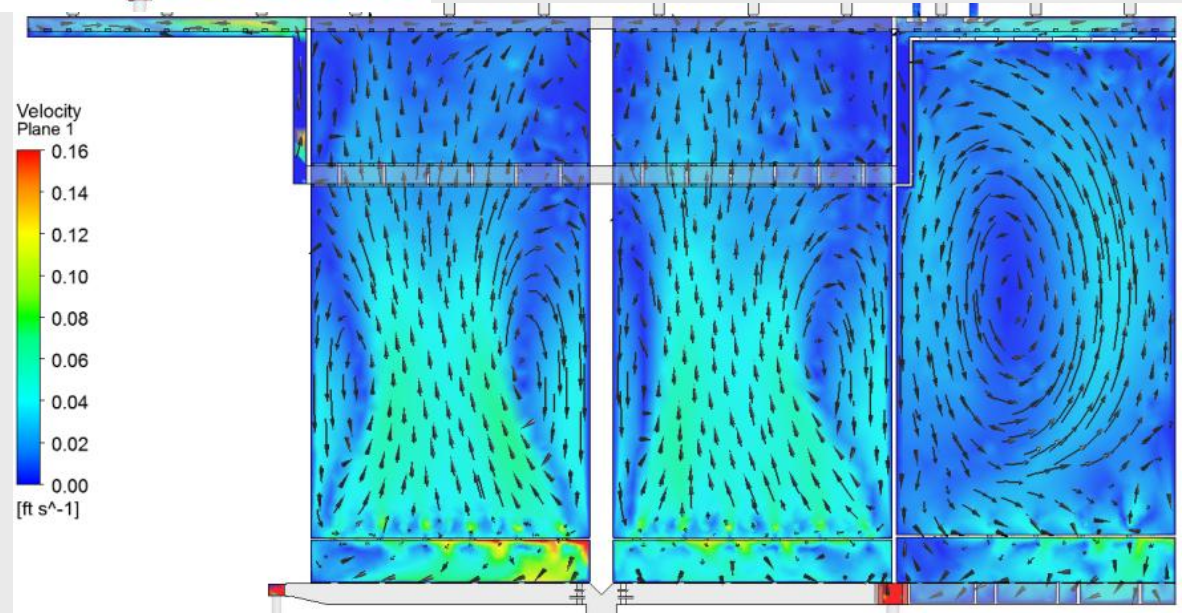


# #1 – Close N. Basin side outlet



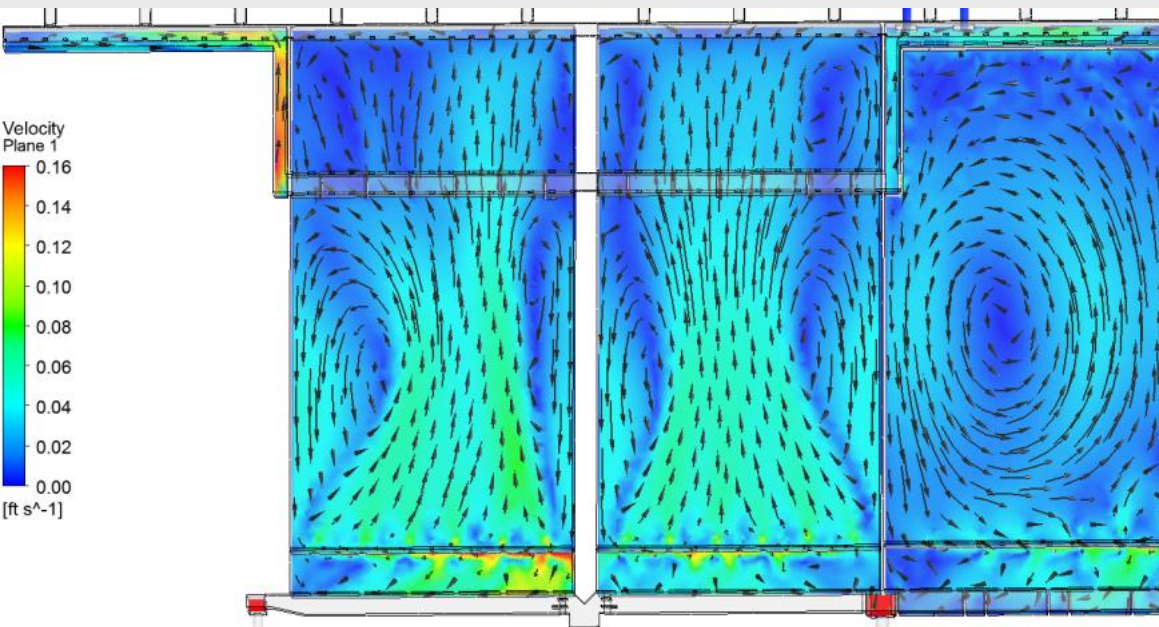
Option #1

Original



12 feet below  
the surface

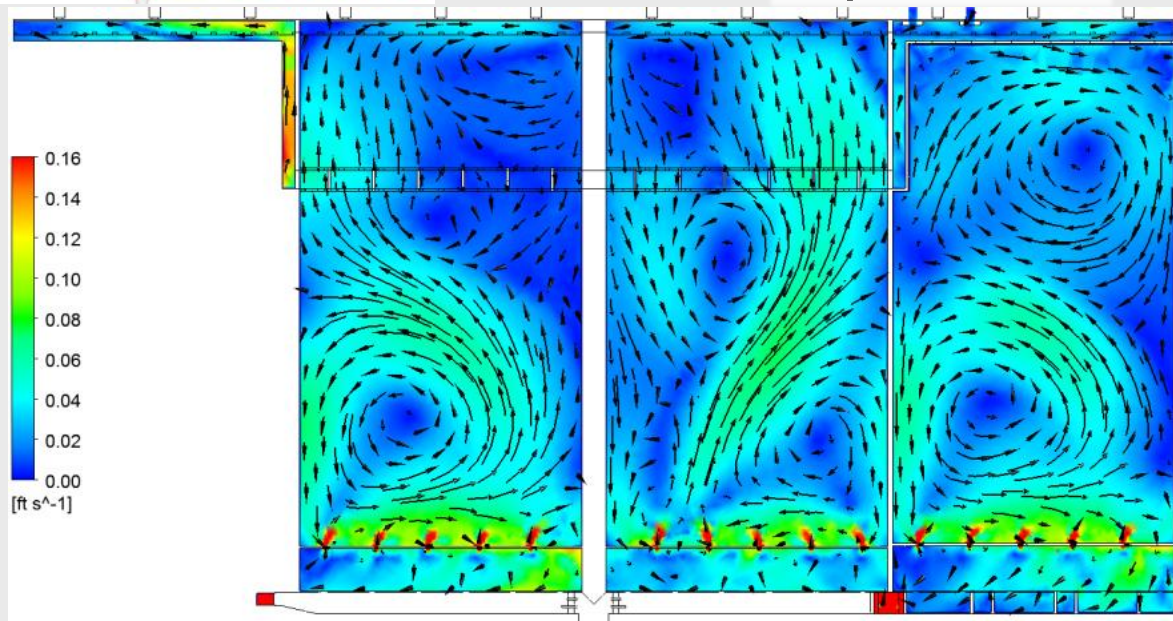
# #2 – Close baffle openings



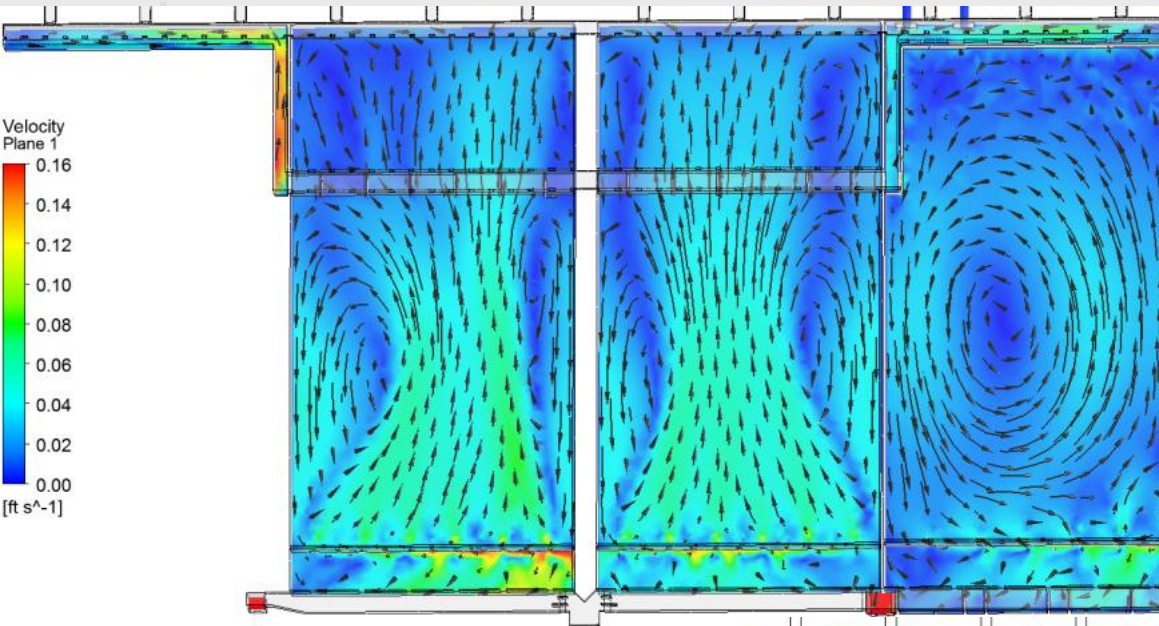
Original

12 feet below  
the surface

Option #2



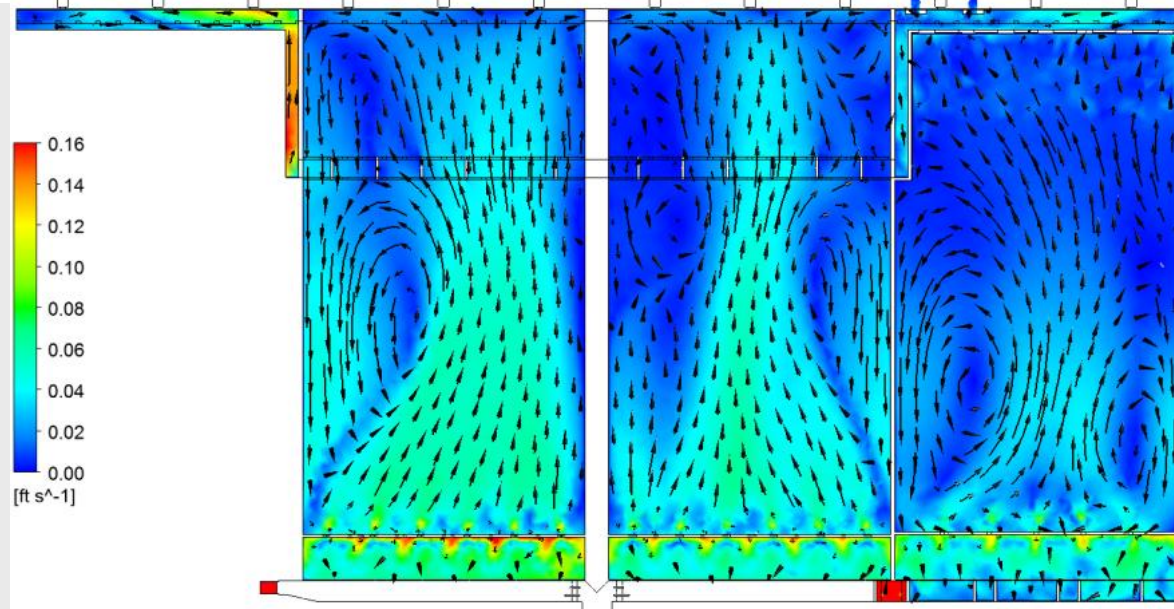
# #3 – Reduce channel inlet size



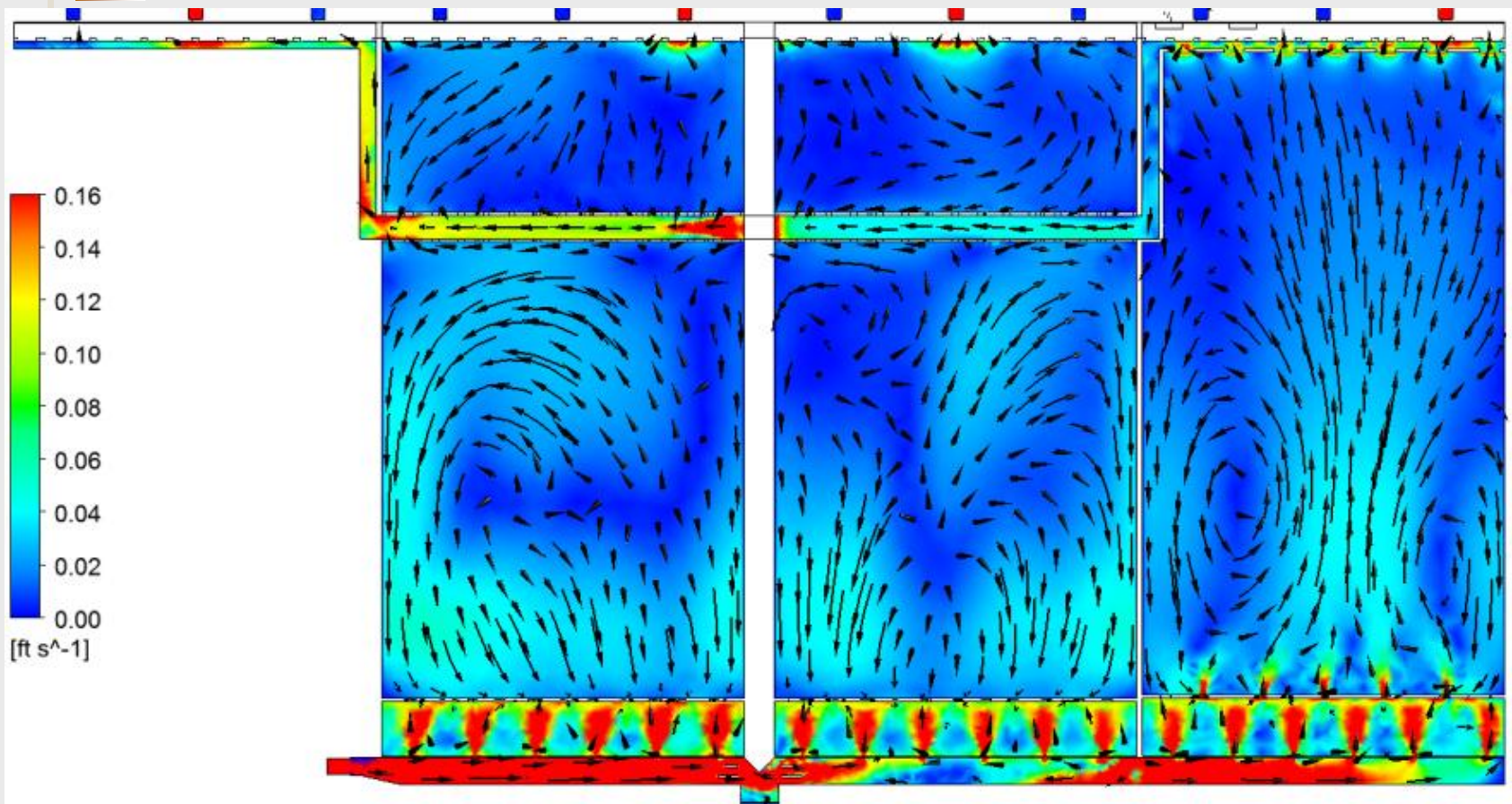
Original

12 feet below  
the surface

Option #3



# #3 – Reduce channel inlet size



2 feet below the surface



# Lessons

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- What you see on the surface doesn't tell the whole story
- Right angles are not part of water vocabulary
- You don't solve hydraulic problems by guessing

You can't  
cheat the  
headloss troll





# Questions?



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