



CTU in Prague - Faculty of Civil Engineering  
The Department of Landscape Water Conservation

# Testing of Bentonite Sealing Layer on Physical Model of an Earth Dam

Project: NAKI II, „Conservation, repair  
and monitoring of historical pond  
dams as part of our cultural heritage“

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# Introduction

- Long-term leakage – creation of preferential path, may result in a breach
- Historical fish ponds – have specific shape, the aim is to maintain the geometry
- Development of noninvasive method of sealing of fish ponds

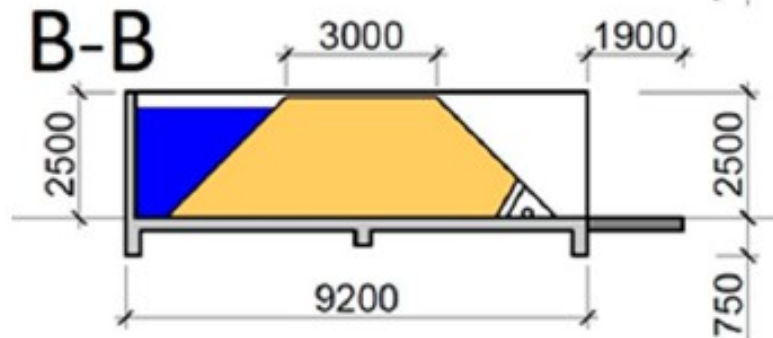
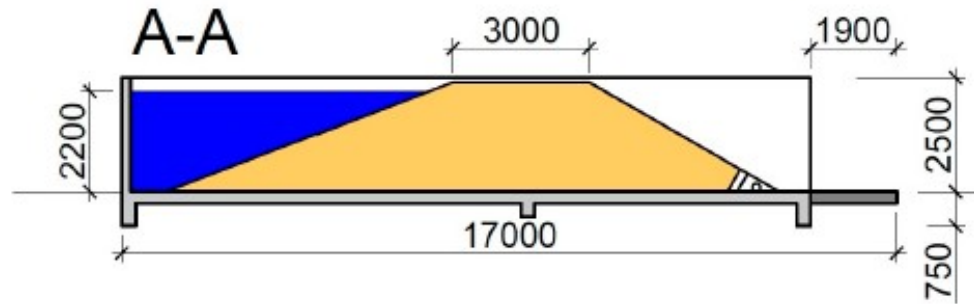
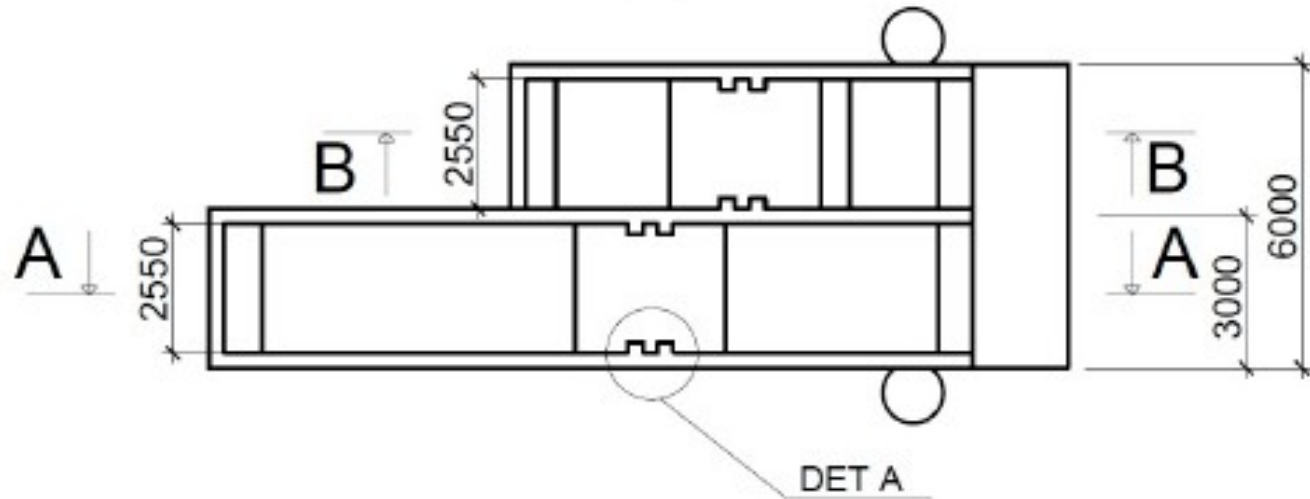


# The Physical Model

- Real-scale section models of two earth dams: one with shape of historical, one with shape of modern dams
- Placed in two sections constructed of reinforced lost formwork



# The geometry





# The Physical Model





# Measurement

- Rainfall, air humidity, temperature
- Earth pressure cell
- Water level in the reservoir
- Leakage
- First was measured seepage without any sealing. Then the bentonite layer was applied and the monitoring of seepage with sealing was taken place



# Upstream slope







## Measurement of seepage





# Bentonite

- Very good geotechnical characteristics for sealing: extremely low hydraulic conductivity, extremely high swelling pressure
- Hydraulic conductivity  $10^{-11}$  -  $10^{-13}$  m.s<sup>-1</sup>
- Swelling pressure 3 Mpa
- The exact value depends on volume of montmorillonite

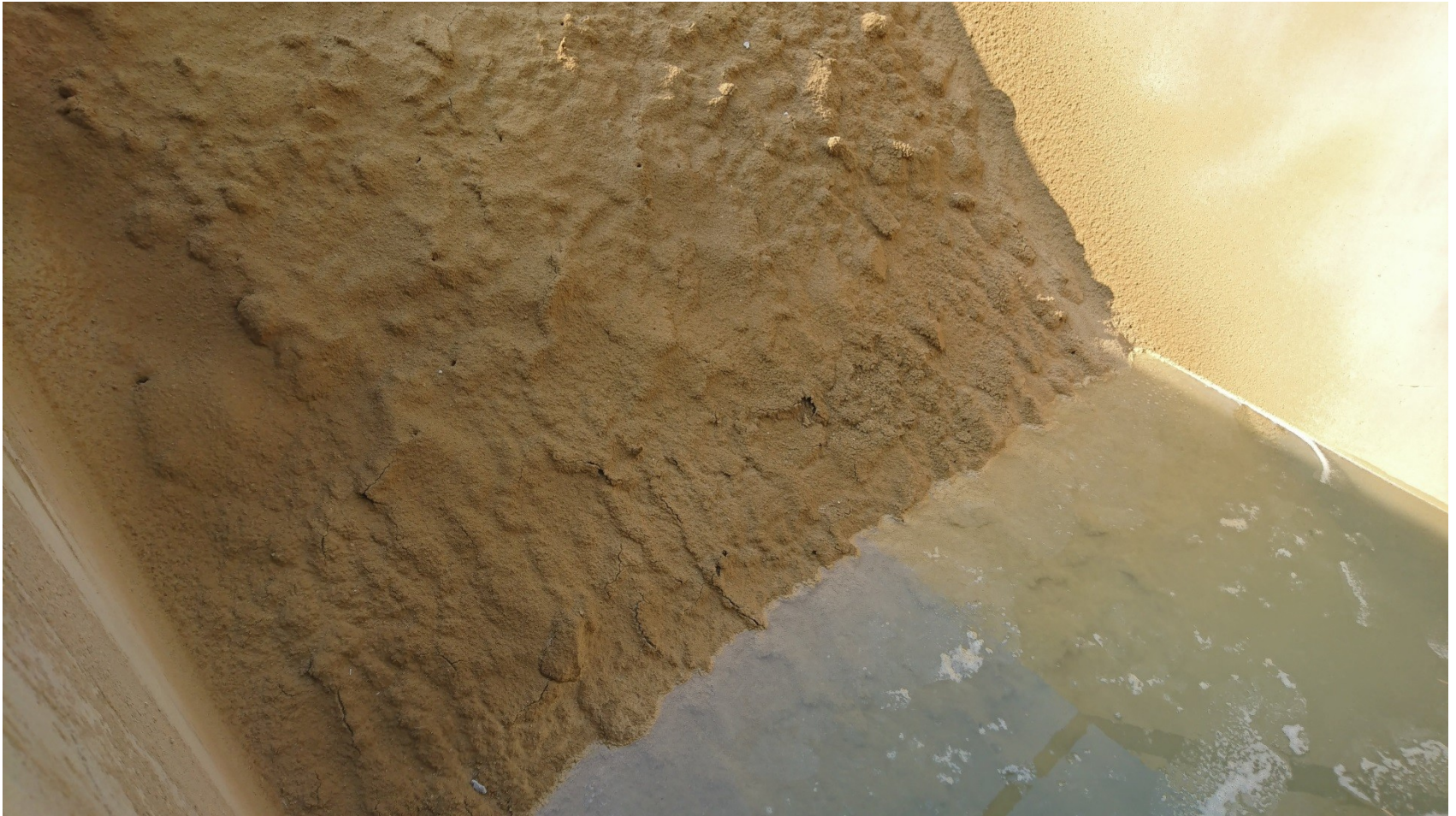


# Sprayed bentonite



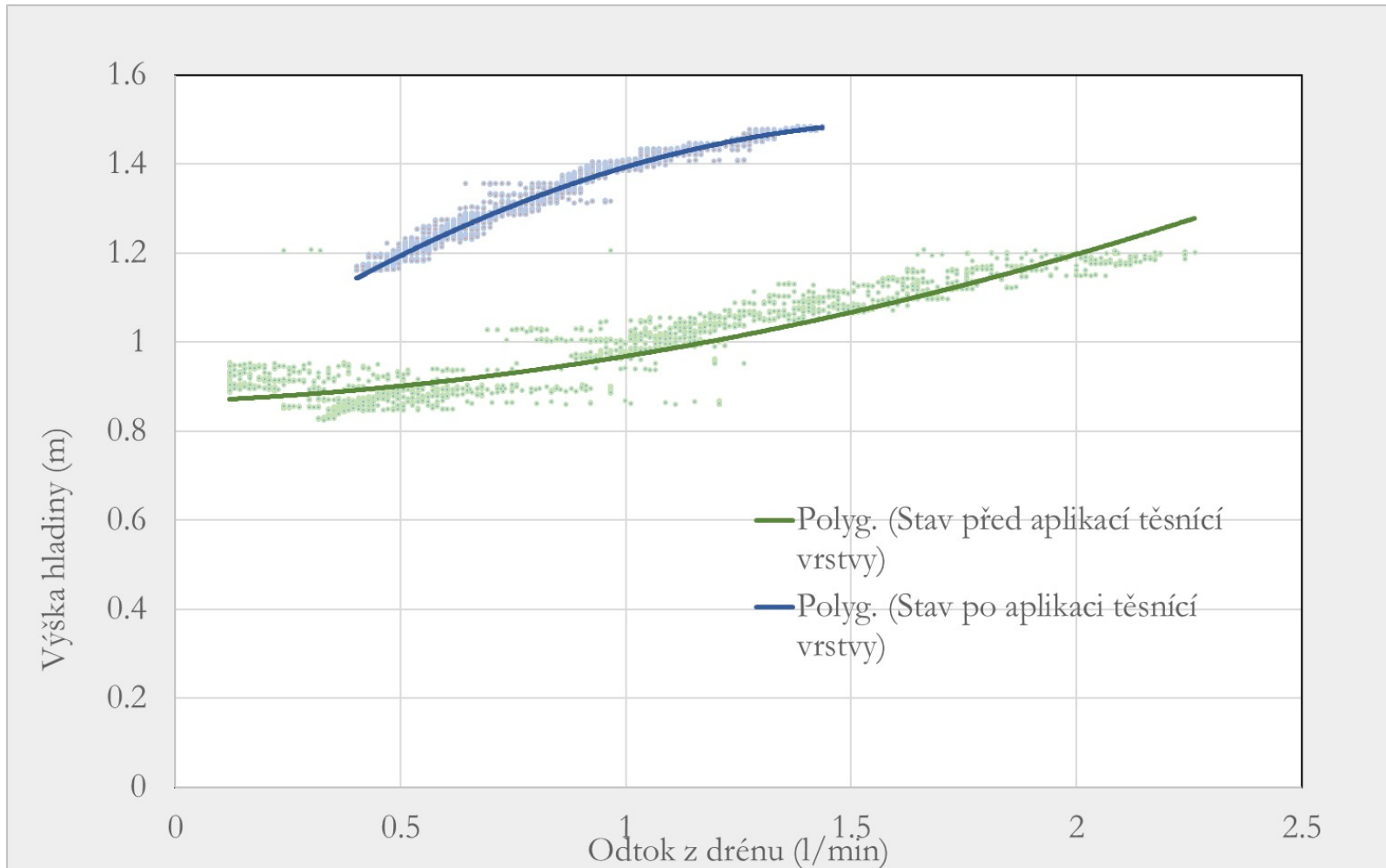


# Sprayed bentonite





# Results



The measurement before the application of bentonite and after the application



# Conclusions

- It works

Thank you