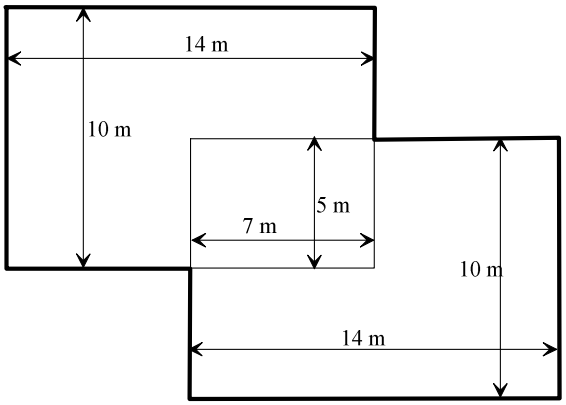
Course: GW Flow and Contaminant Transport Modeling

Assignment #3: Determination of the effect of an underground parking lot to groundwater flow regime

An area is given where the underlying clay's surface (bottom of the aquifer) is at a depth of 10 m from the surface. The lower 2.5 m thick part of the aquifer is composed of gravelly sand, the overlying part is slightly silty sand up to the surface. Groundwater flows in any chosen direction (optional), but with a horizontal hydraulic gradient i > 0.01 m/m. The water table is approx. at 2 m below ground level. An underground car parking lot with an impermeable concrete wall fixed into the clayey formations is planned to be constructed at the site with the shape shown in the figure below.



Task #1:

Task #1 building the steady-state GW flow model of the site

- before starting the construction (original state)
- after completion of the parking lot considering fully impermeable walls
- for the period after the underground car park has been built, with 0.5 m wide gravel drainage around the car park in all directions.

– Make
  - a map of the potential distributions in the original state, with and without drainage system after the construction of the underground car park
  - map of groundwater level changes due to the underground car park with and without drainage system
– Draw the flow lines from the model boundary around the underground car park and the map of seepage velocity distribution.

Task #2 – Build a transient model of a 4 years period of the site assuming 4 months of wet season with 250 mm/year recharge and 8 months long dry period with 35 mm/year recharge each year.

– Determine
  - the flux of the drainage system during the 4 years period
  - the potential changes in some observation wells

Data not given in the task description are optional, but must be consistent with the task description!

To be submitted in PDF format:

A short expert opinion about the problem with a brief description of the model, including the requested result tables and model parameters and avaluation of the results.

To be submitted as a compressed file: the PDF document and the complete data set.