CIE4491

Sobek workshop – feedback results

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Design assignment, some common issues

- Rational method calculation: how to estimate concentration time
- Runoff coefficient: rational method uses 1 estimated runoff coefficient per subcatchment, Sobek uses various surface types within subcatchment area.
- Requirement of 36 mm water storage for T=10 years versus requirement of design rainfall and design storms for T= 1, 2 etc. years
- Role of pumping station versus overflows in combined system and implications for flow and pipe dimensions
- Piezometric gradient calculation
- Overflow calculation for combined systems; NB: no overflow weirs in stormwater systems

Design assignment, guidelines and recommendations

- In final report:
  - always motivate your design choices
  - provide interpretation of calculation results

    Not just: "this is what I see", but also: "why do I see these results, how to explain outcomes and variations, how does that relate to theory and characteristics of design system and urban area"
- Nr of manholes and pipe sections: aim for approx. 20 manholes to keep repetitive work within reasonable limits

- Design requirements Appendix A of manual: these are provided (and used in practice) by City of Delft. If you deviate from requirements (e.g. apply smaller gradients for stormwater system) this is possible, but should be motivated in the report

Design assignment, guidelines and recommendations

- Runoff coefficients: for rational method – based on average coefficient per runoff area: decide upon reasonable average value based on urban characteristics;

- Runoff coefficients: for Sobek calculation – based on runoff parameter values per runoff area type: decide upon reasonable values (easiest way is to use default values, it should be motivated why this is best estimate for your design area)
  N.B. be explicit about how you treat unconnected areas and unpaved areas

Design assignment, guidelines and recommendations

- Stationary rainfall event for Sobek input, representative of rational method calculations: it is up to you to choose a representative rainfall intensity (e.g. divide total flow by total effective runoff area or take weighted average of intensities for areas at different concentration times).

The aim of this calculation is to investigate how one type of static calculation (rational method) is different from another (stationary Sobek)

Design assignment, guidelines and recommendations

- Sobek calculation scenarios:
  - rational method vs stationary Sobek
  - stationary vs 3 design storms
  - changes in system conditions)

Each of these scenario sets should be discussed explicitly in the final report: how sensitive are the model outcomes (water levels, flows, nr of flood locations) to each of the scenario changes and explain why, based on knowledge of model components (hydrological and hydraulic model) and De St Venant equations.

Design assignment, guidelines and recommendations

- **Grading criteria for assignment:**
- Motivation of design criteria, design choices and assumptions (e.g. for runoff parameters)
- Quality of flow quantification calculations, especially rational method calculations for stormwater flow, using IDF-curves and concentration time
- Quality of hydraulic gradient calculations. NB: normally, no weirs are applied in stormwater systems, weirs should only appear in combined system calculations
- Quality of Sobek model calculations

Design assignment, guidelines and recommendations

Grading criteria for assignment:

- Quality of discussion of differences between scenarios: difference rational method vs stationary Sobek, difference between rainfall scenarios (stationary and 3 design storms), difference due to changes in system conditions.
- Reporting quality: English writing, quality of figures and drawings, explanation of figures, tables and drawings, clear link between calculation tables and maps (where are nodes located), use of proper units

Combining data sources for optimising urban water management ~ the case of Rotterdam City ~

static

Digital Elevation Map

Urban fabric

static

Information Requests

remote sensing

Weather radar Xband+Cband

Water Damage Reports/calls

Expected rainfall: operate pumps, reservoirs

in-situ point measurements (fixed, continous)

Rain Gauges on Roofs

Social Media

Expected flood locations and flood levels

Detect system degradation/need for maintenance

in-situ point measurements meteo (mobile, continuous)

Temperature, humidity on trams

Low cost sensing water-on-streets

Disdrometers on pumping stations

Disdrometers (on umbrellas?)

Fixed,continuous

Fixed,discontinuous

Mobile,continuous

Mobile,discontinuous

Next week, 15 oktober 2013: Final presentations

Preparation:

- Each student:
  Pitch your design: special features, innovative solutions, unconventional choices
- Material: Factsheet, Photo, Illustrative map, Logo

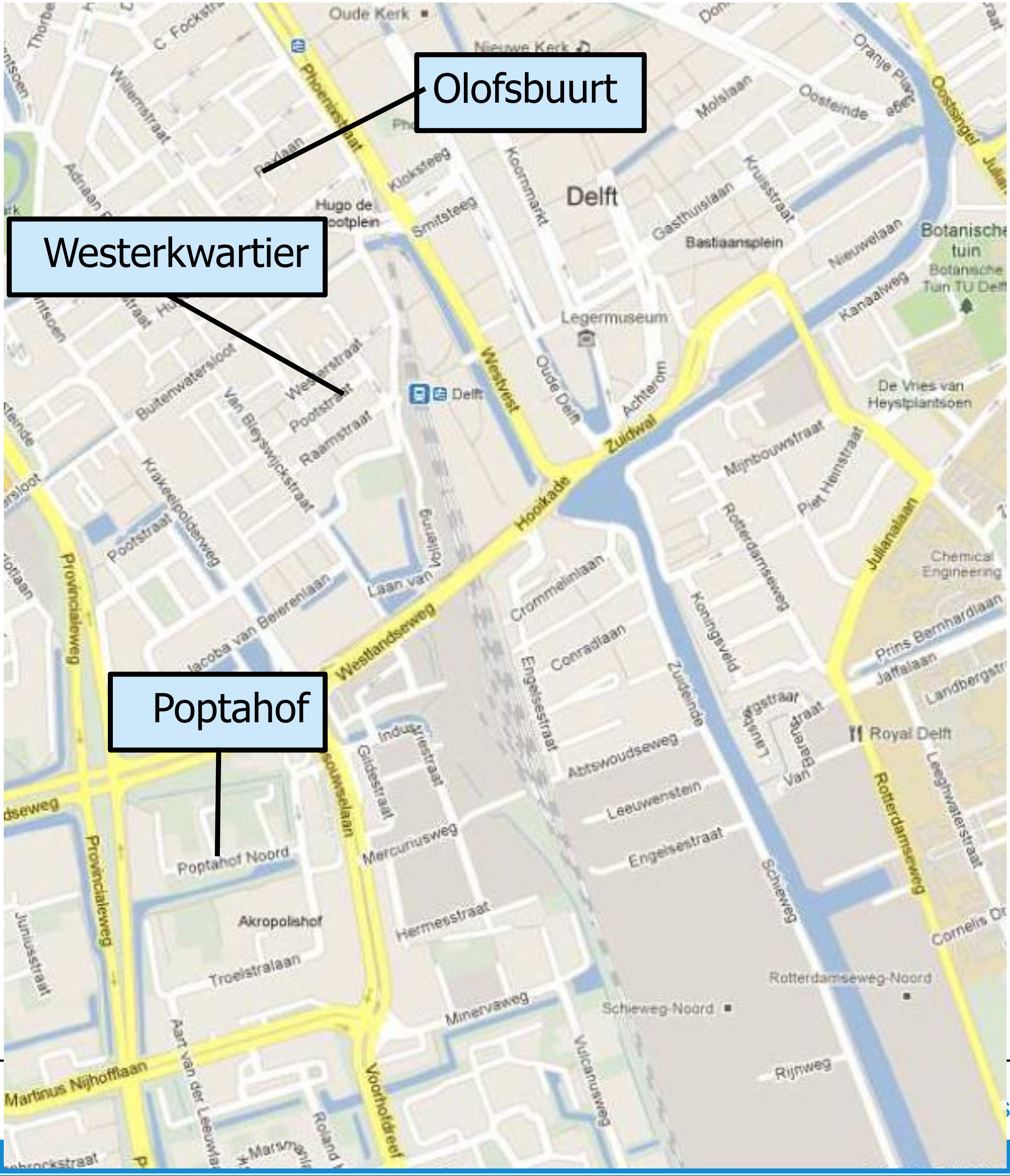
Program:

8.45h – 9.30: Per design area: pitches + select top features
Olofsbuurt/ Poptahof/Westerkwartier

9.30 – 10.00: Prepare top3 flash presentation (max 6 minutes)

10.00 – 10.18: Flash presentations 3x6min

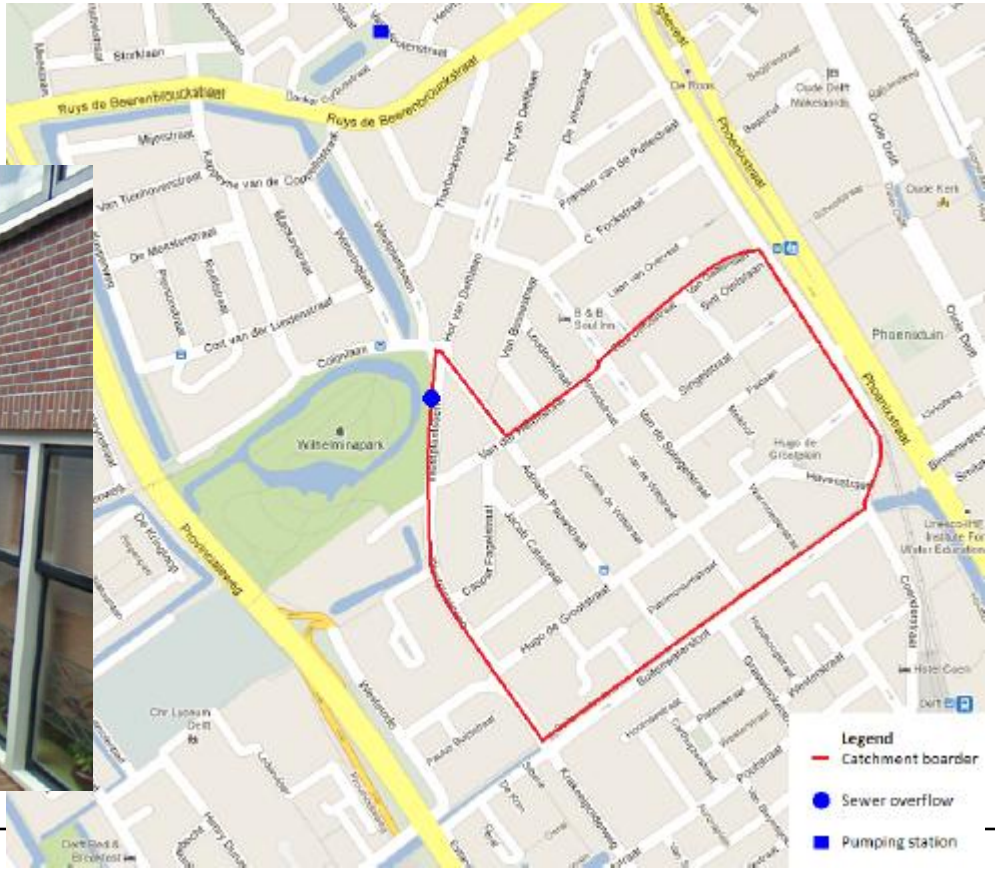
10.18 – 10.30: Election of winner



Olofsbuurt
Westerkwartier
Poptahof

CIE4491 – Design Assignment

Olofsbuurt: redevelopment of existing, densely built residential area



CIE4491 – Design Assignment

Poptahof: redevelopment of urban drainage system in existing high rise area

CIE4491 – Design Assignment

Westerkwartier: redevelopment of existing, densely built residential area