Size and Design of Retention Structures

This exercise aims to calculate the "useful retention volume [m^3]" required to design a retention structure capable of collecting rainwater from the Learning Centre's esplanade (Place Cosanday).

Step 1 - Ground Cover calculation

Creating an Excel file from a shape

1. Activate the shape [COSANDAY_DATA_RUNOFF] on QGIS.
2. Right-click on the shape and select “export”, then “save feature as”.
3. In the “format” tab, select the “MS Open Office XML spreadsheet XLS” format.
4. In the “file name” tab, give a file a name and indicate where you want to save it.
5. Click on OK

Create a pivot table

6. Open the Excel file you've just created
7. Select all layers in the top left-hand corner of the Excel sheet.
8. In the “insertion” tab, select “tableau croisé recommandé”.
9. This command opens a new Excel sheet

1. In the “tableau croisé dynamique” field
   - drag the “TYPE_TXT” criterion into the “Line” field
   - drag the “Shape_Area” criterion into the “Values” field
2. Enter the results in the “Characterisation of connected surfaces” table in the Word file “2025.03.14_ENV-462_Rainwater_Sub-Projet”.

Characterisation of connected surfaces

Couverture du sol	Ground Covers	Surface area [m2]
Toitures	**Roofs**	
Amphithéâtre	amphitheatre	
Toit incliné	sloping roof impervious	
Toit plat imperméable	flat roof impervious	
Accès, places et chemins	**Accesses, squares and paths**	
Route, parking, chemin (asphalte ou béton)	road, parking, path (impervious)	
Trottoir, place piétonnière (asphalte ou béton)	walkway, pedestrian square (impervious)	
Revêtement perméable (gravillon, copeaux)	pervious surface (pavement, gravel)	
Place perméable	pervious place (gravel)	
Aménagement extérieurs et divers	**Outdoor landscaping and miscellaneous**	
Espace vert pleine terre	green space open ground	
Espace vert sur dalle (épaisseur 25-50 cm)	green structure (thickness 50-100 cm)	
Aire de jeu (revêtement semi perméable)	green space semi pervious	
Total	**Total**	

Step 2 - Calculating the Useful Retention Volume

Fill the form “K03 Evacuation des eaux pluviales” issued by the Water Department of the Canton of Geneva [Service Eau (GE)_k03-retention-2016_Empty].

Dimensioning parameter

1. Discharge constraint(*): 20 [l/s/ha].
2. Return time(*): 5 [years]

Characterisation of connected surfaces

3. Enter the data from the table in step 1 into form K03.

Sizing and Layout of Retention Structures

4. Transfer the dimensioning data taken from the form K3 to the table below (see Word file [2025.03.14_ENV-462_Rainwater_Sub-Projet]).:

Dimensionnement	**Sizing**	**Results**	
Débit de sortie maximum :	Maximum output flow rate :		[l/s]
Organe de régulation :	Control device :		
Volume utile de rétention :	Useful retention volume		[m]^3

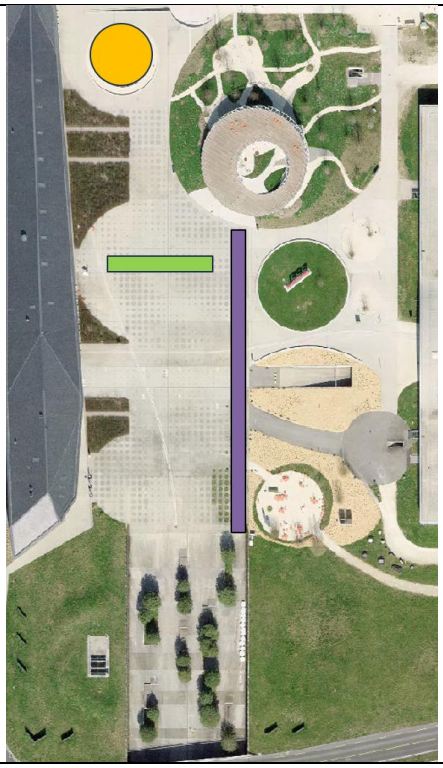
Step 3 – “Grey 2 Green” Scenario

Using the “BRC Guide to Green Stormwater Infrastructure”, discuss the advantages and disadvantages of the following “Grey 2 Green” scenarios (e.g. effect on the useful retention volume, connection with existing green spaces, compatibility with the various uses of the site, routing of water through the infrastructure, etc.). Summarize your discussion in the Word file “2025.03.14_ENV-462_Rainwater_Sub-Projet”.

Scenario 1 - Stormwater planter
- Groupe xx

Scenario 2 - Bioswale
- Groupe xx

Scenario 3 – Raingarden
- Groupe xx



Definition (Domaine de l'Eau, 2005, p. 1)

Temps de retour	Return time	Interval (expressed in years) during which an event (e.g. hourly rainfall) is reached or exceeded once, on average over a long period.
Coefficient de ruissellement volumique (Ψ_v)	Volume-Based Runoff Coefficient	Coefficient exprimant le rapport du volume ruisselé au volume de précipitation sur la durée totale de l'averse (à ne pas confondre avec le coefficient d'écoulement maximum (Ψ) habituellement utilisé pour le calcul des débits).