Auvergne-Rhône-Alpes - Outstanding operations for rainwater management

2

Place de Francfort

Lyon 3ème (Rhône)

Creation of a welcome and meeting area for Part-Dieu station

The project

CONTEXT

To create a pleasant welcome area for the Lyon Part-Dieu train station, combined with a bus terminal, a drop-off point and interconnections between Rhônexpress and tramlines T3 and T4.

STAKEHOLDERS

Project manager: SPL Lyon Part-Dieu
Project contractor: AUC, Egis, Bas Smets, Citec, Encore, No Design, ON and Consolis (monitoring tools)

DATE

2017-2018

COST

€4.8m ex. tax, including € 410k ex. tax for rainwater management (with a contribution of €63,525 ex. tax from the Agence de l'eau Rhône-Méditerranée-Corse [Rhone-Mediterranean-Corsica Water Authority])

- ➔ Public-Private project
- ➔ Urban zone
- ➔ Scale: Public space (Square and car park)

AIMS

- ➔ Hydraulic management of rainwater
- ➔ Urban air-conditioning (prevention of heat islands)
- ➔ Landscaping
- ➔ Public space

SOLUTIONS ADOPTED

Techniques for implementation

- ➔ Stockholm trenches
- ➔ Porous road surface

Operating principle

- ➔ Infiltration
- ➔ Retention

Monitoring tools

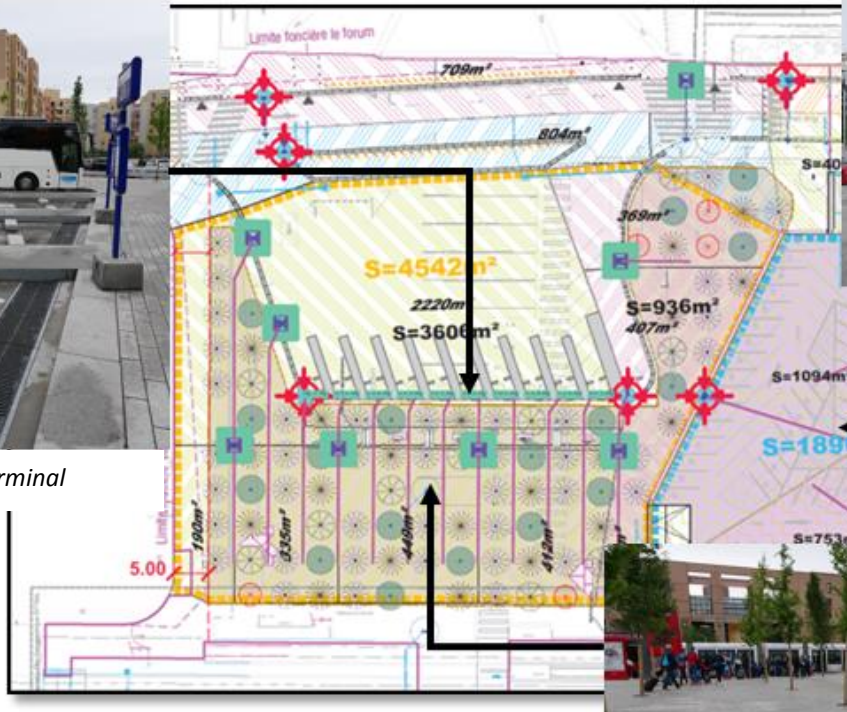
- ➔ Water level sensors in drain inspection pits, with data transmission.

The reasons behind alternative management of rainwater

The Métropole de Lyon is committed to an environmental policy of 'zero discharge in water networks'. It is thus engaged in designing new developments which integrate rainwater management in the immediate vicinity of its falling point.

In the framework of the redevelopment project for the Lyon Part-Dieu multi-modal hub, the first phase of work consisted in the transformation of Place de Francfort, the reorganisation of the bus terminal and the conservation of the drop-off area. The redevelopment of these areas provided an opportunity to integrate alternative techniques for the management of rainwater, despite a certain number of constraints: a highly-frequented area requiring engineered roadway, in particular for heavy vehicles (buses and cars to drop-off area). The square, which will eventually provide extensive shade, was designed to bring vegetation into a highly mineral space and thus prevent heat islands.

Bus terminal



Overhead view of the various uses of the square

Drop-off area

Pedestrian square

What about biodiversity?

The square will be characterised by abundant vegetation providing shaded areas. Several species (ginkgo biloba, honey locust, pear and cedar) were planted to minimise the risk of disease. These trees were chosen for their small leaves (easy maintenance) and their tolerance of water-logged soil.

To foster the growth of different species, the trees were planted in a stone-soil mixture which enables the roots to reach water while benefiting from sufficient aeration, as this mixture is compaction-resistant.

Sizing hypotheses

Intake surface: 6,432m^2
Return period: 30 years
Storage volume: 565m^3
Volume to be stored: 81m^3
Average leakage rate: 22m^3/sec.
Topography: flat
Ground permeability: 1.10^{-5} m/sec

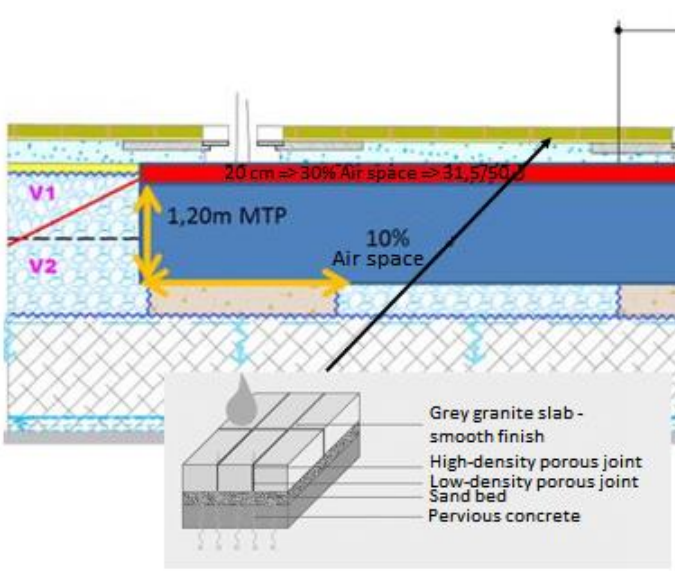
How does it work?

The site consists in 2 catchment basins which are managed by different procedures.

The pedestrian square is covered with impermeable granite paving with porous resin joints, laid on a bed of sand and pervious concrete, both of which are permeable. Beneath this, gravel with 30% air space and a stone-soil mixture with 10% air space enable infiltration to a depth of 1.65m. The square slopes gently towards collector grids, which, along with dispersal drains, disperse rainwater into the permeable ground.

The bus terminal slopes towards a long grated gutter which collects and holds runoff for decantation up to a certain load, after which the water is dispersed via the drains in the ground of the pedestrian square, beneath the paving.

The drop-off car park, which is a flat plane, is coated with a porous asphalt over a storage ballast which enables deep infiltration of rainwater. The intake surface extends beyond the car park and includes several footpaths sloping slightly towards the car park. The urban fittings (benches) are raised to allow water to run off the footpaths towards the porous asphalt. In addition, grids collect water from the west-side footpath and disperse it via a drain to the storage ballast under the car park.



Porous paving joint system

Stone-soil mixture

Cross-section showing the Place de Francfort system

Works phase on Place de Francfort: laying of the granite slabs and installation of the stone-soil pits.

Operation of the facility

In charge of maintenance: Métropole de Lyon for the water management facilities and tree maintenance.

Planned maintenance operations: Hydro-dredging of drains according to clogging (tooled monitoring), annual dredging of the grated gutter, unclogging of the porous car park if required (every 30 years) and tree-pruning.

Feedback

What worked well

➔ The alternative techniques implemented enable rainwater to be infiltrated effectively from this highly frequented and mineral space. The result is a square without steps or borders which facilitates movement for persons of reduced mobility and passengers with bags.

➔ The levelling of the drainage asphalt in the drop-off car park must be executed with great precision to avoid the formation of puddles. Although this surface is not recommended in areas subject to intense vehicle manoeuvres and turning, it has not presented any signs of tearing to date (to be confirmed in the long-term).

Aims set aside

➔ The use of resin-based porous joints stained the paving stone. In addition, sandblasting resulted in a slight clogging of the joints which has reduced their permeability.

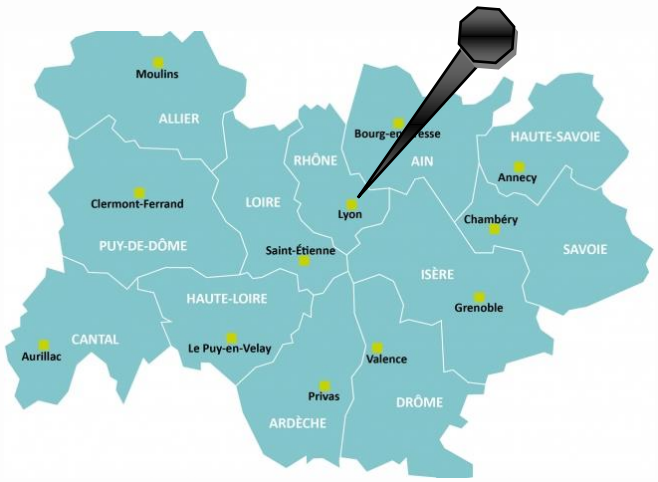


Photo credits:

Métropole de Lyon, EGIS & GRAIE

For more information

To visit the site:

Location: Place de Francfort, Lyon 3ème
GPS: 45°45'37.7"N; 4°53'43.6"E

➔ **Open to the public**

For more information or to visit the operation, contact:

CALTRAN Hervé - Métropole de Lyon
20 Rue du Lac
CS 33569
69505 Lyon Cedex 03
Phone: +33 (0) 04 78 95 89 80
Email: hcaltran@grandlyon.com

Document compiled in 2019.