



When “Cautious ” becomes “Troublesome ”

Case study of a Challenging jobsite

*Paul CAVILLON
Engineer in Geology and
Geophysics*



Spring talks 2026 in Aachen



Spring Talks, on the 28th of May 2026

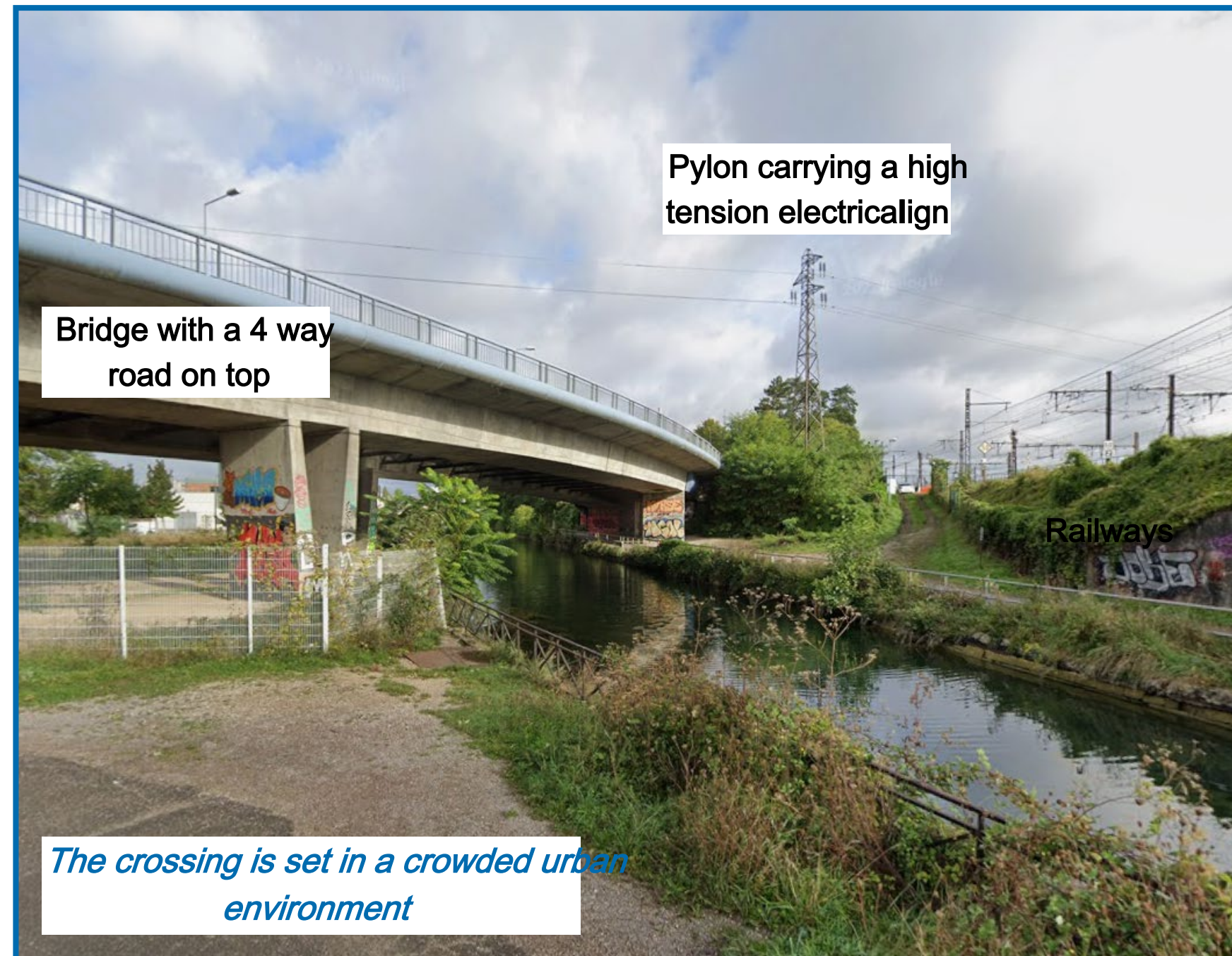
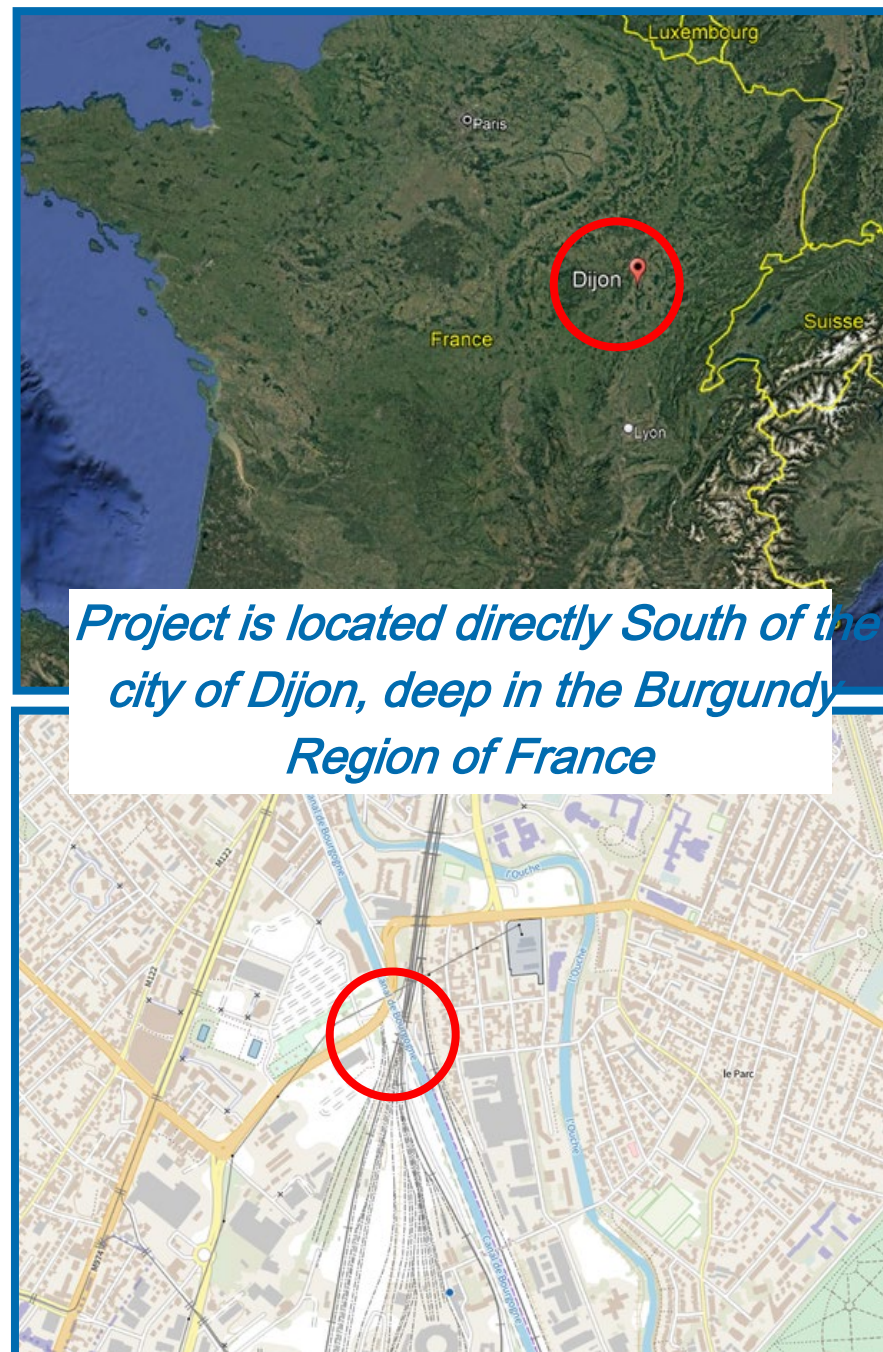


Case study of the Burgundy Canal Crossing in Dijon

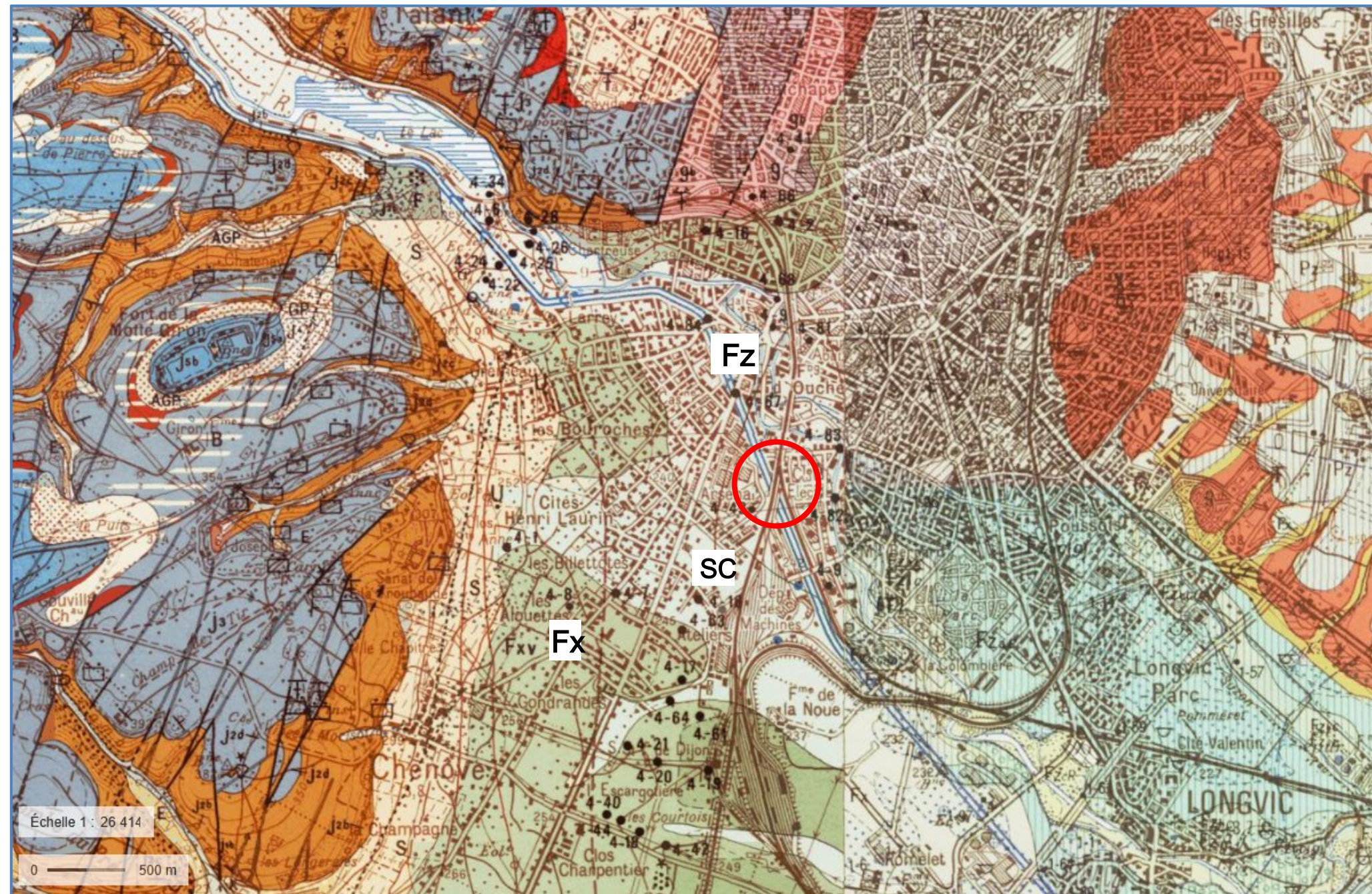
- Overview of the project- Preliminary studies
- Timeline of Events- Project modifications
- Execution phase- Following the actual jobsite
- A reflection on what could have been done
- Conclusion and questions



The first steps : A tricky crossing

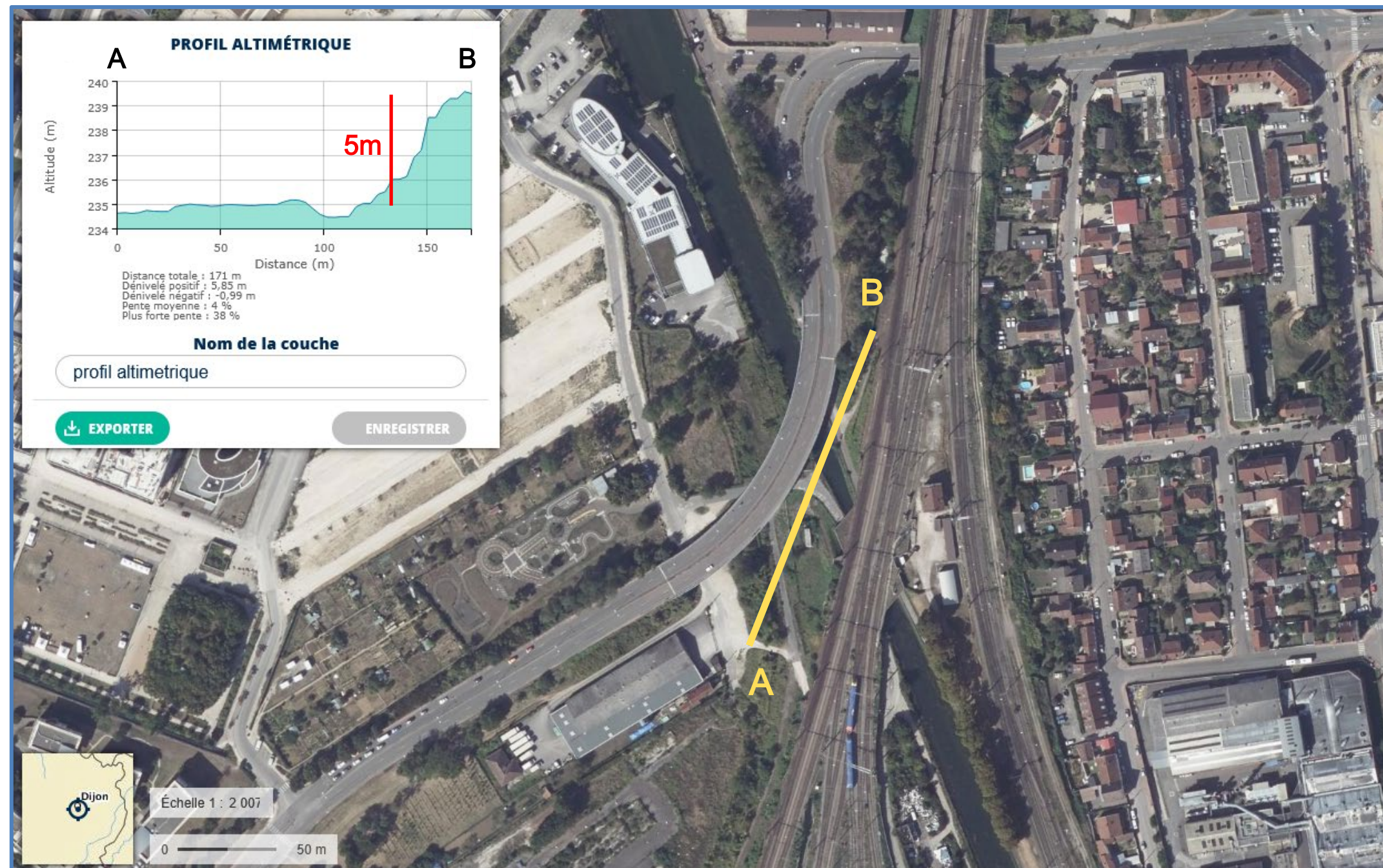


The first steps : A tricky crossing

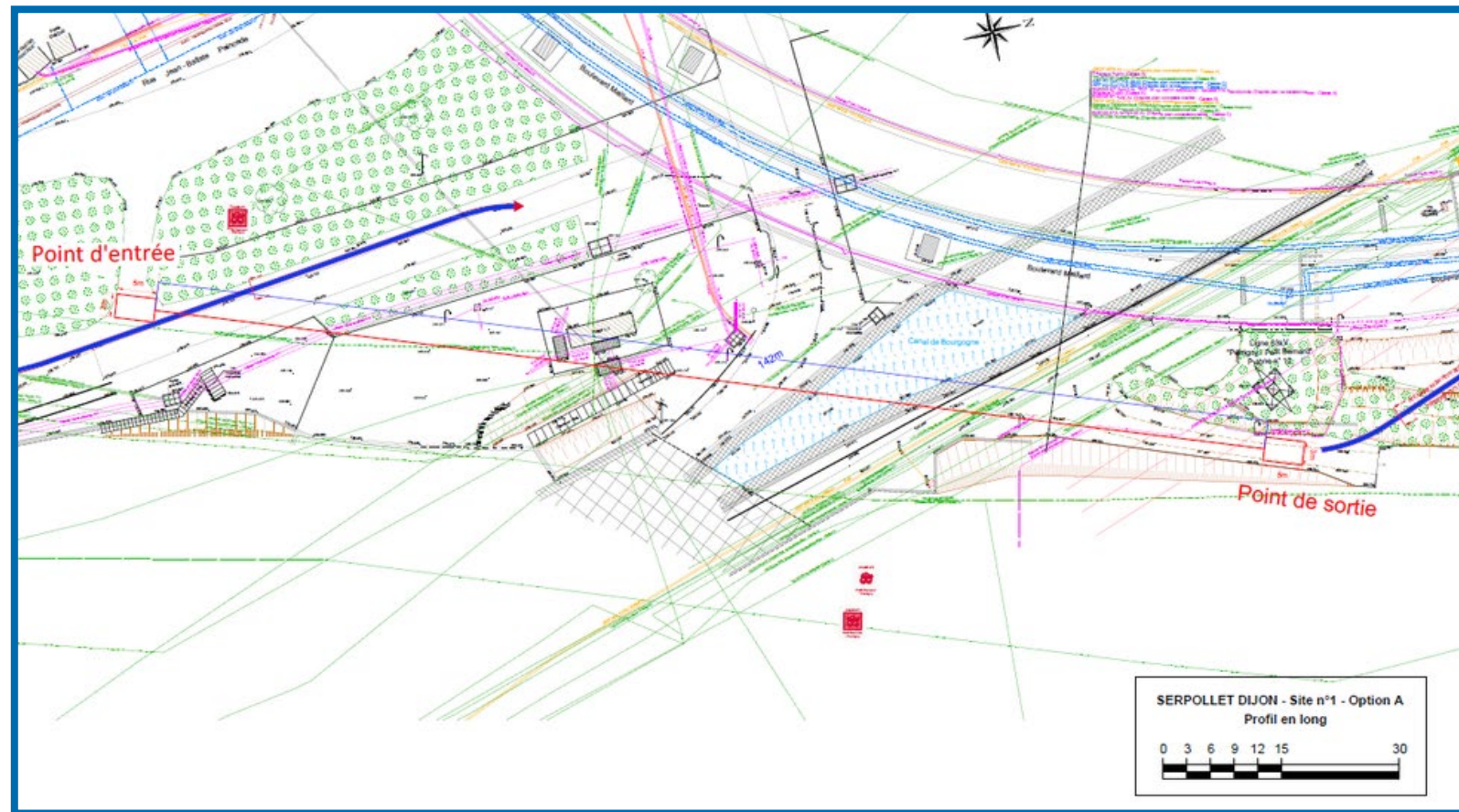


- 0m ▼ SC : Colluvium, mostly silts and clays
- 2m ▼ Fz : Recent alluvium, described in a very similar way as the colluvium, mostly composed of silts and clays with a light distribution of limestone gravel
- 5m ▼ Fx : Old alluvium, with gravel and pebbles of limestone
- ▼ Marls and Limestones bedrock

The first steps : A tricky crossing

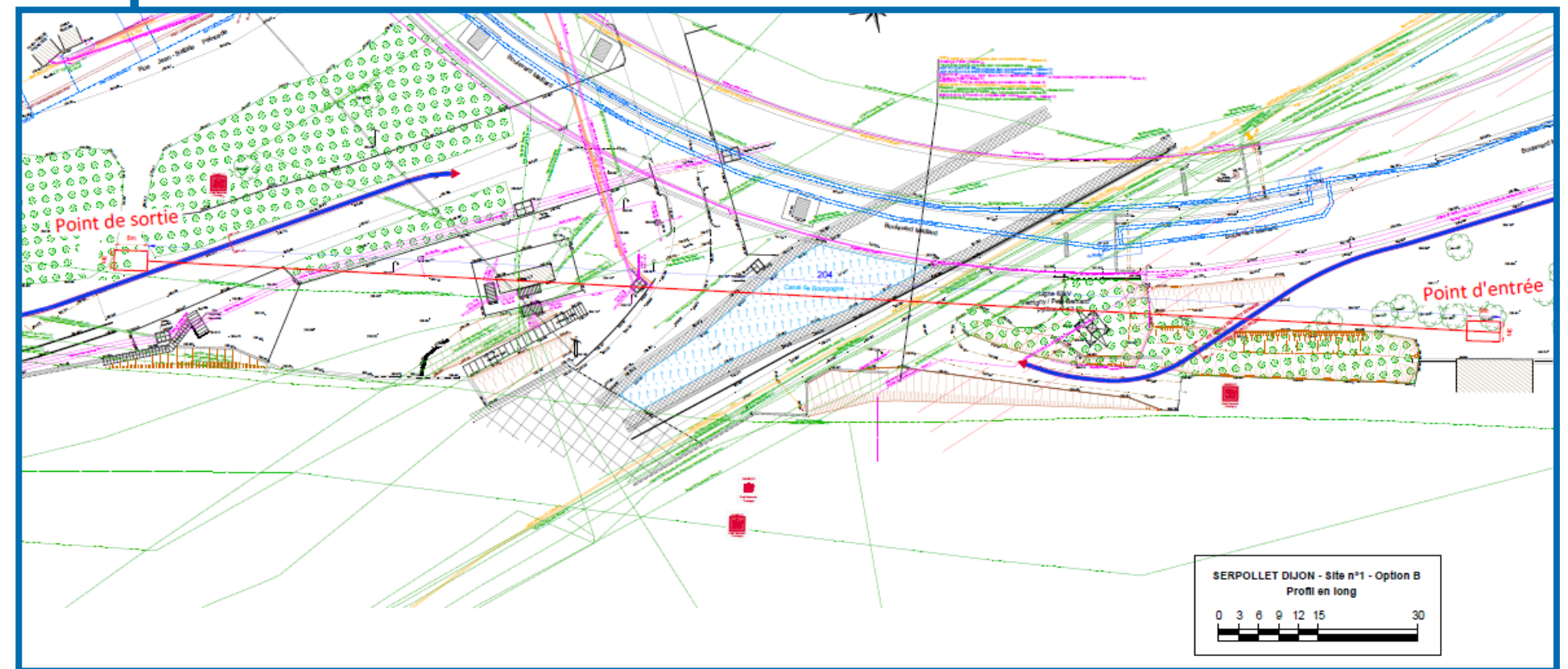


The first steps : A tricky crossing



- Shorter option : 142m long
- Less than 5m under the Canal, for a Ø625mm hole
- Pipe construction can happen on the Northern side, within a SNCF private path

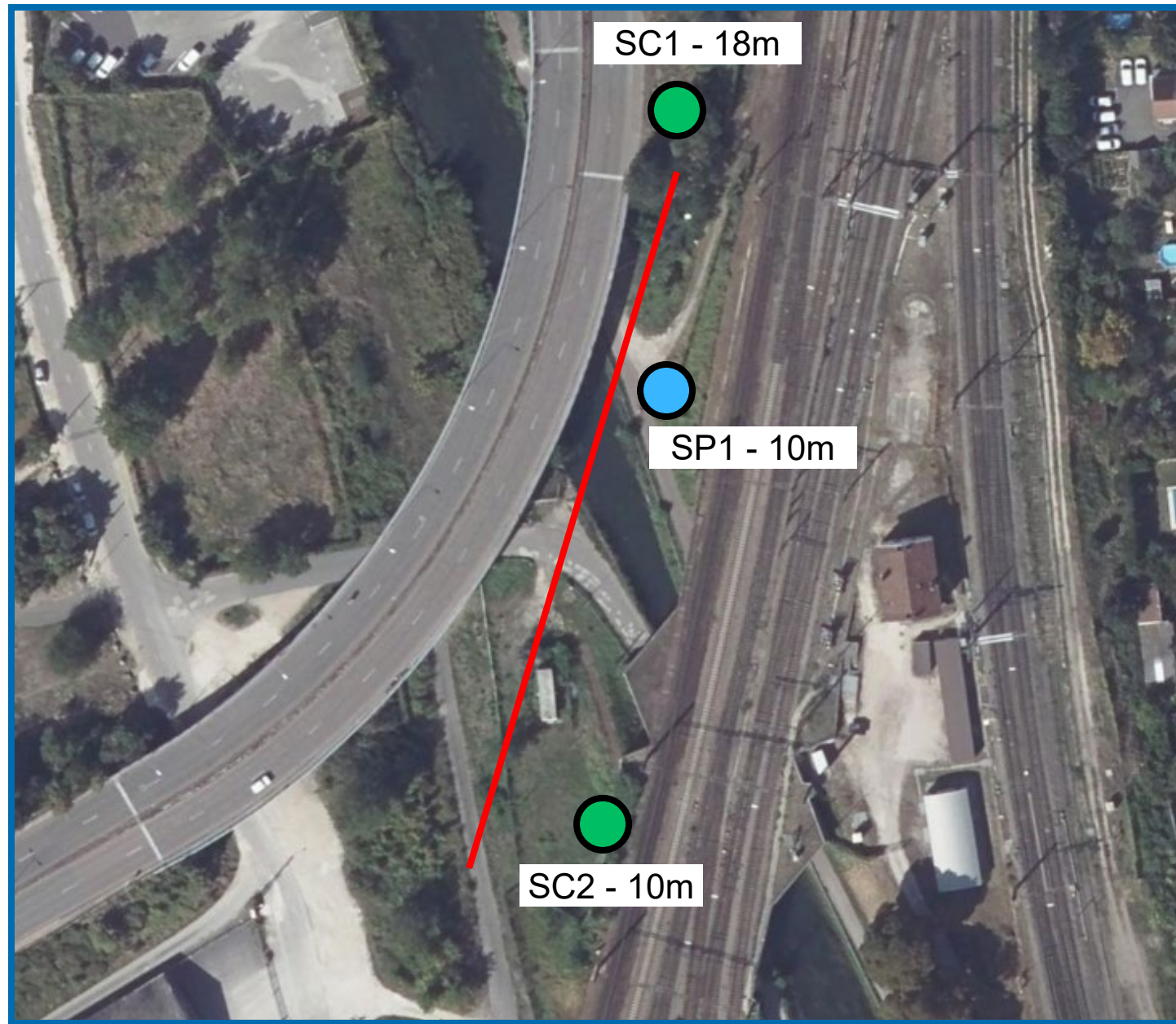
- Longer option : 204m long
- Less frack-out risks - Over 9m of depth under the Canal
- Borehole is extremely close to the Pylon and the Bridge.



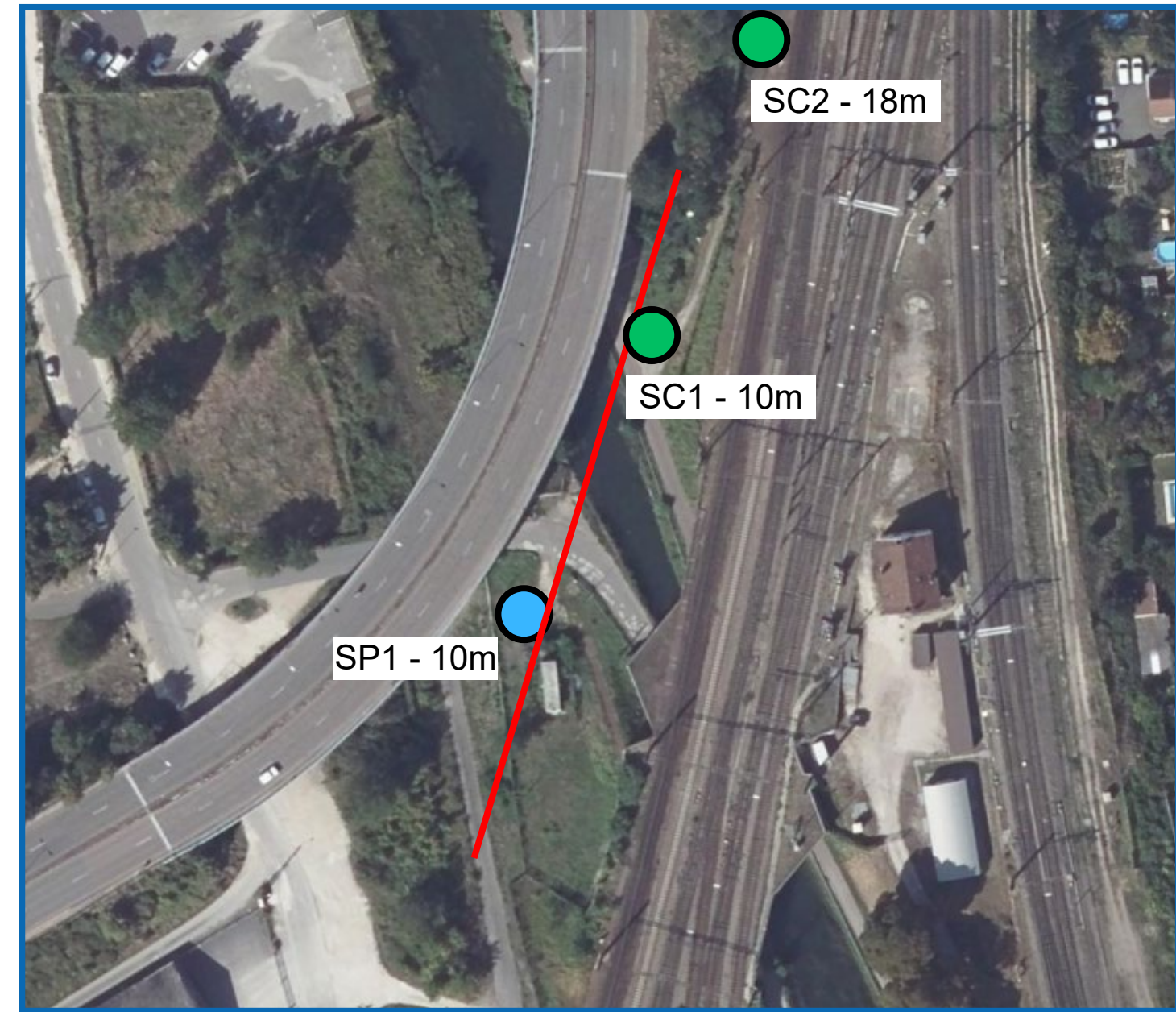
Client was recommended this option

With proper investigations to identify the foundations of the Pylon & the Bridge

Modifications upon Modifications

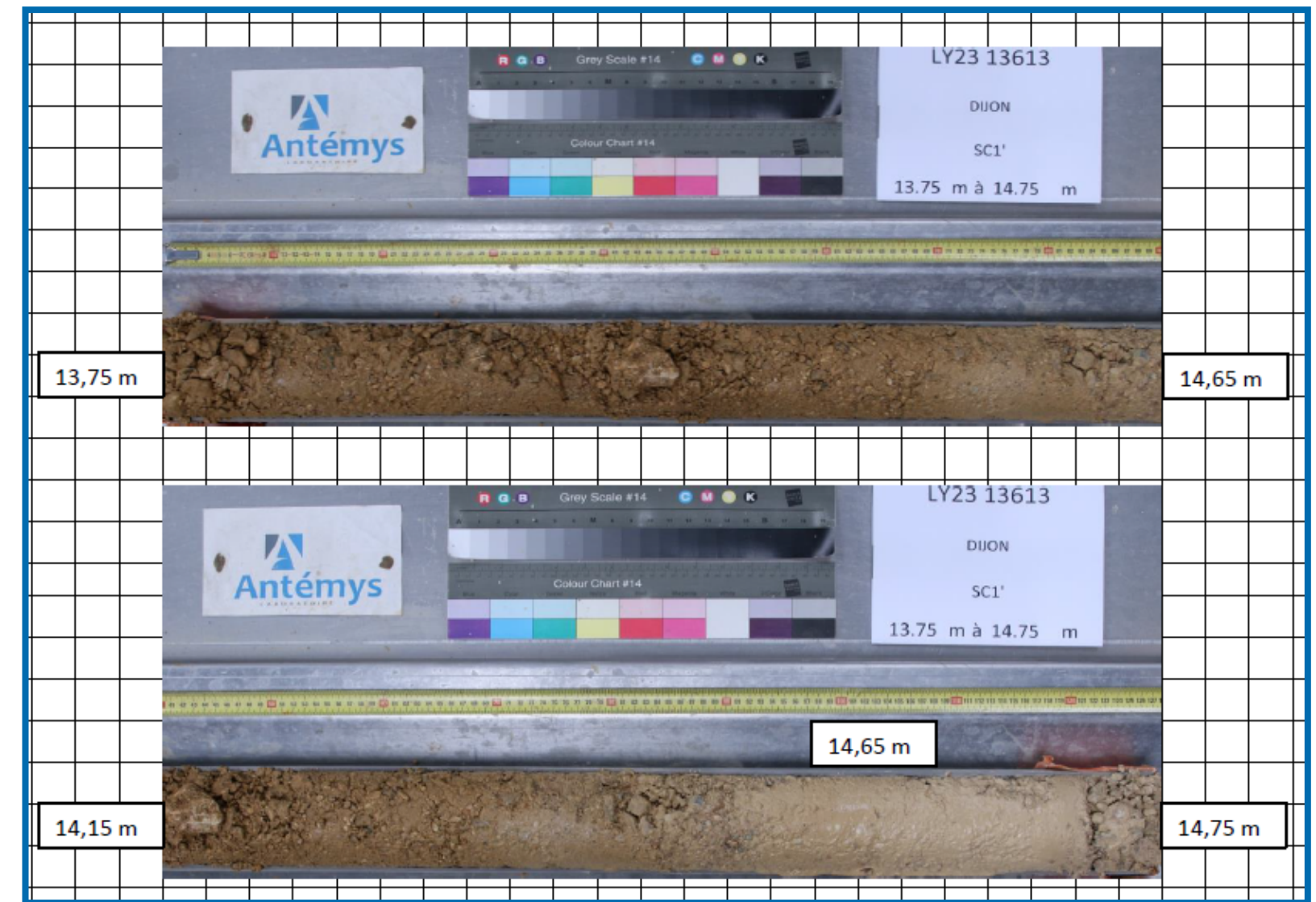
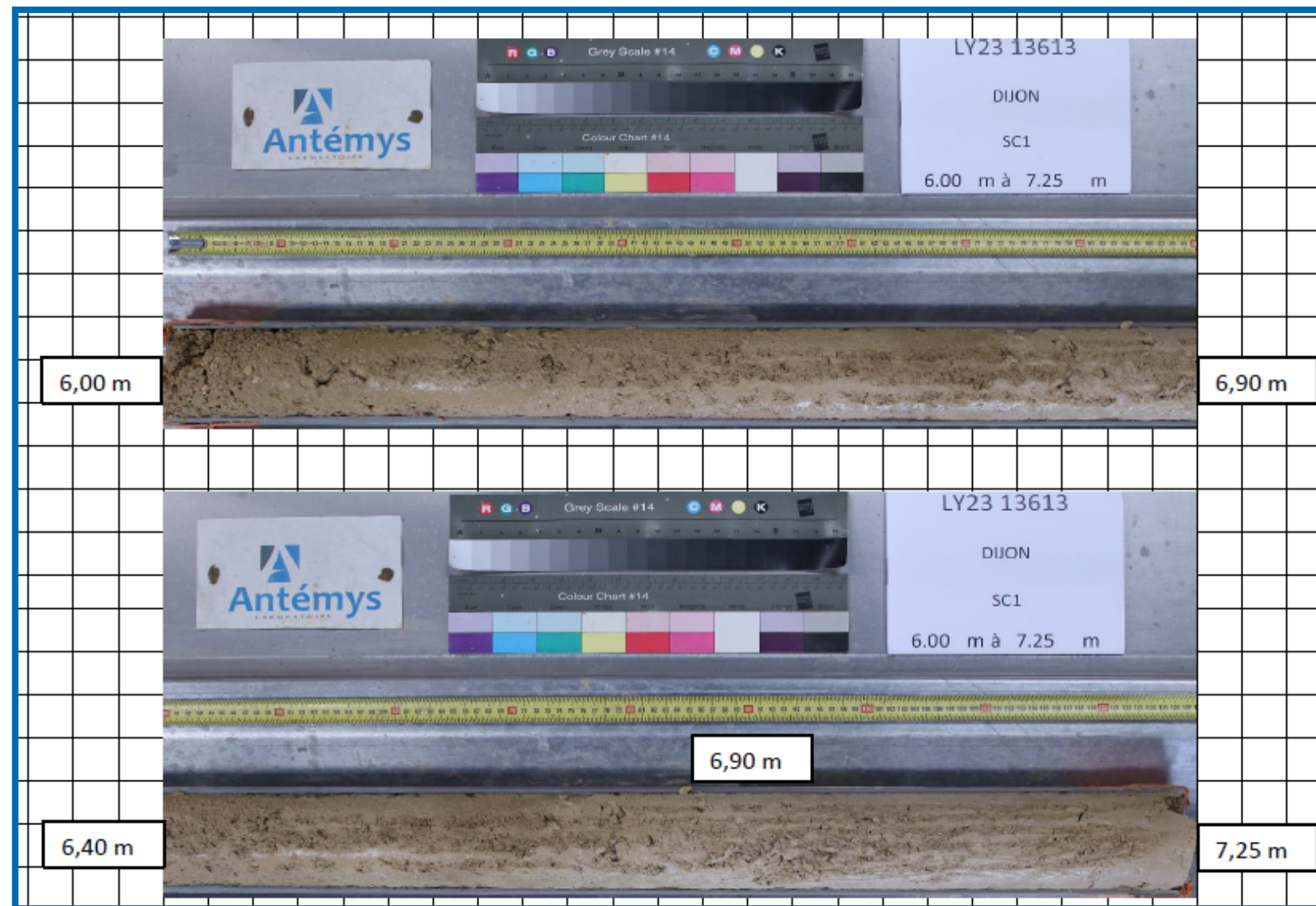


What was asked



What was done

Modifications upon Modifications



Modifications upon Modifications



Modifications upon Modifications



Modifications upon Modifications



Modifications upon Modifications



Modifications upon Modifications

This is no longer the same project.

Everyone has in their minds our first report and its conclusions : “the crossing is feasible”

But the parameters we used are no longer the same !

We could blame the client, the mayor, the surveyor... None of those people have our understanding of HDDs and the constraints we face.

It is our responsibility to say “stop”

Designed to be difficult

Contractor offered :

- **To start with the simplest HDD.**

↳ Good intentions, familiarize with soil conditions

↳ Bad consequences, 2nd HDD was made much harder

- **To use a Gyroscope**

↳ Good intentions, could offer more precision

↳ Bad consequences, steering in gravel was chaotic

Designed to be difficult

- Calibration issues
- Drilling bit refuses to initiate the curve
- Trip-out n°1
- Trajectory is wrong again
- Trip-out n°2
- Decision to change the entry point
- Calibration issues
- Drilling bit refuses to dive with a sufficient angle
- Trip-out n°3
- Random mud losses
- Very slight fracture right on the core sample
- Calibration issues
- Steering becomes extremely hard
- Drillbit is too deep
- Pilot is heading towards the bridge
- Pilot is heading towards the SNCF Structure
- Cable connecting the gyro snaps
- Trip-out n°4
- Drillbit is coming up too fast

What went wrong ?

Timeline of events

Feasibility oriented towards a “geometrically” sound design

→ Was the design cautious enough ? Too cautious ? Where was the mistake ?

Conception centered around a much simpler project

Major modifications of the project with no corresponding depth study

→ When must we say STOP ? Is finding theoretical solutions always appropriate ?

Technical adaptations → Decision to start with the easiest HDD, use of a gyroscope

On site Murphy’s Law → Issues with the machine, the gyroscope, the cables...

What can we learn ?

An Engineer is wired to find solutions. But sometimes it is our responsibility to slow things down.

Just because a project is feasible doesn't mean it should be done.



When “Cautious” becomes “Troublesome”

Thank you for your attention

And “Bon Appétit” :)