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DEVELOPER PROJECTS

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What we do?

- Drone and airplane scanning and imaging
- 3D terrestrial laser scanning
- Multispectral data capturing
- Thermal inspections
- Postprocessing of captured data
- Research and development

DEVELOPER INSPECTOR

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Questions, problems and other

- How to create a 3D model without original documentation?
- Can the train derail?
- Can new building collapse old tunnel?
- Is something wrong in new tunnel construction?
- Will the dam tear up after refill?
- Can we find a dinosaur underground?
- From small river model to one to one realistic banks
- How can you save 300 000 €?

The Locomotive Depot

How to create a depot model without original documentation?

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The Locomotive Depot

What we had to do:
Measuring of depot for real documentation and model creation before reconstruction

Used method:
Drone photography and terrestrial laser scanning

Outputs:
Georeferenced pointcloud, orthoimages, documentation, 3D models

Conditions:
Big area, in full operation, inside of a city, short time for measurement

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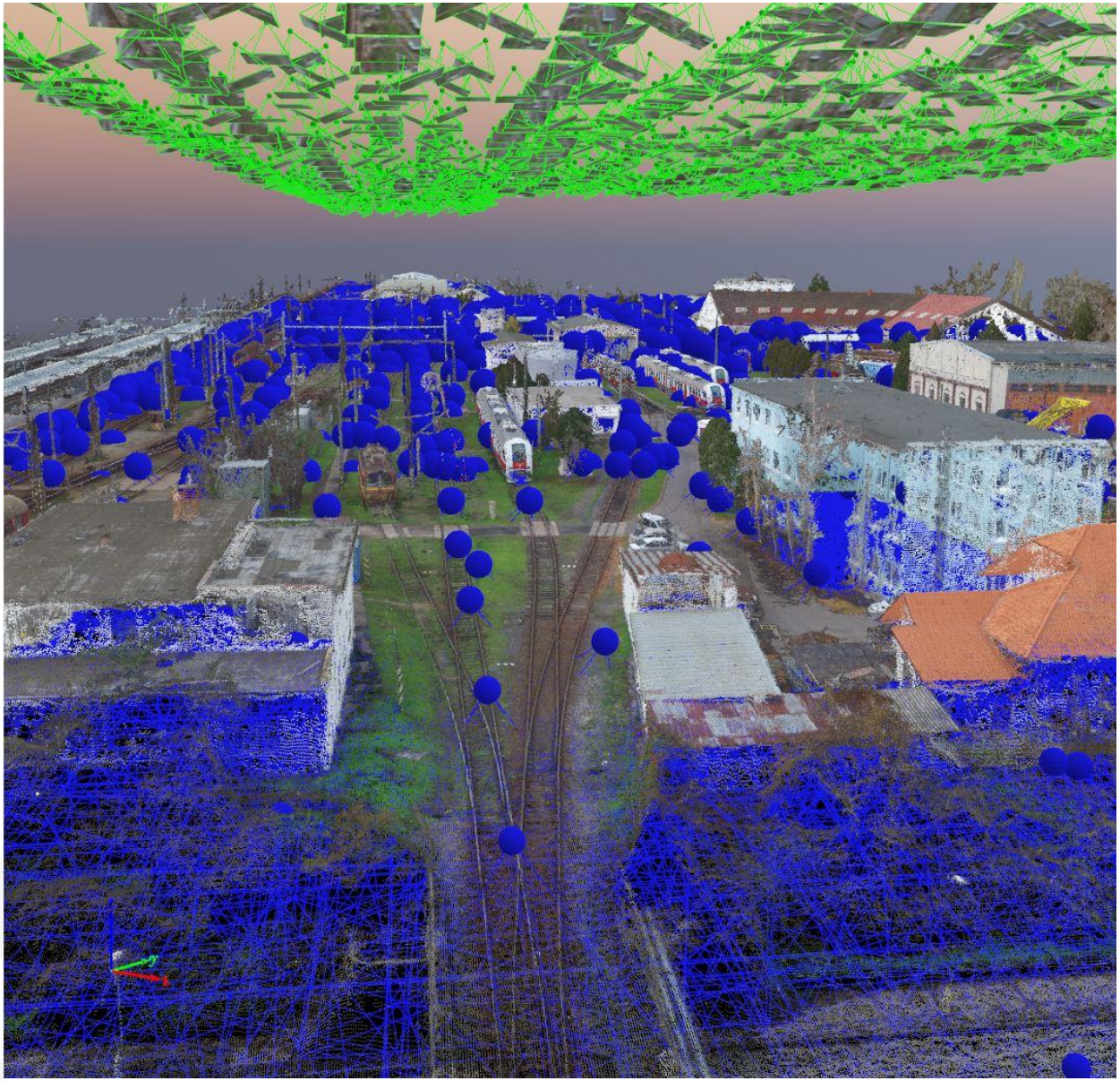
Merging of aerial and ground images



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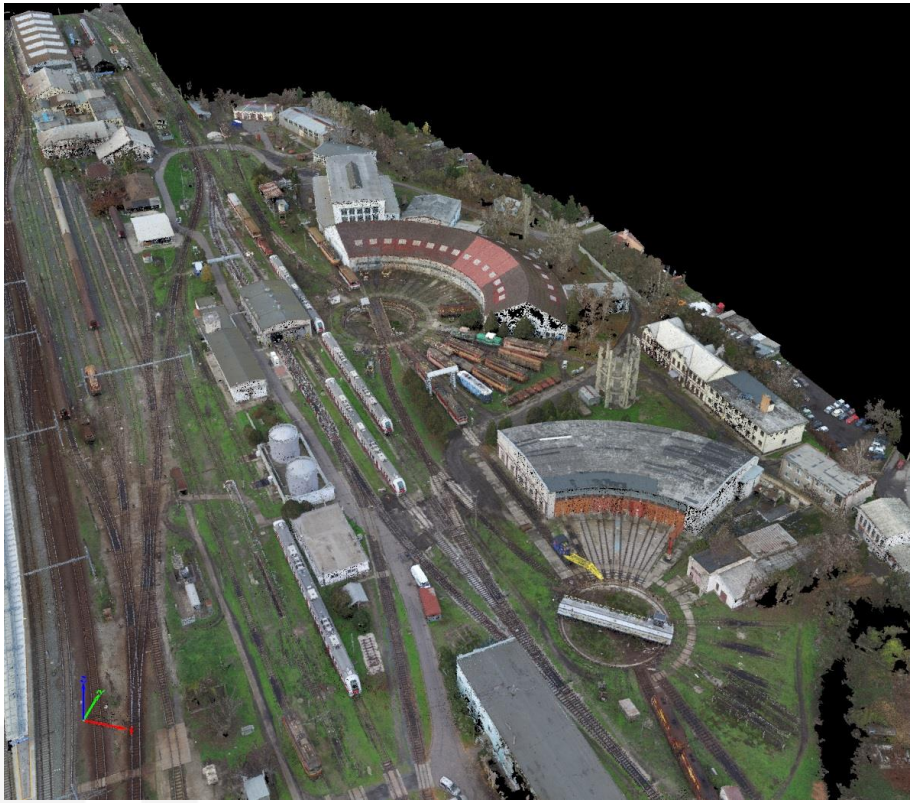
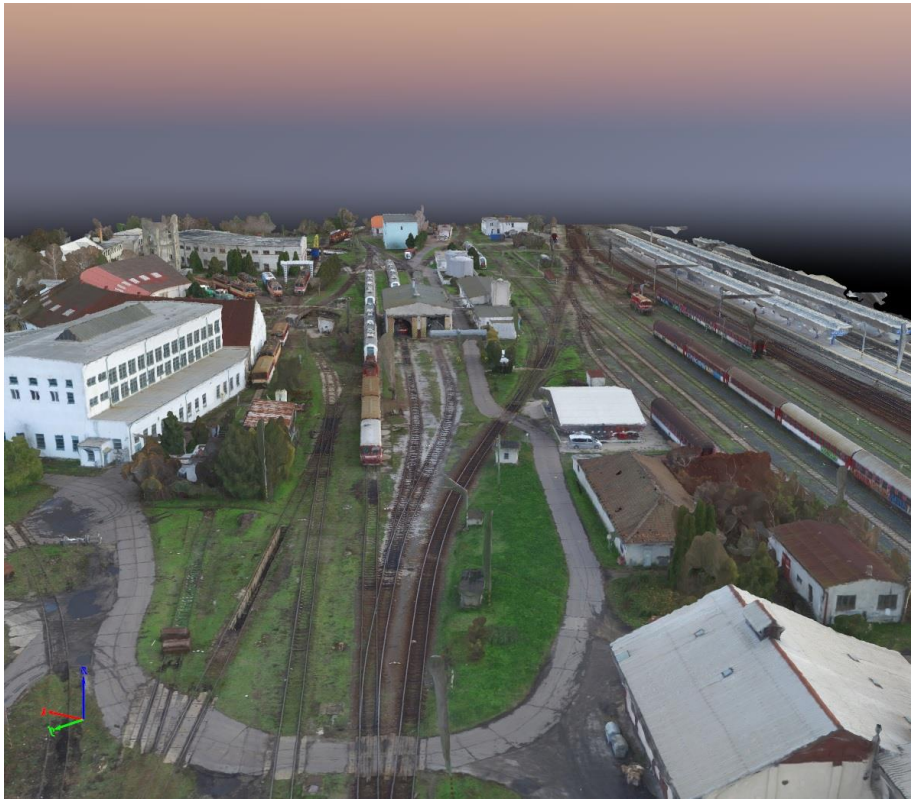
3D model from drone images

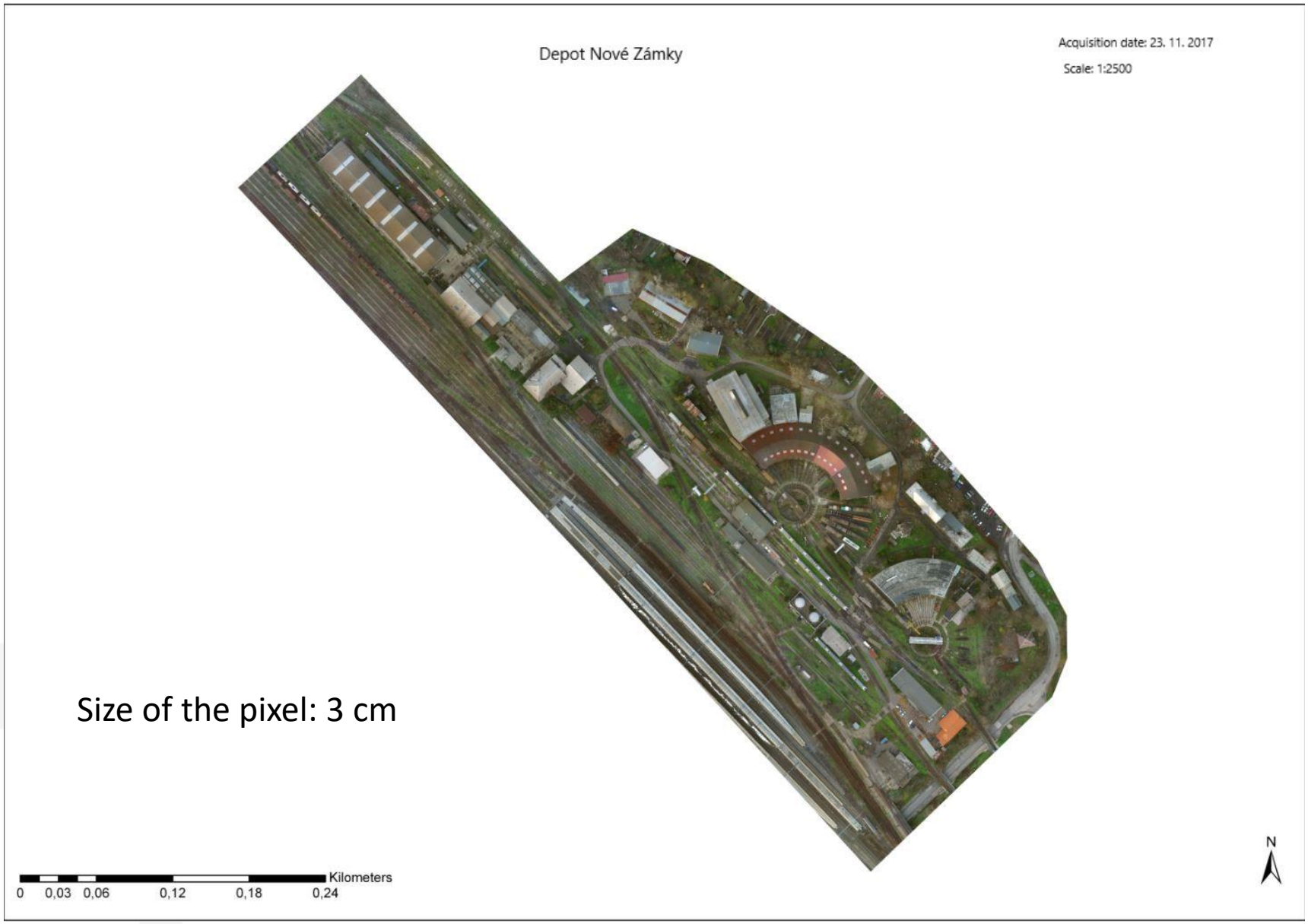


Pointcloud



Mesh

Orthomosaic



Size of the pixel: 3 cm

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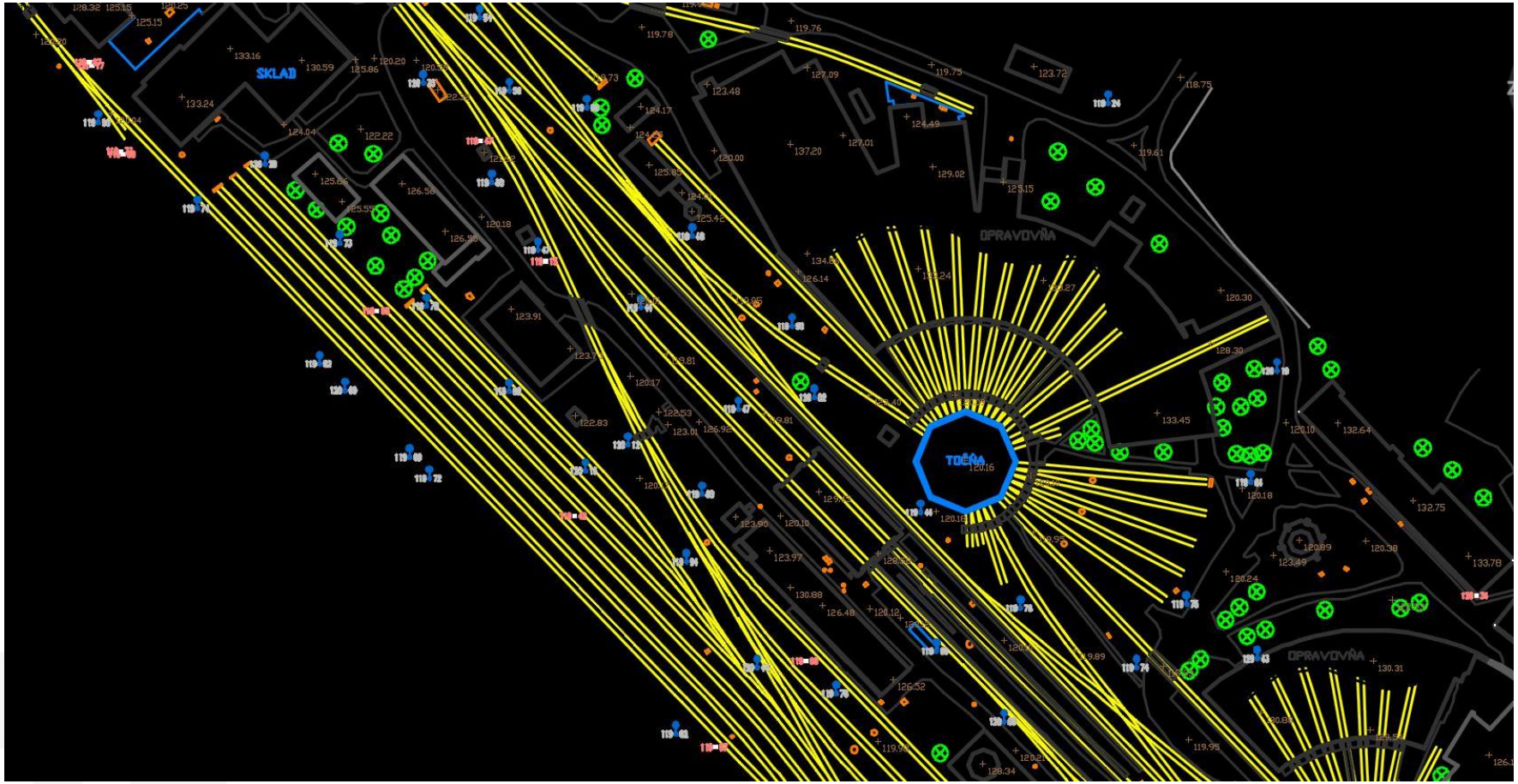
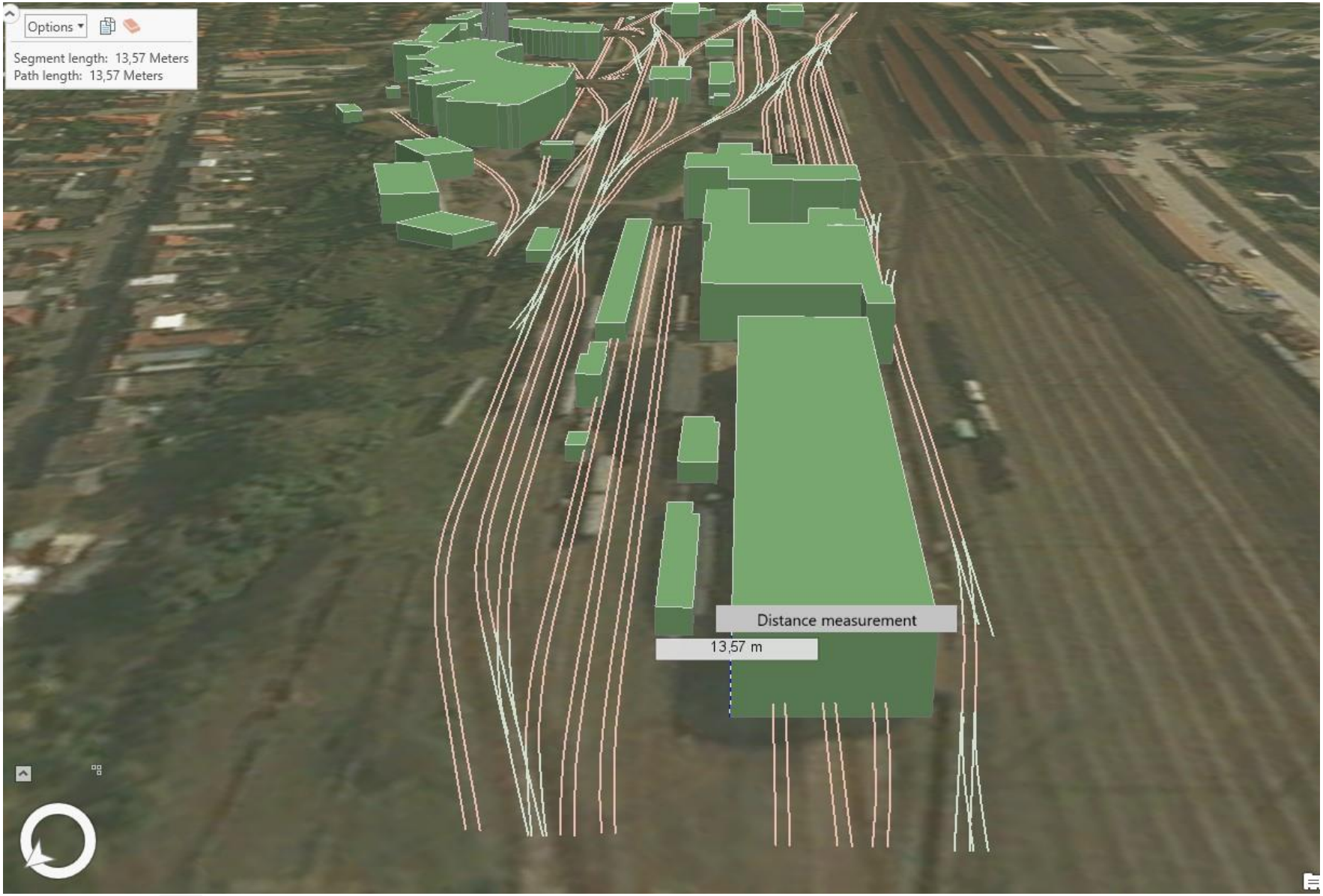
Topography and altimetry - detail



Urbanistic model – distance, area and volume measurements



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Building's lighting system design - video

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Revitalization of the depot - realistic photo

Revitalization of the depot - future condition

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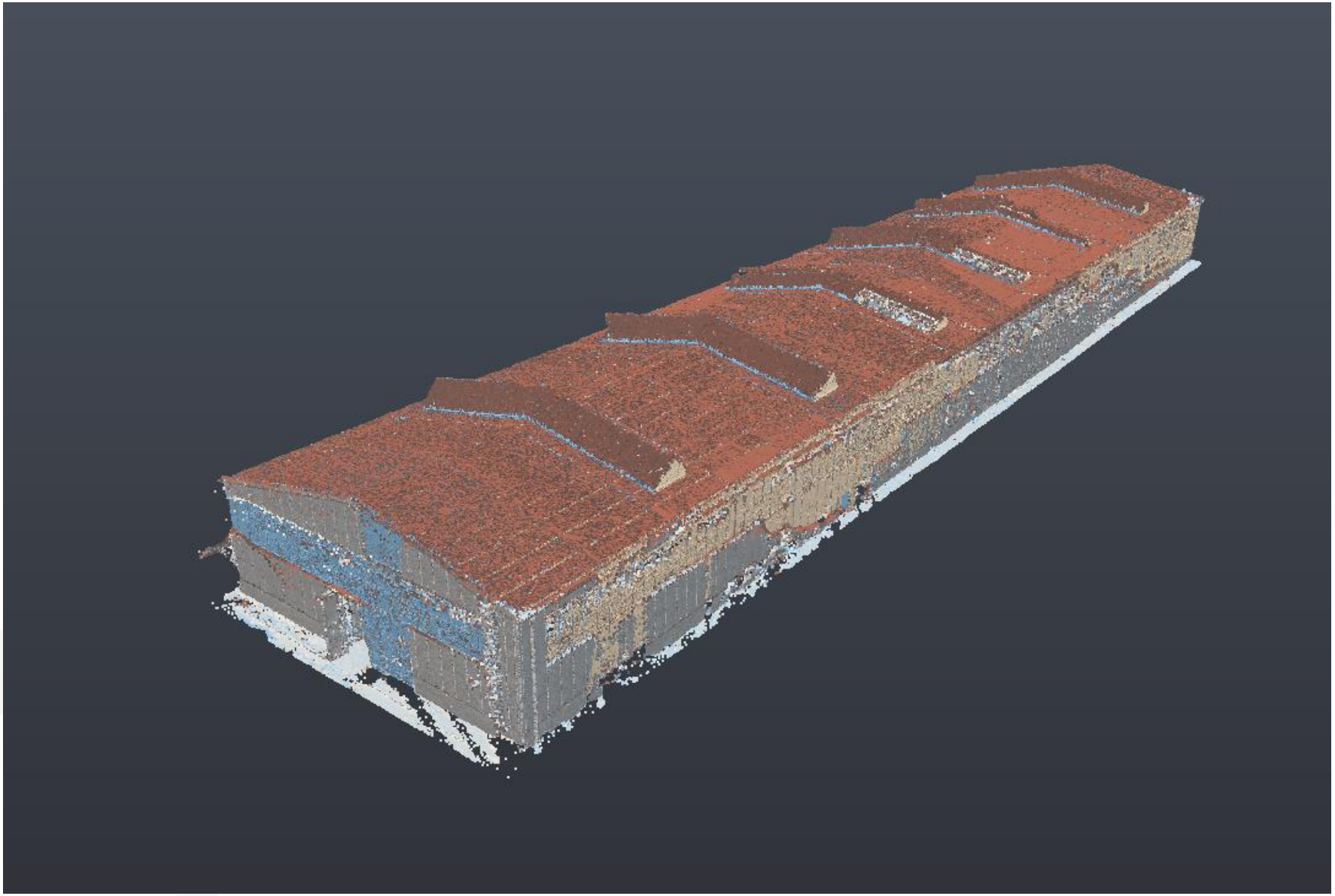
3D model of building - pointcloud



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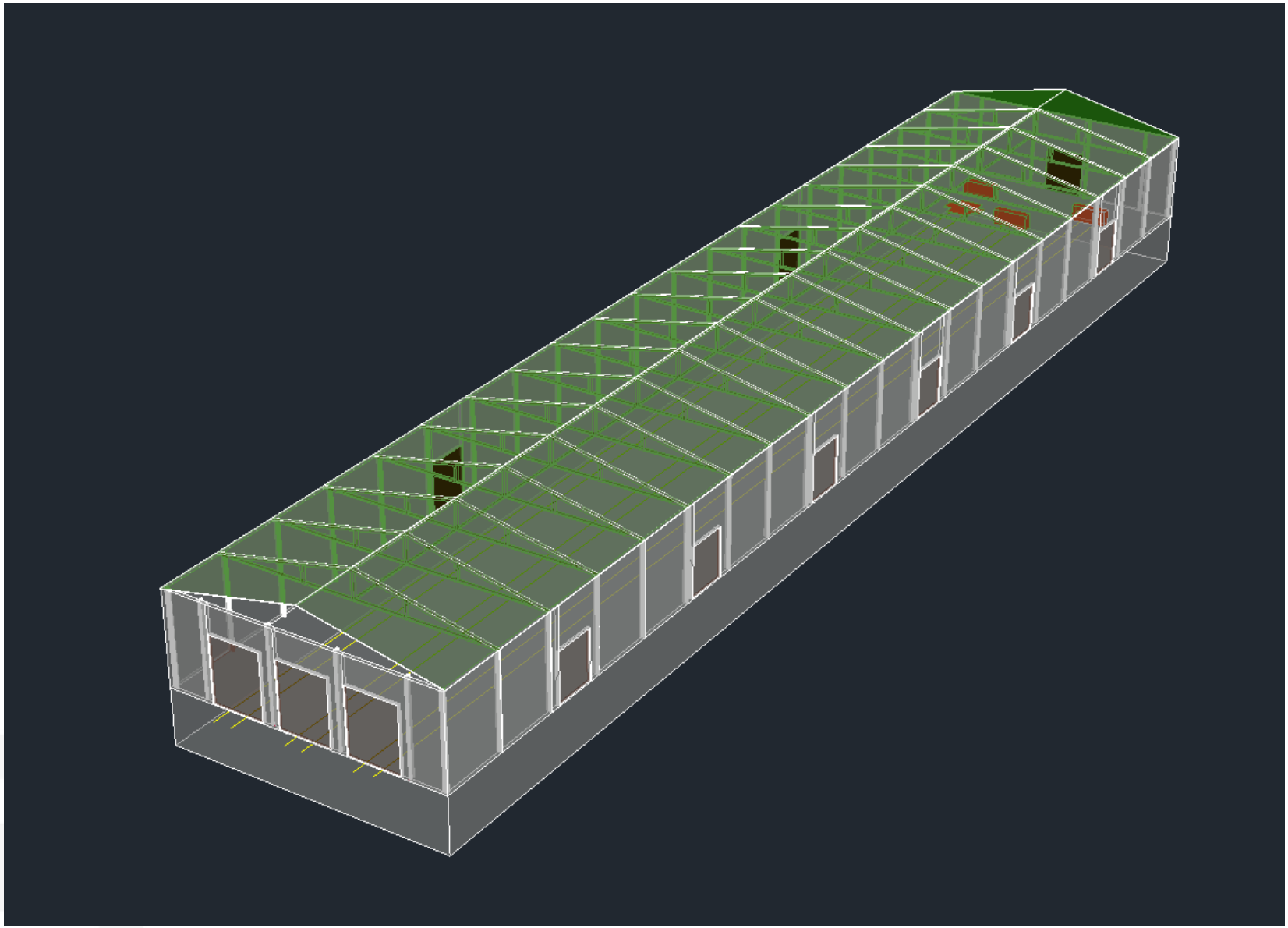
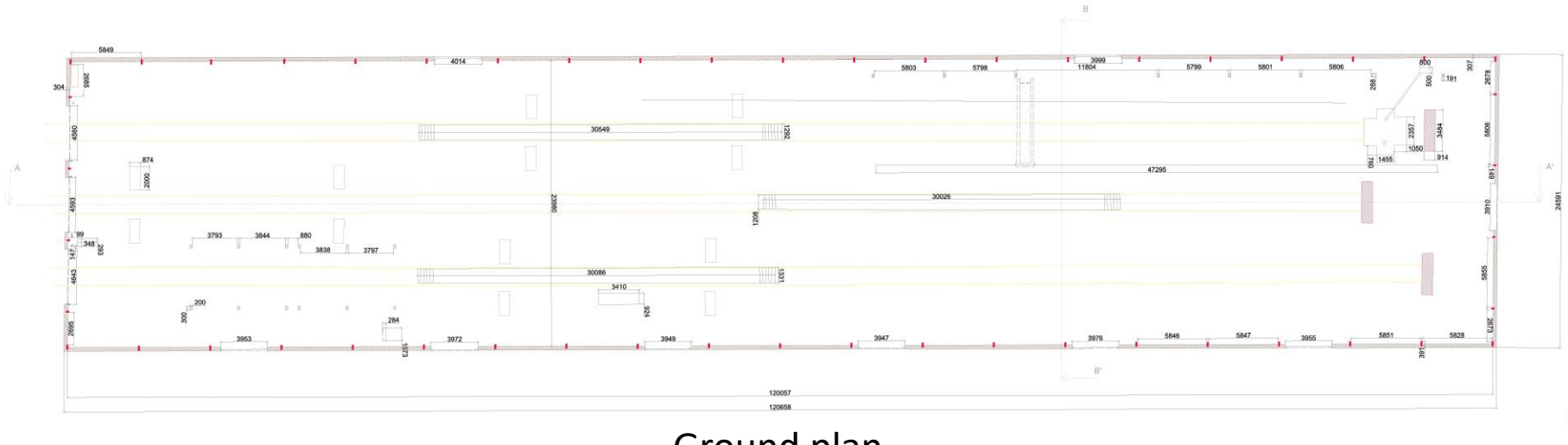
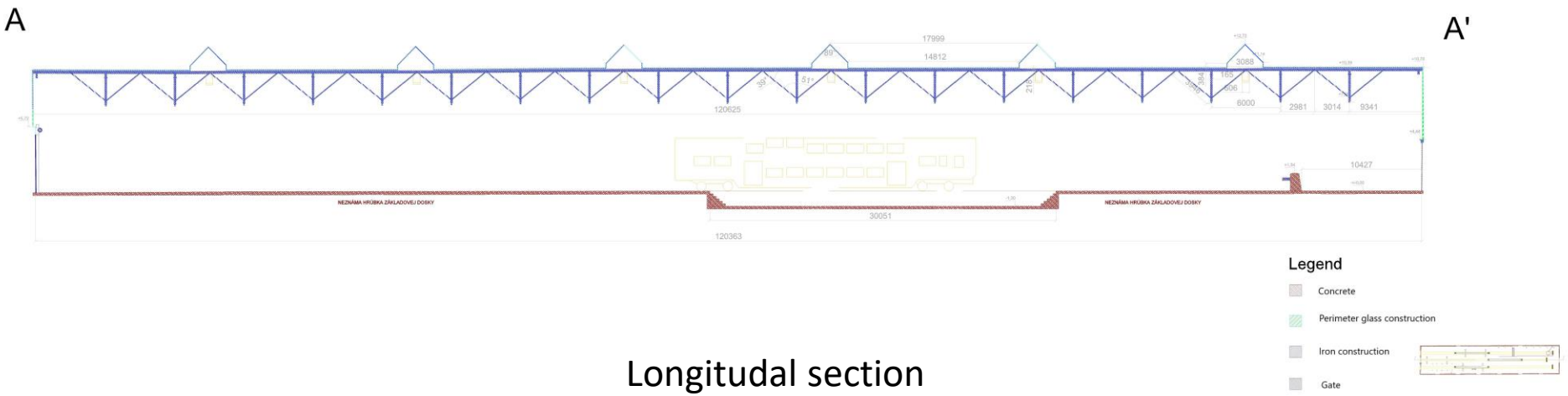
BIM model of building



Ground plan and longitudal section of building



Ground plan



Longitudal section

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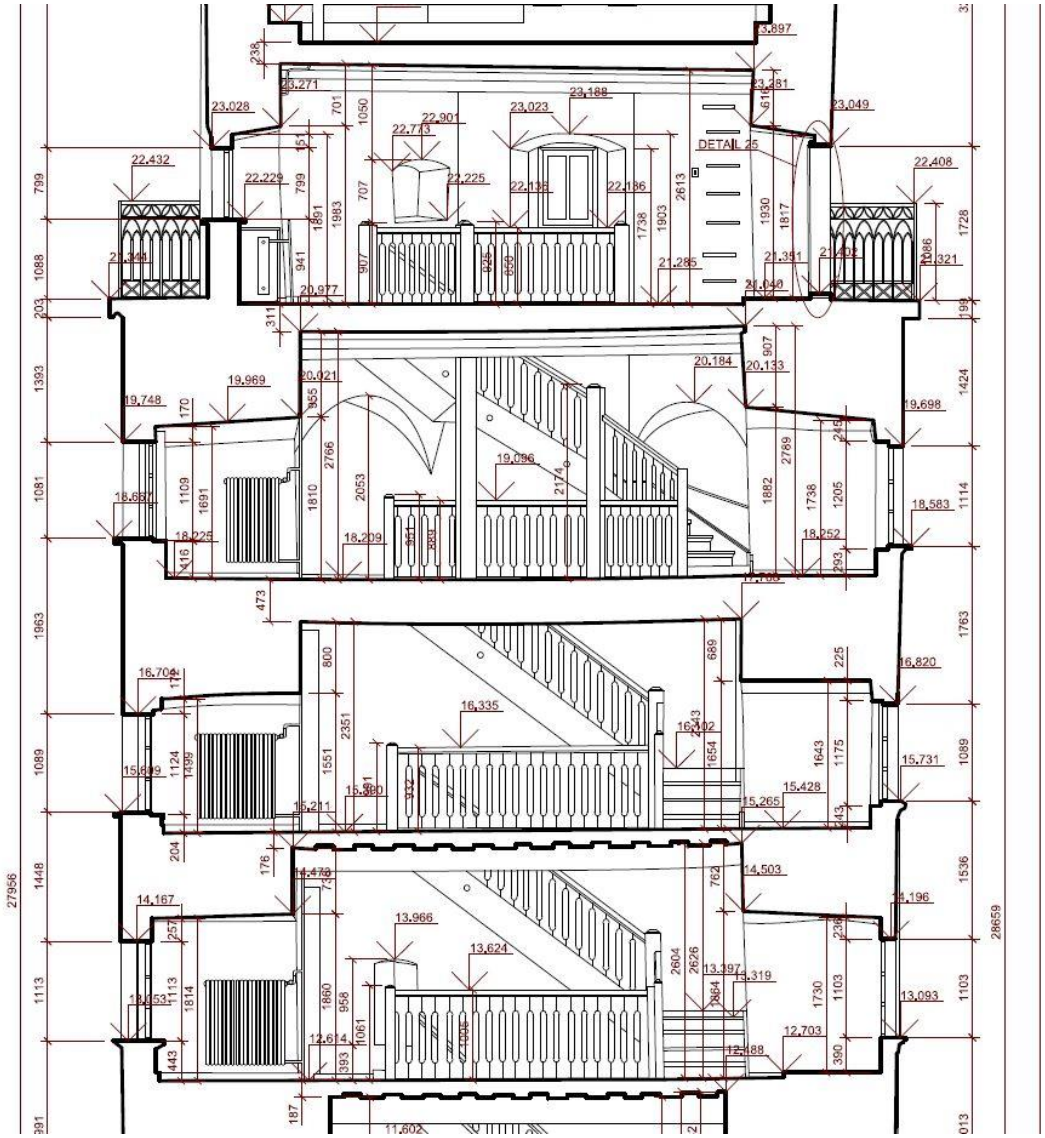
Cross section of building



Results

- Basic geodetic outputs
- New documentation of the depot
- 3D model of the depot
- Revitalization study of the depot

The Train Rails

Can the train derail?

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The Train Rails

What we had to do:
Find out the shape and direction of railways and its embankment

Used method:
Drone photography

Outputs:
Georeferenced pointcloud, orthoimages, documentation, cross sections

Conditions:
Long area (8 km), in full operation, cold conditions (0°C), short time for processing

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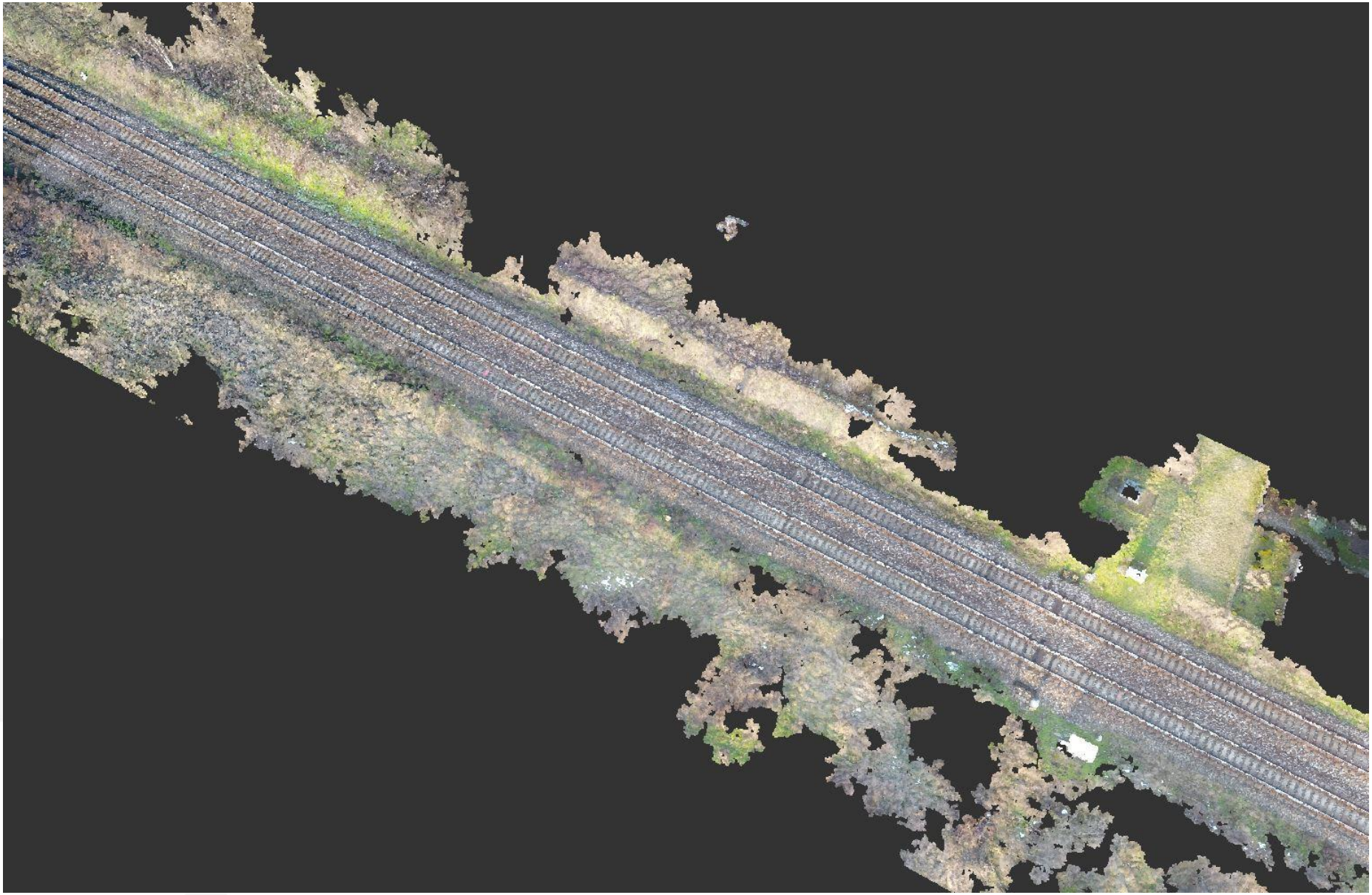
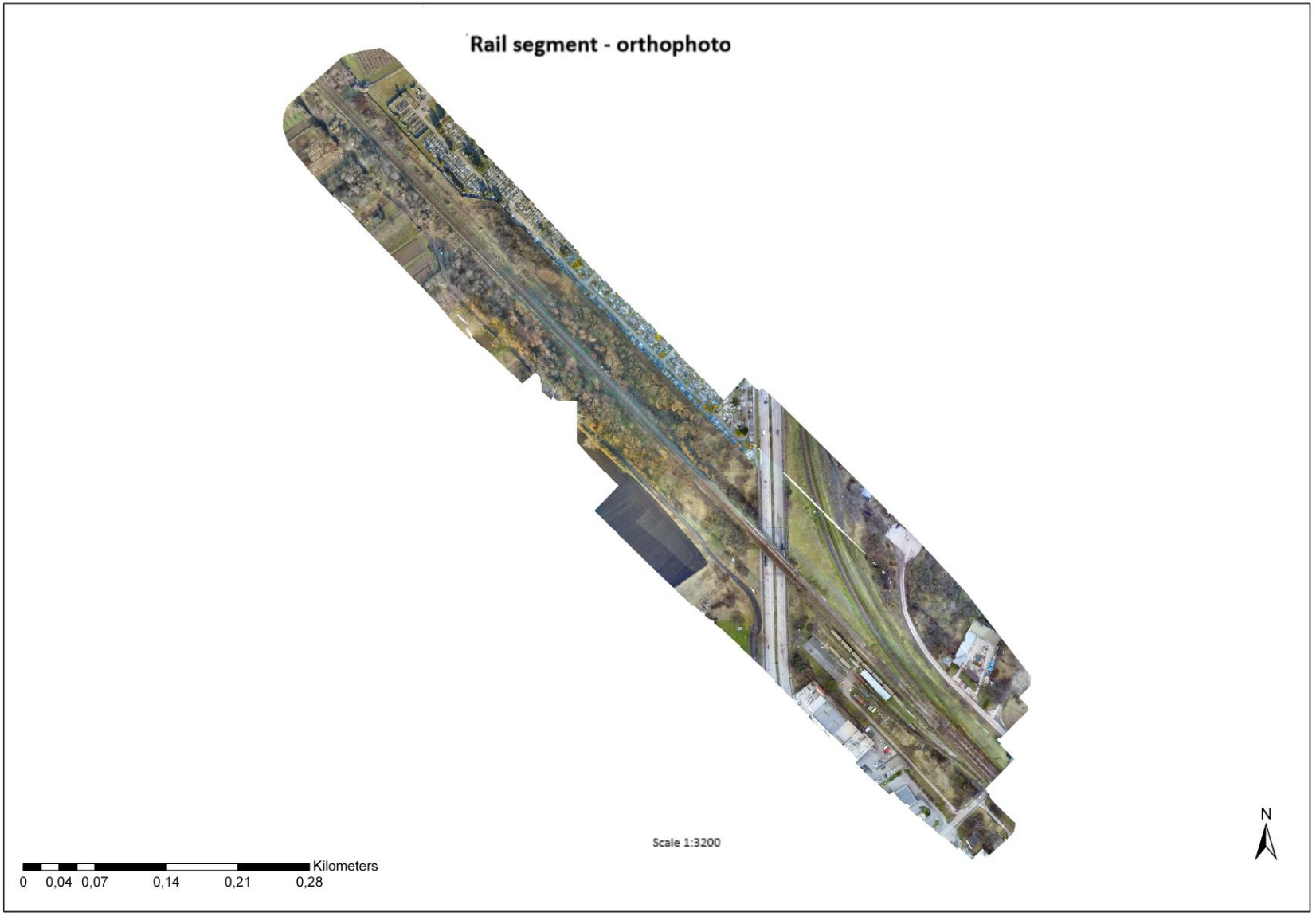
3D model - pointcloud



Drone rail inspection - orthomosaic



Drone rail inspections - measurements

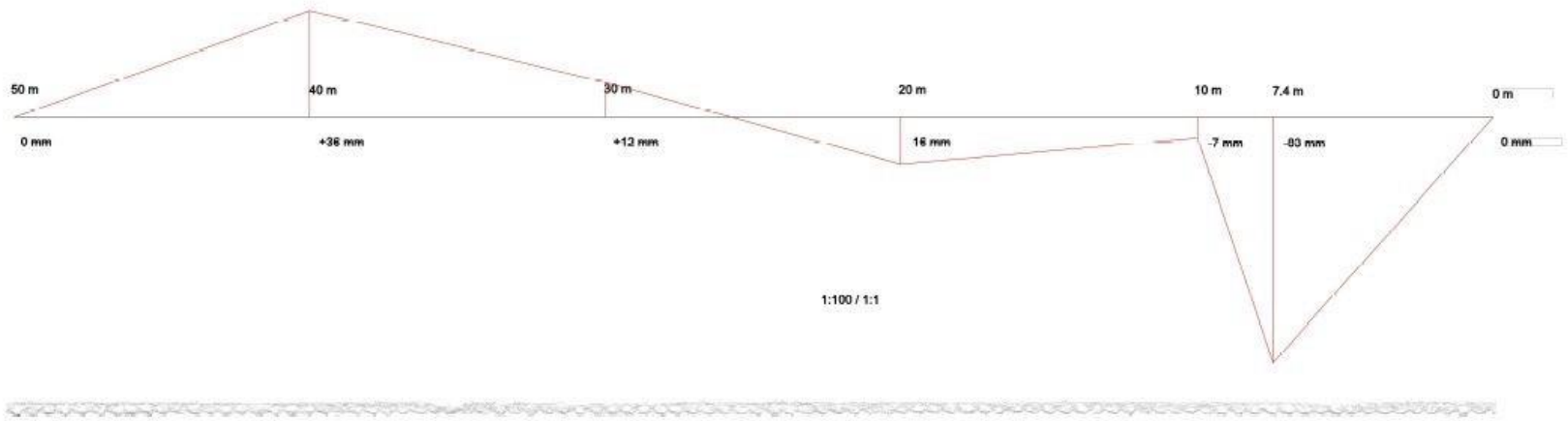
Track course in the 200 m section, tracking of the embankment and gauge

1:100

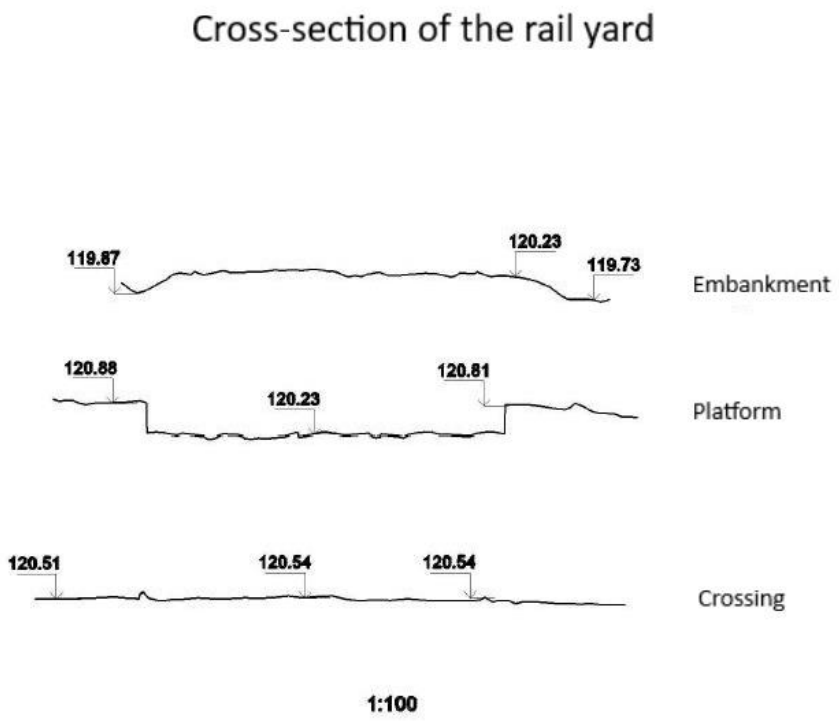
- Distance measurements
- Difference between various areas
- Difference between nominal and real values

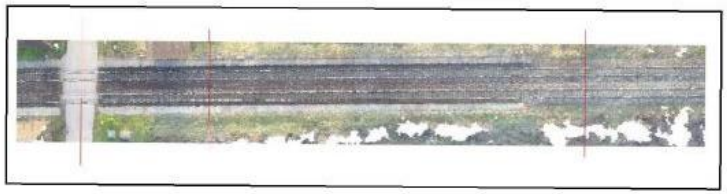
Drone rail inspection - height course of the rail

Height course of the rail



Drone rail inspection - cross section of the rail yard





- Different types of environment

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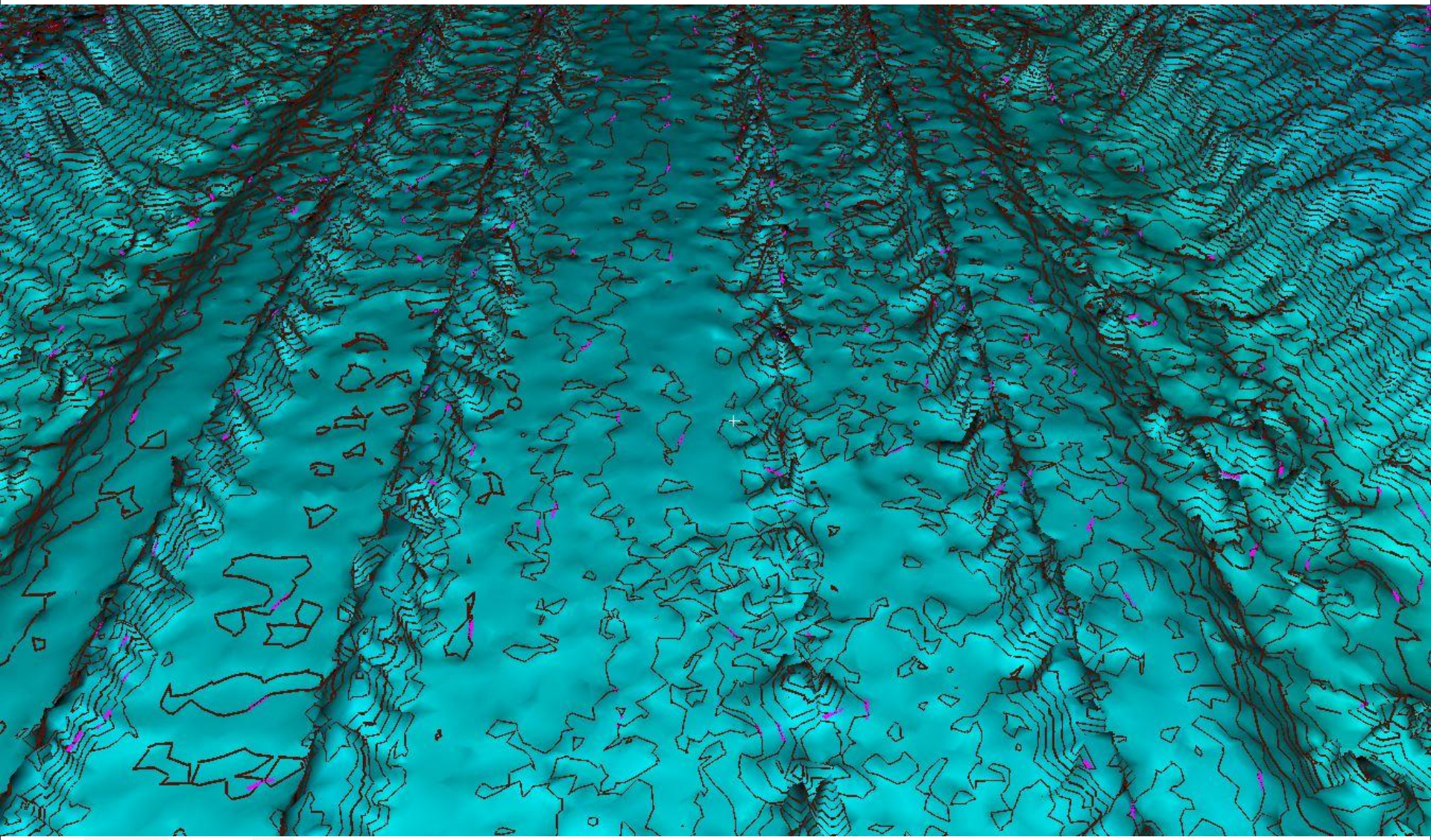
Drone rail inspection - monitoring of the embankments using contours



Results

- Basic geodetic outputs
- Cross section of the rail yard
- Height course of the rails
- Changes of the embankment in time

The Tramway Tunnel

Can new building collapse old tunnel?

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The Tramway Tunnel

What we had to do:
Surveying measurements to find out the condition of the tunnel before new building construction over the tunnel

Used method:
Scanning using terrestrial scanner and targets

Outputs:
Georeferenced pointcloud, orthoimages in lenght of 120 m, cross-sections in needed places

Conditions:
Night hours (after midnight), cold environment

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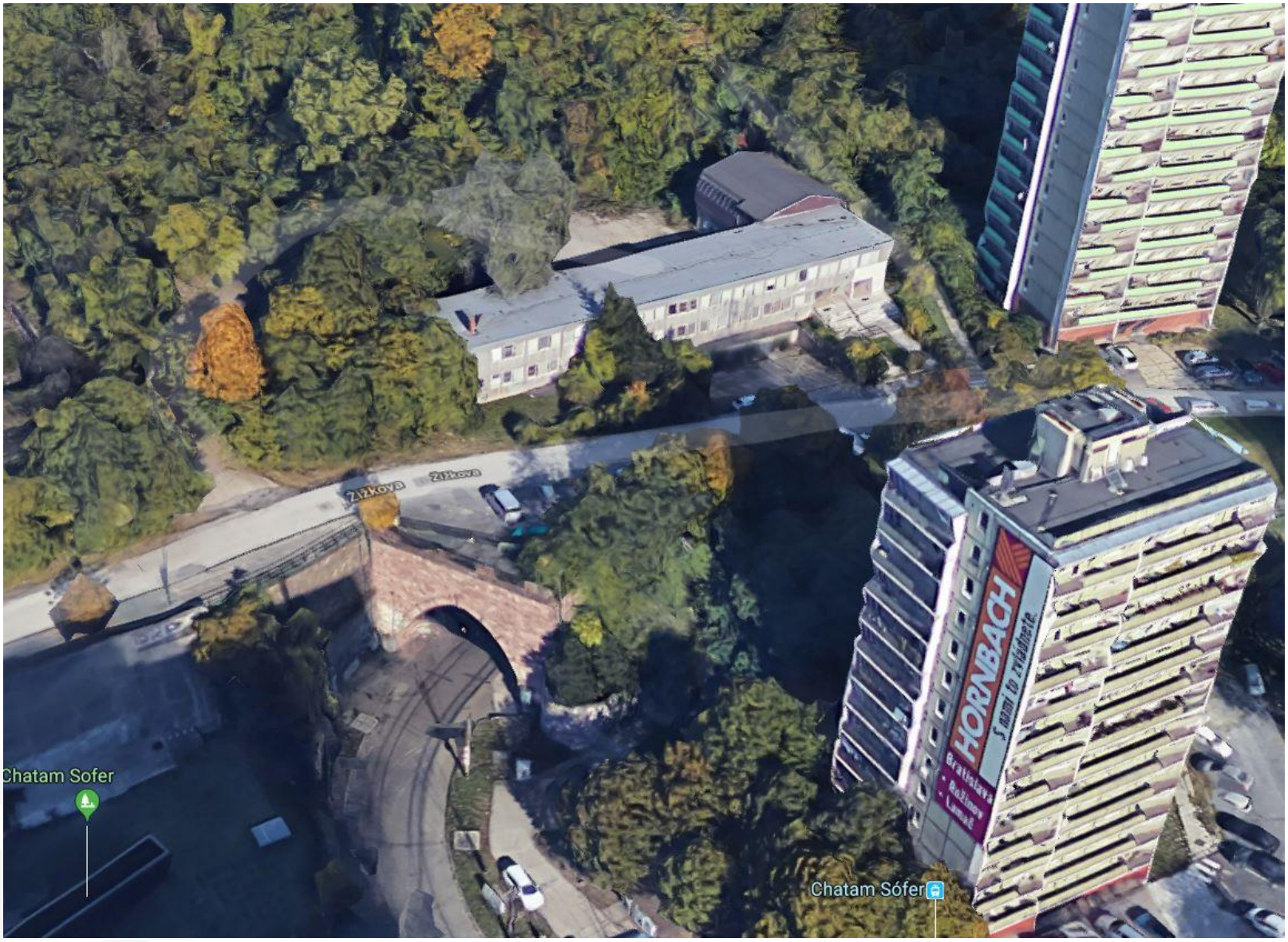
Old building over the tunnel



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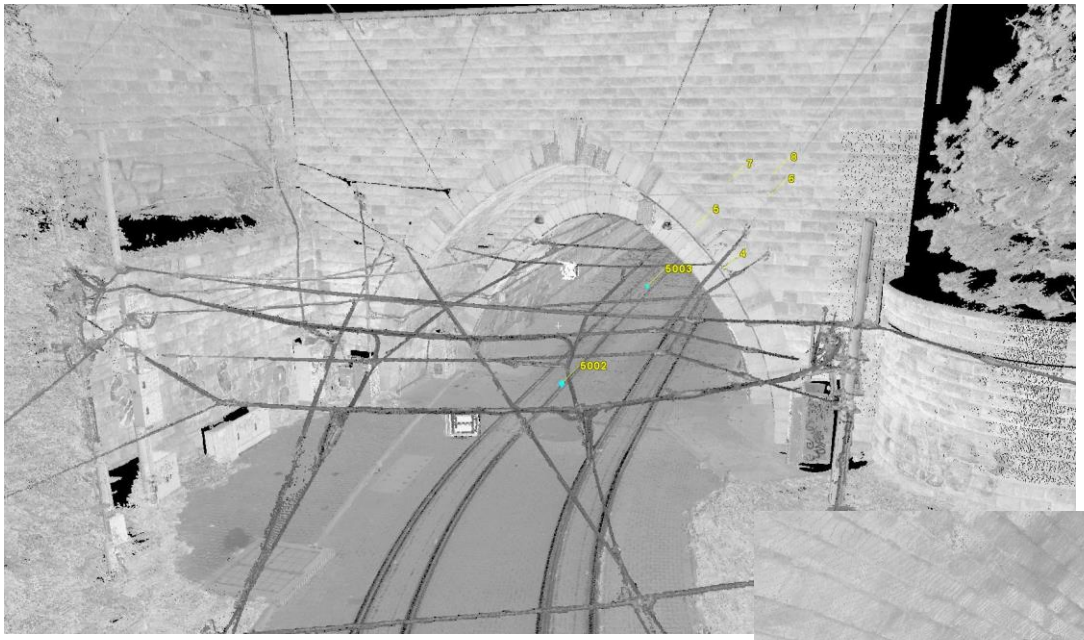
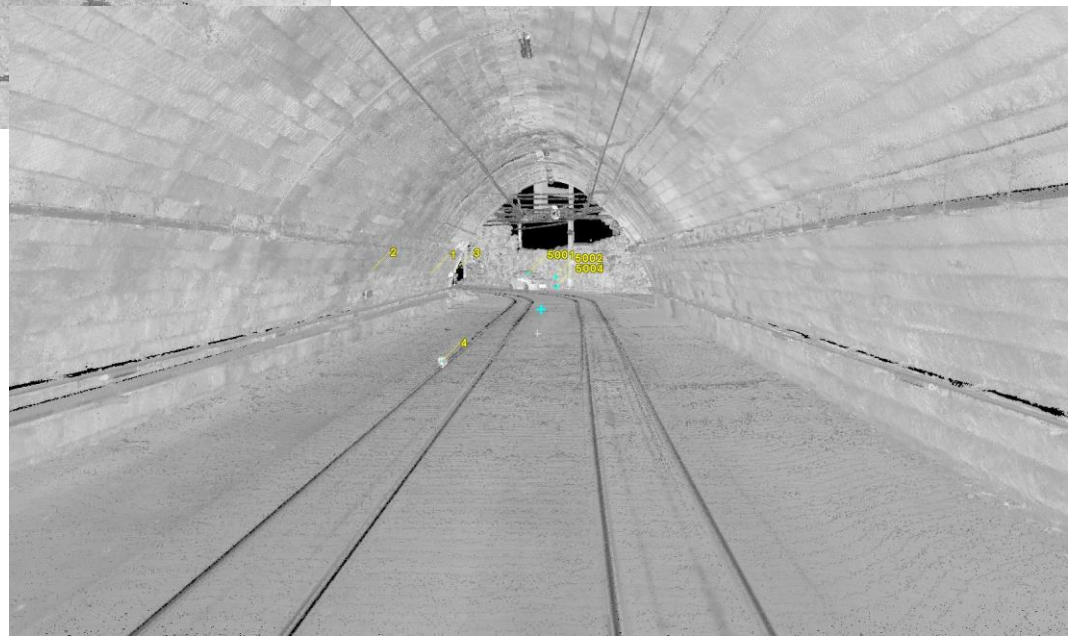
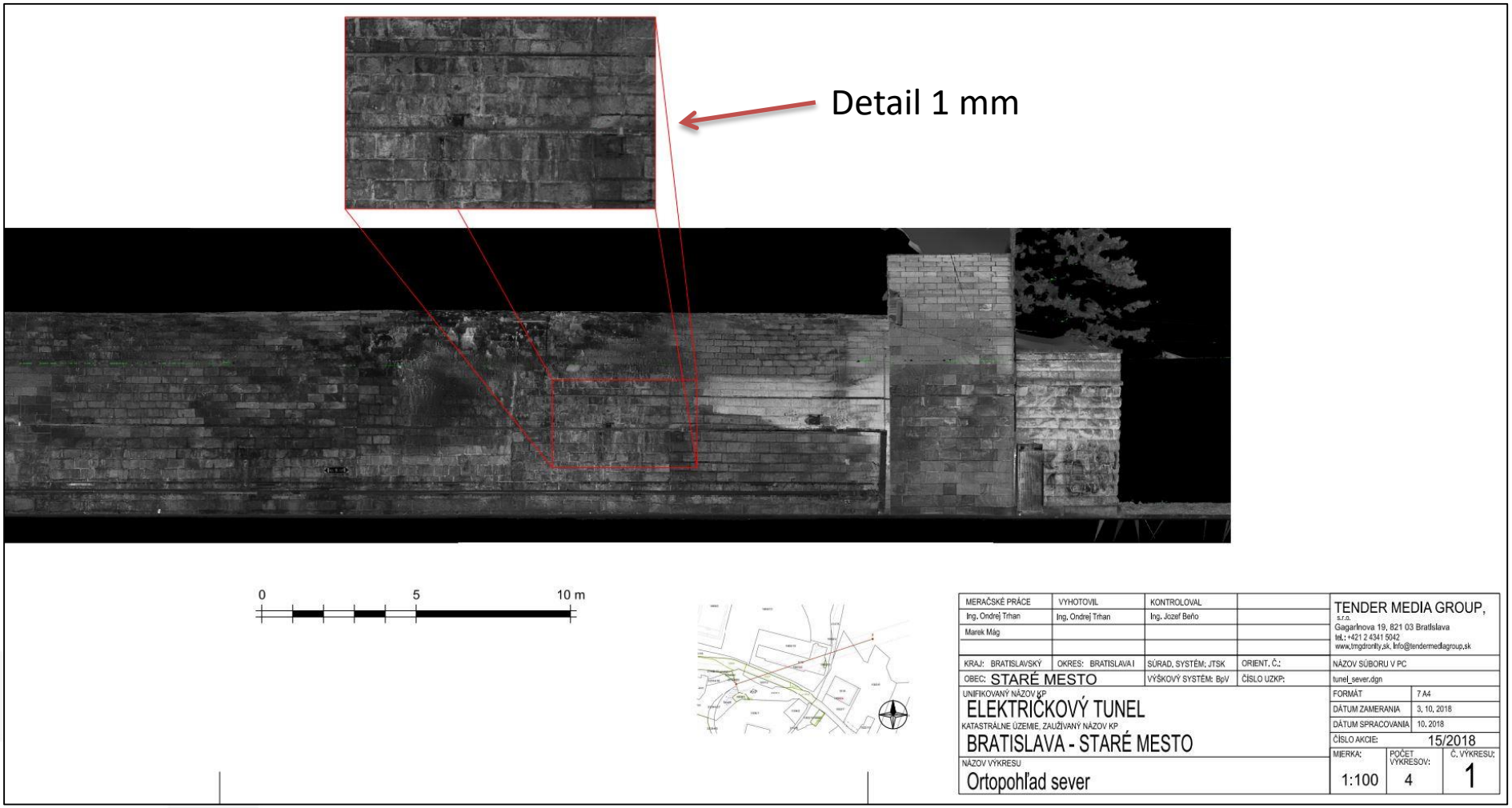
Georeferenced Pointcloud





View of orthoimage



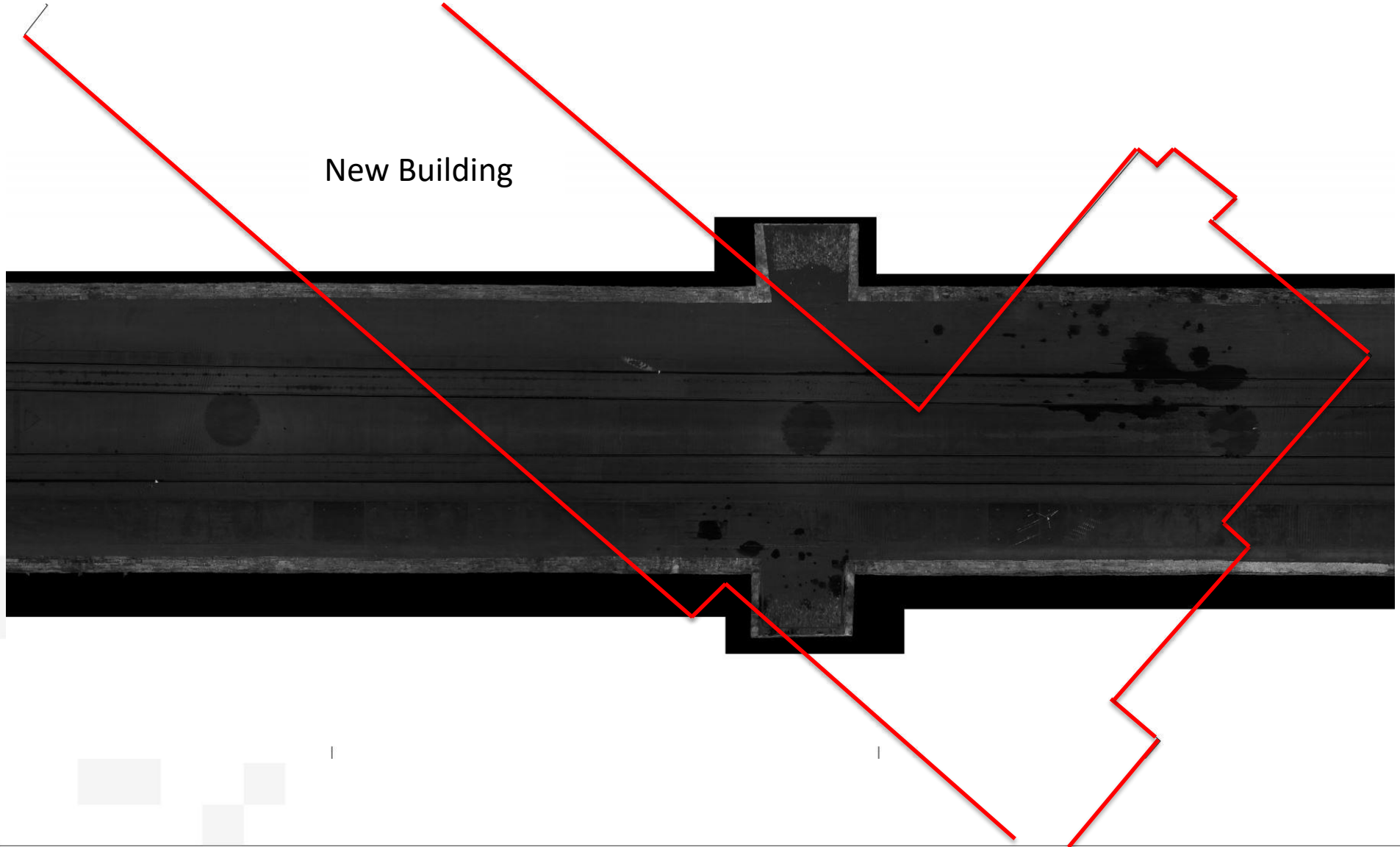
MERAČSKÉ PRÁCE	VYHOTOVIL	KONTROLOVAL		TENDER MEDIA GROUP, s.r.o. Gagarinova 19, 821 03 Bratislava tel.: +421 2 4341 5042 www.tmgdronity.sk, info@tendermediagroup.sk
Ing. Ondrej Trhan	Ing. Ondrej Trhan	Ing. Jozef Beňo		
Marek Mág				
KRAJ: BRATISLAVSKÝ	OKRES: BRATISLAVA I	SÚRAD. SYSTÉM: JTSK	ORIENT. Č.:	NÁZOV SÚBORU V PC
OBEC: STARÉ MESTO		VÝŠKOVÝ SYSTÉM: BpV	ČÍSLO UZKP:	tunel_sever.dgn

UNIFIKOVANÝ NÁZOV KP
ELEKTRIČKOVÝ TUNEL
KATASTRÁLNE ÚZEMIE, ZAUŽÍVANÝ NÁZOV KP
BRATISLAVA - STARÉ MESTO
NÁZOV VÝKRESU
Ortopohľad sever

FORMÁT	7 A4
DÁTUM ZAMERANIA	3. 10. 2018
DÁTUM SPRACOVANIA	10. 2018
ČÍSLO AKCIE:	15/2018

MIERKA:	POČET VÝKRESOV:	Č. VÝKRESU:
1:100	4	1

Schematic view of new building over tunnel



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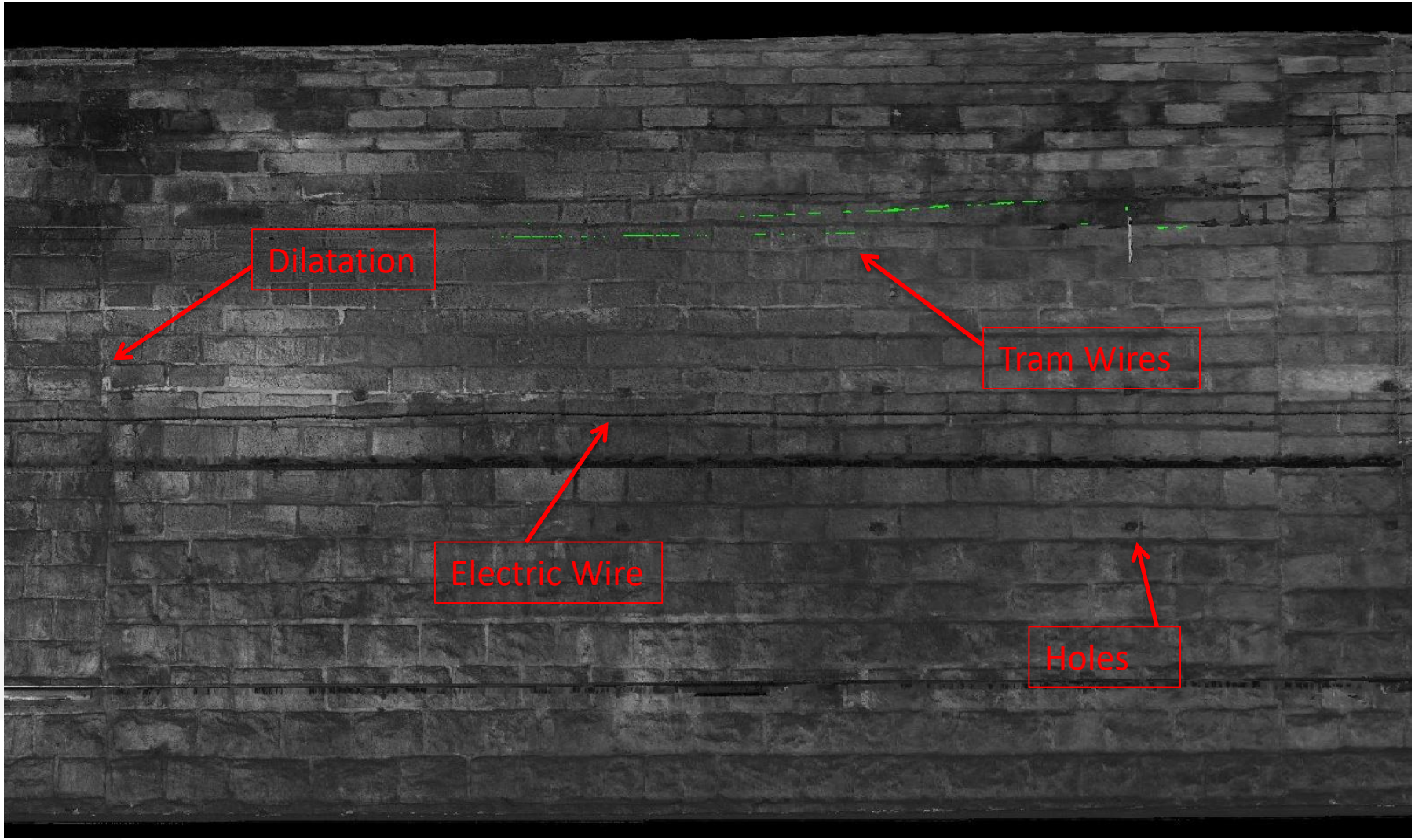
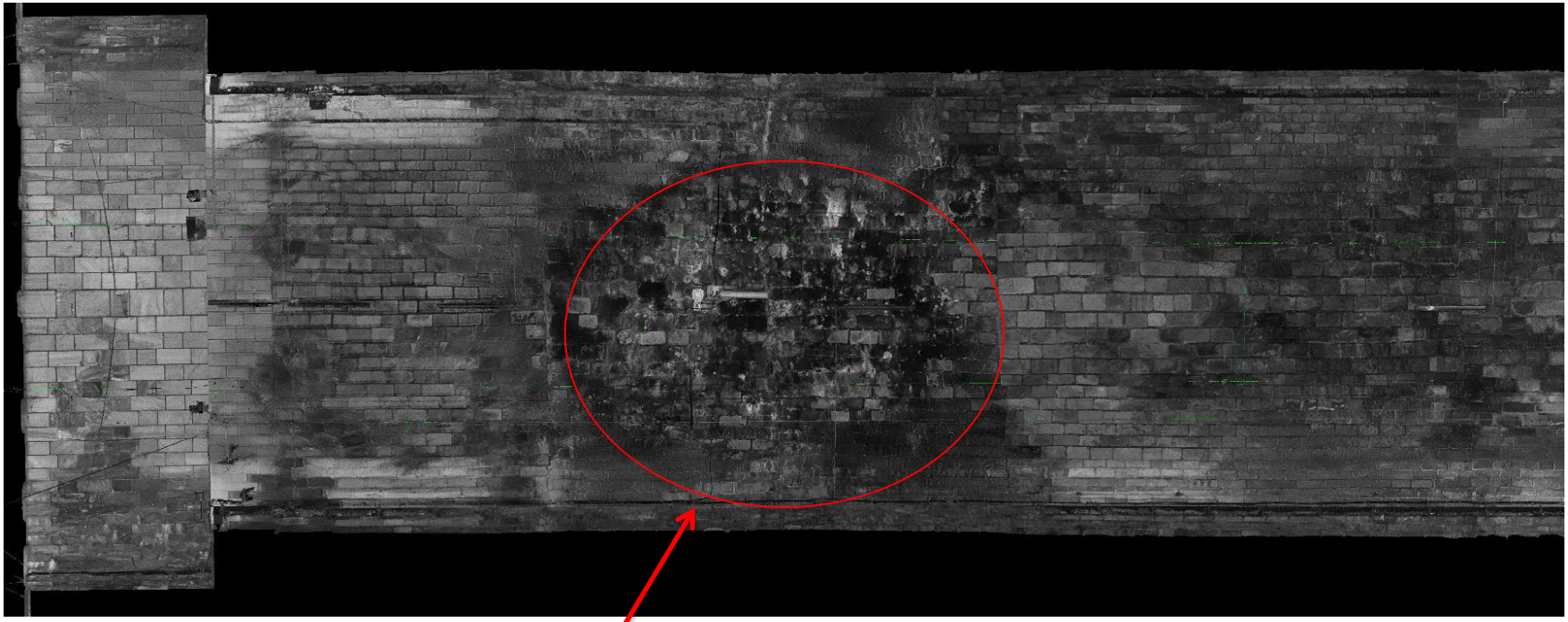
Visual analysis



Visual analysis



Propably flooded area

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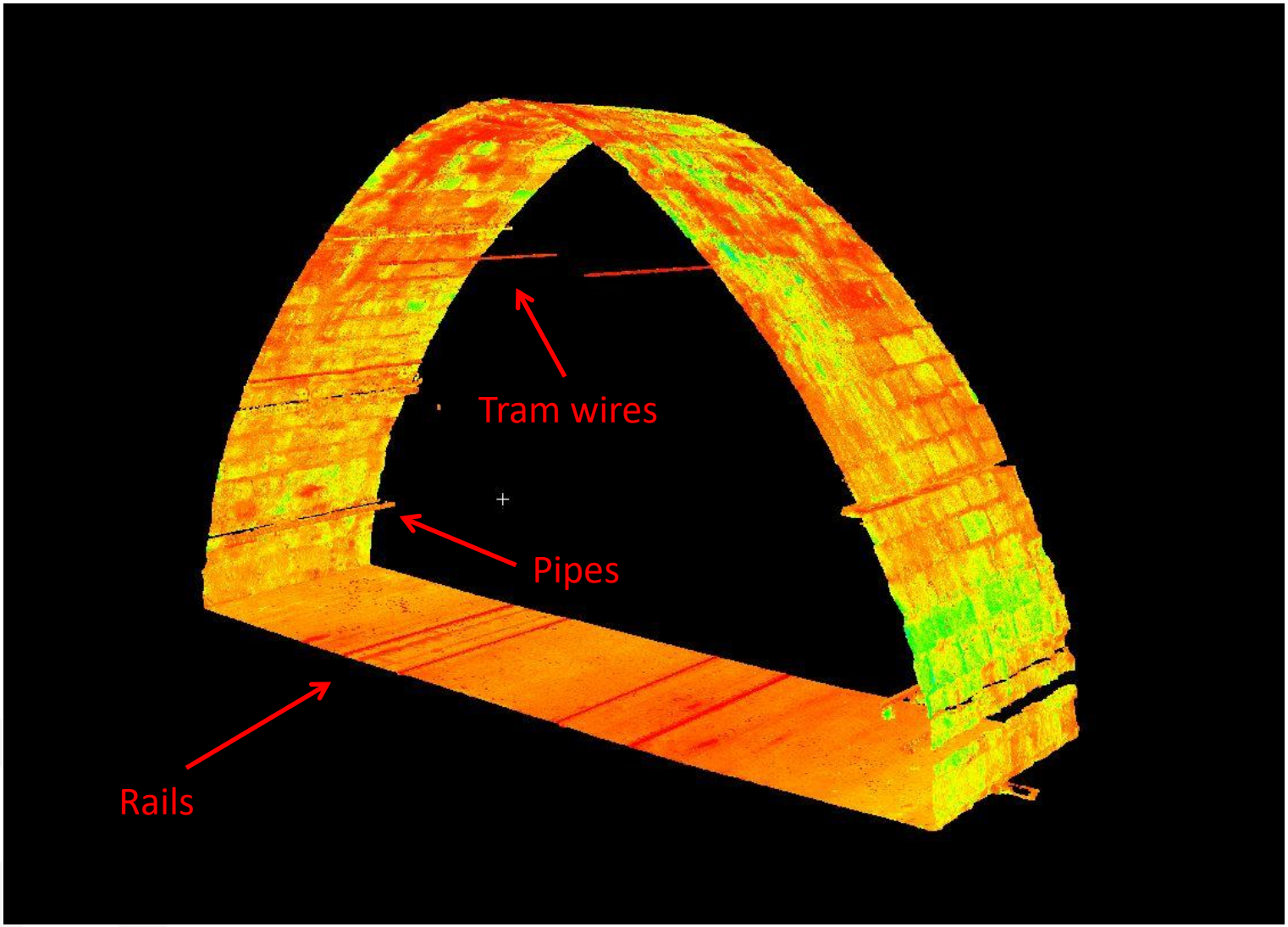
Object detection in pointcloud



Results

- Basic geodetic outputs
- Cross sections of the tunnel
- Actual state of the tunnel
- Identified tunnel deformations

The Highway Tunnel and Roads

Is something wrong in new tunnel construction?

The Highway Tunnel and Roads

What we had to do:
Surveying measurements to find out the actual condition of the tunnel and near highway before handover to other builder

Used method:
Scanning using terrestrial laser scanner and targets, drone and terestrial photography

Outputs:
Georeferenced pointclouds, orthoimages, cross-sections in needed places, damages of the tunnel and pilars, models

Conditions:
7 445 m of one tunnel tube, over 5 000 m outside measurements (pilars, bridges), hot weather (over 30°C)

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Problematic environment

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Problematic environment

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Problematic environment

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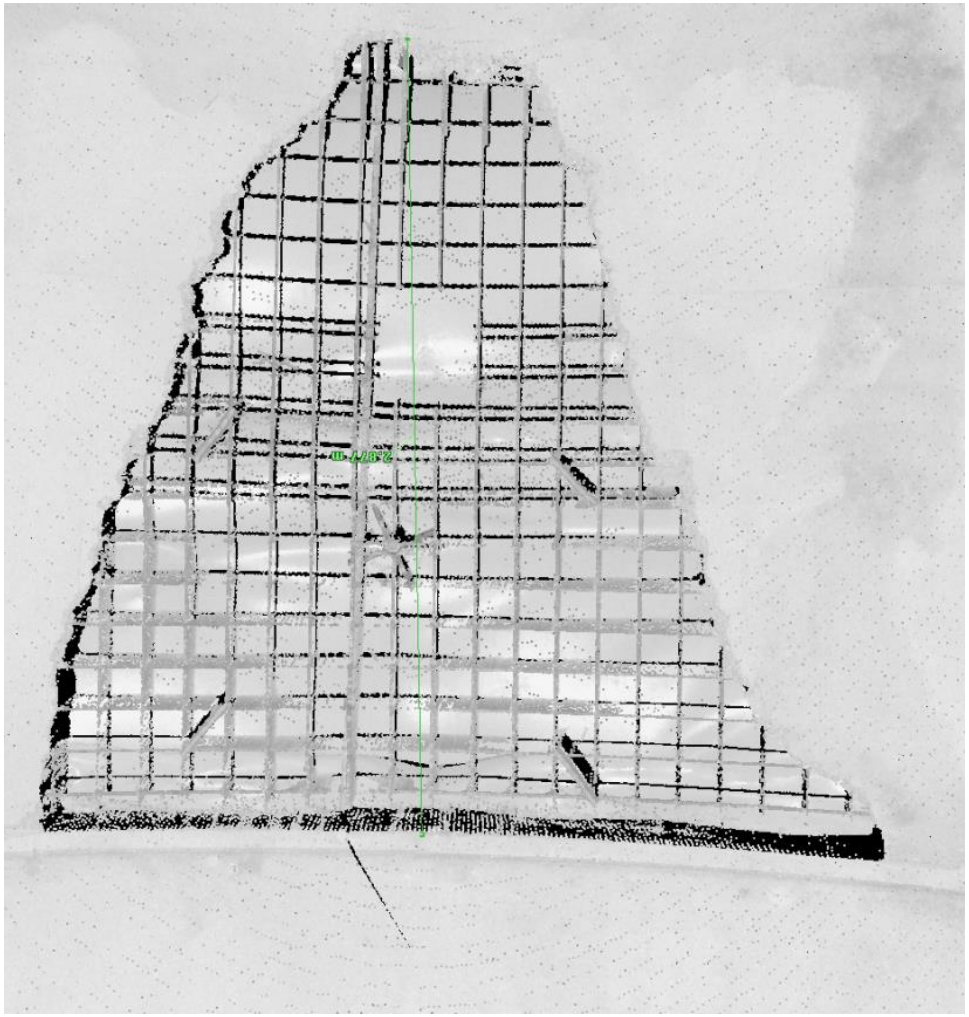
Problematic environment

Inside deformation detection and localization

- Detection of inside deformations
- Size measurements
- Corect coordinates and localization of deformation

TMG Dronity Inside deformation detection and localization

- Detection of inside deformations
- Size measurements
- Corect coordinates and localization of deformation



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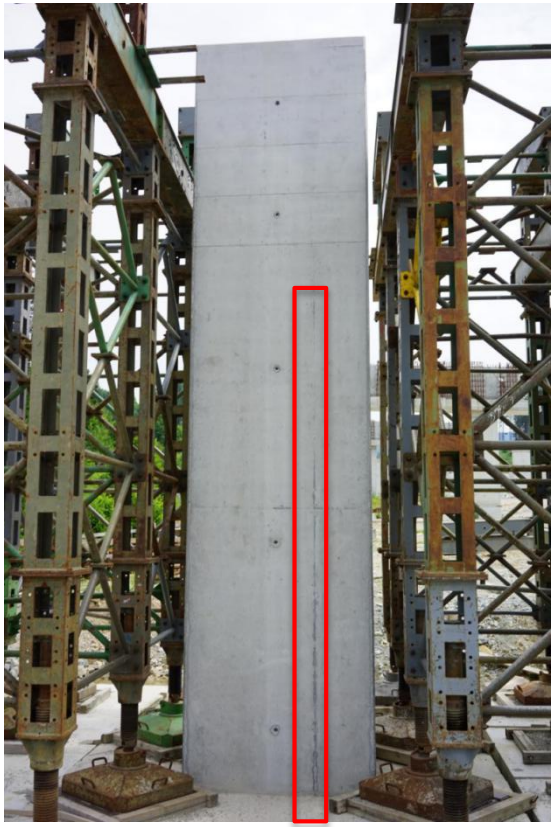
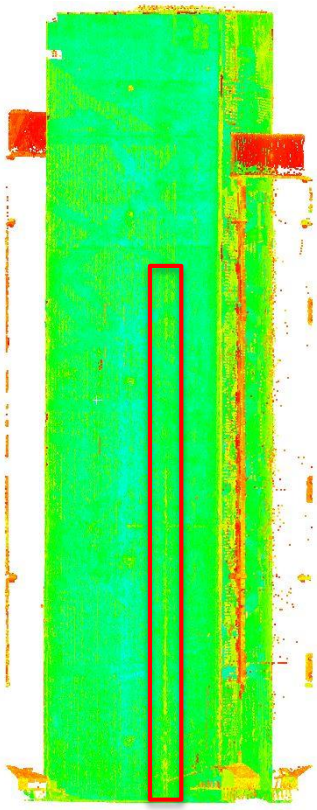
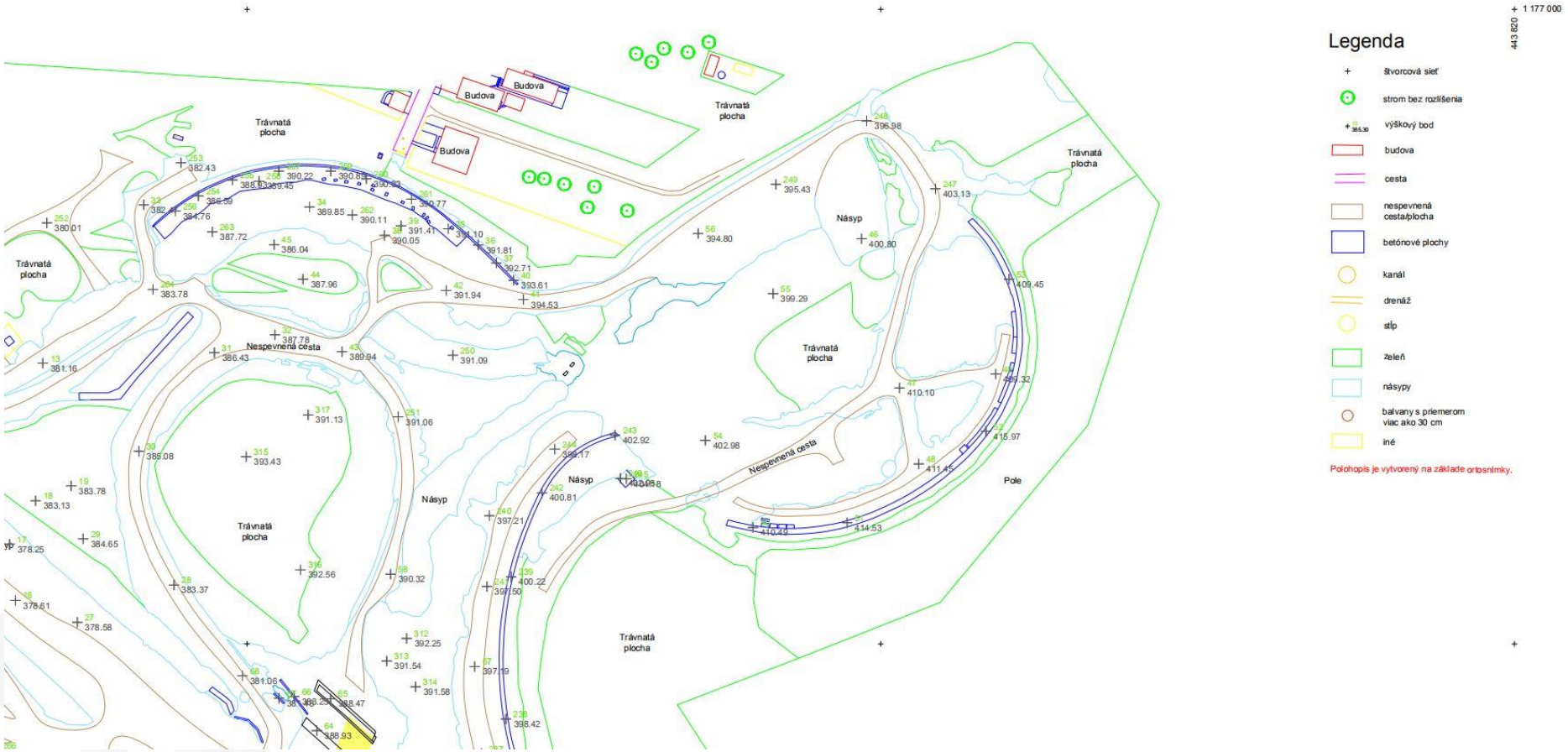
Outside deformation detection and localization





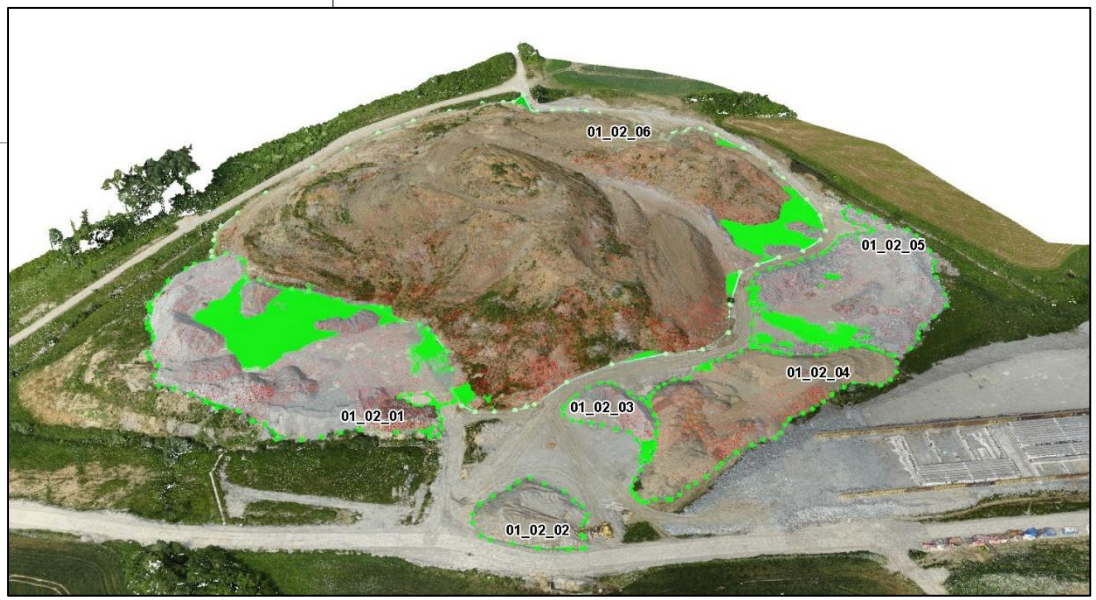
- Distance measurements
- Different deformations
- Comparision with realistic photos
- Correct localization

Topography and altimetry



Volume calculation

Number	Volume (m^3)	Area (m^2)
01_02_01	18 082	12 807
01_02_02	2 215	1 237
01_02_03	1 780	1 051
01_02_04	14 178	5 437
01_02_05	16 140	8 489
01_02_06	568 443	62 707



Results

- Basic geodetic outputs
- Cross sections of the tunnel
- Actual state of the tunnel
- Identified more than 70 tunnel deformations and 50 pillar deformations

The Dam

Will the dam tear up after refill?

The Dam

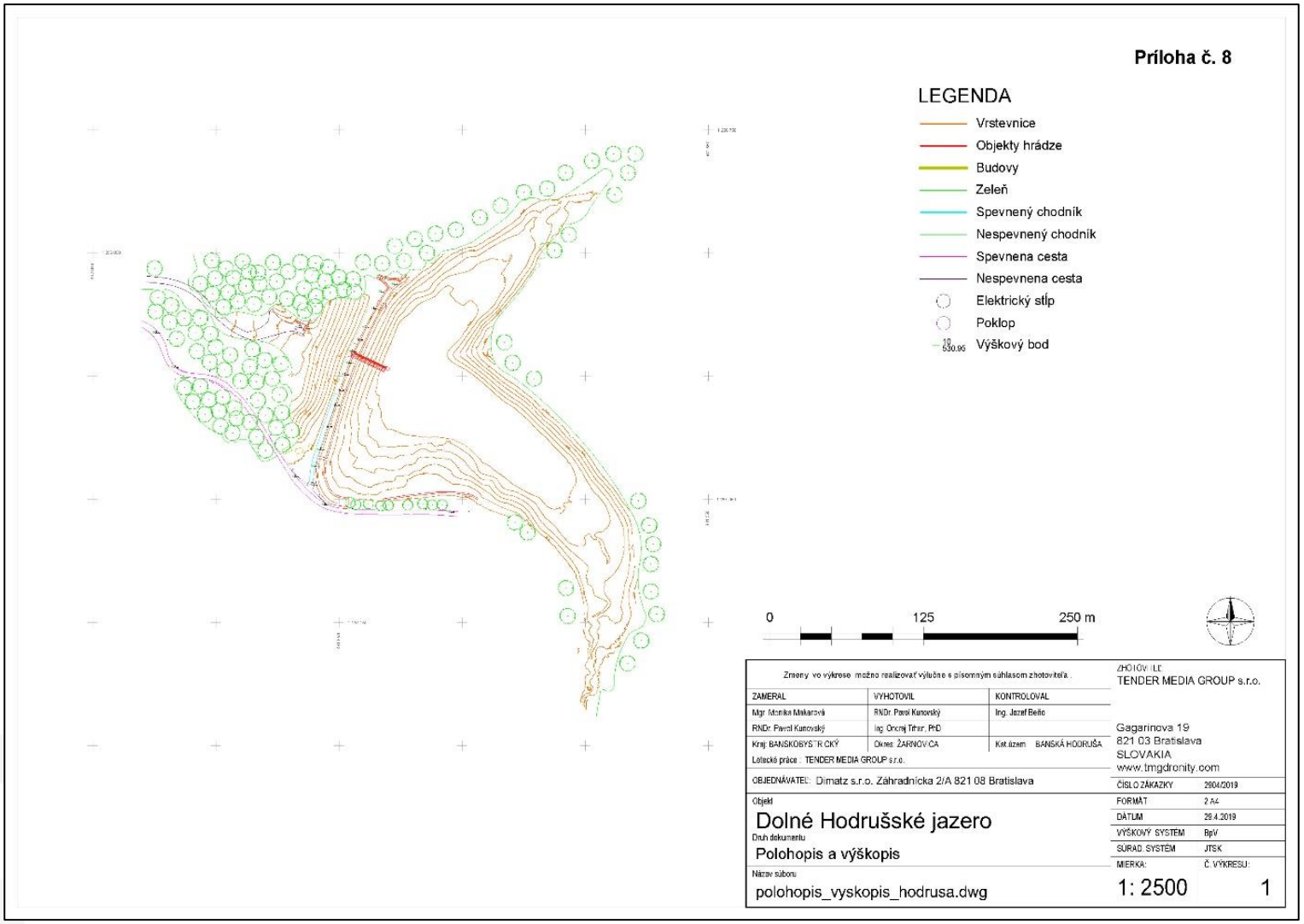
What we had to do:
Find out tears in the dam wall underground

Used method:
Aerial and terrestrial photography, thermal images, geophysical measurements

Outputs:
Georeferenced pointclouds, orthoimages, cross-sections in needed places, damages of the dam

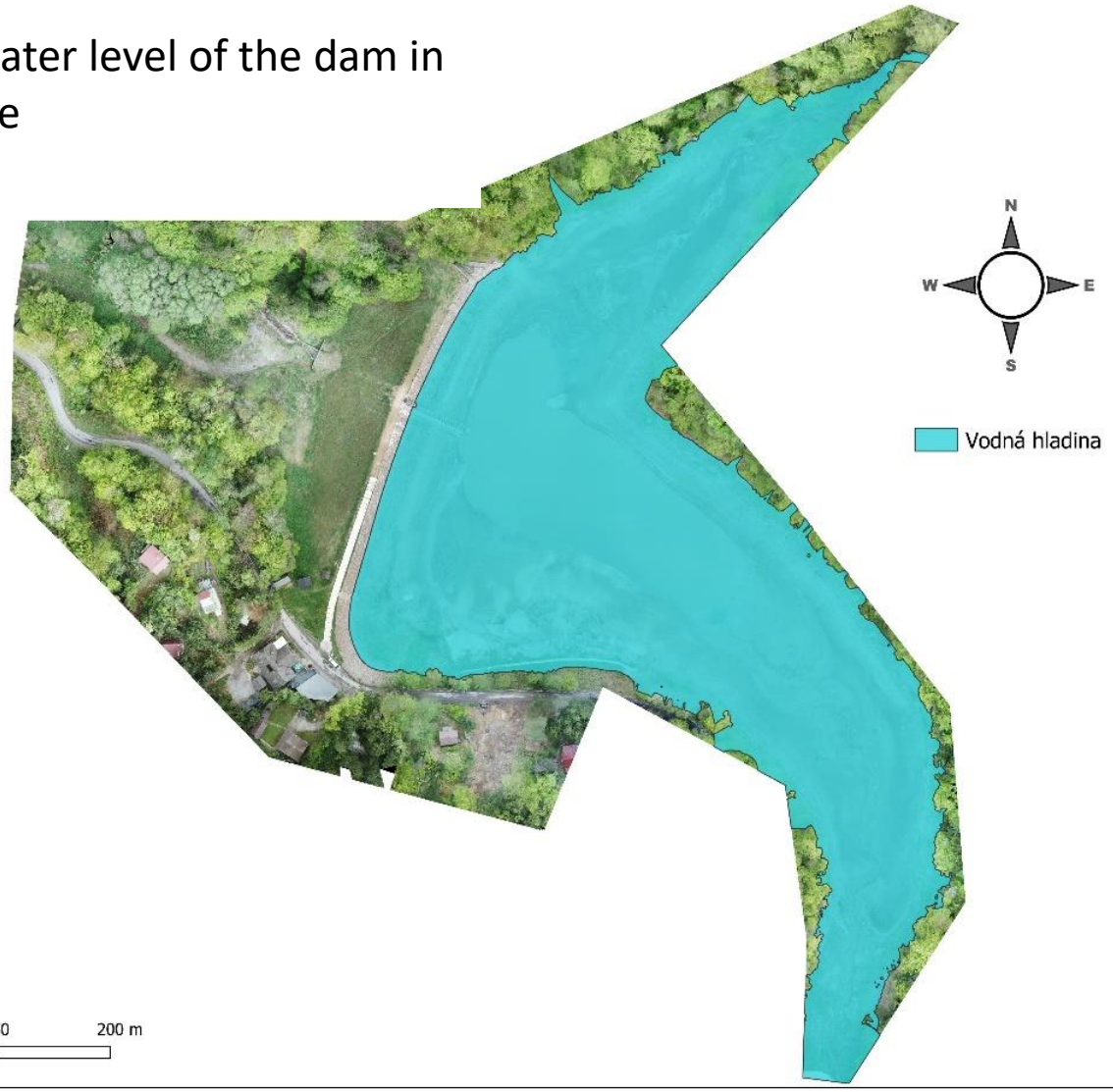
Conditions:
Forrest, small space for landing, camping area, windy and rainy weather

Topography and altimetry of the dam

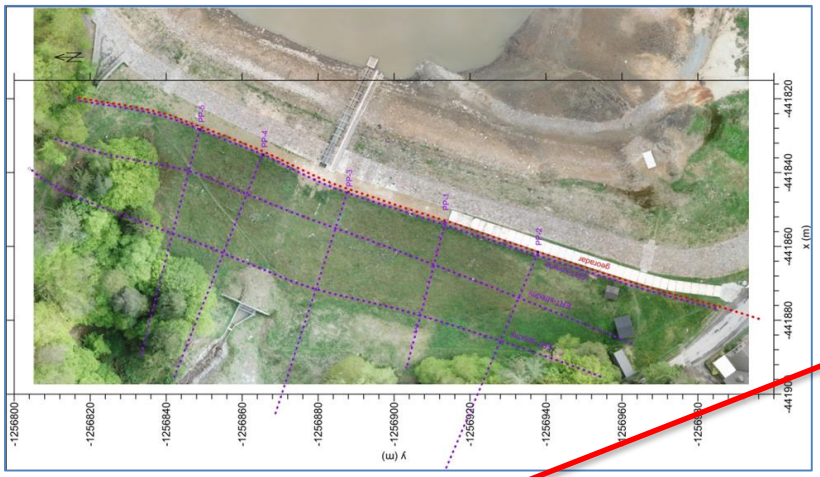


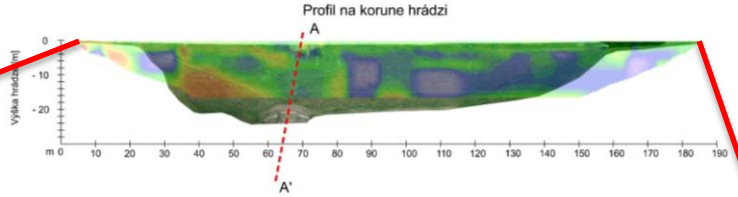
The Dam refill

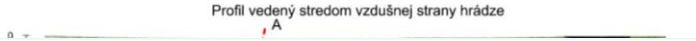
- Height of the water level of the dam in maximal volume

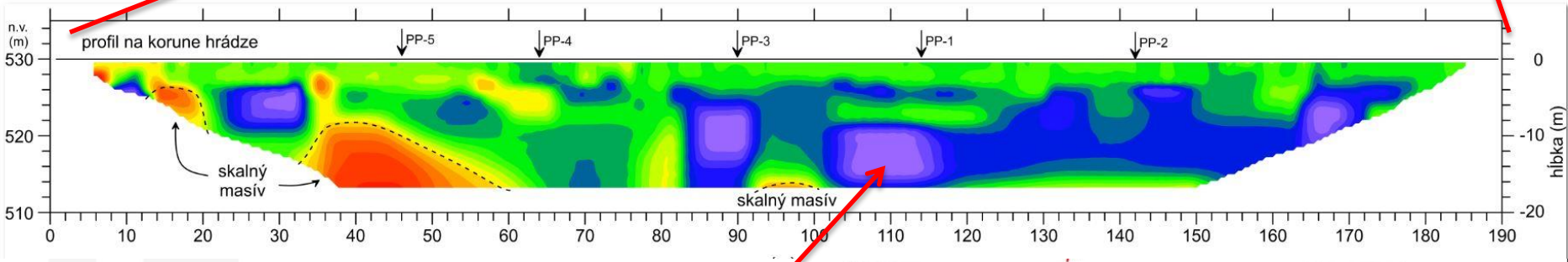


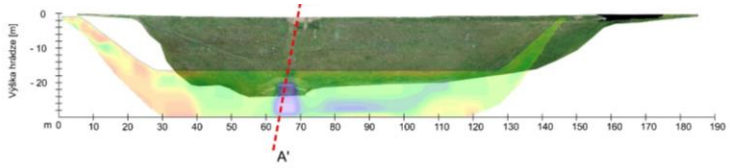
Underground profiles throught the dam







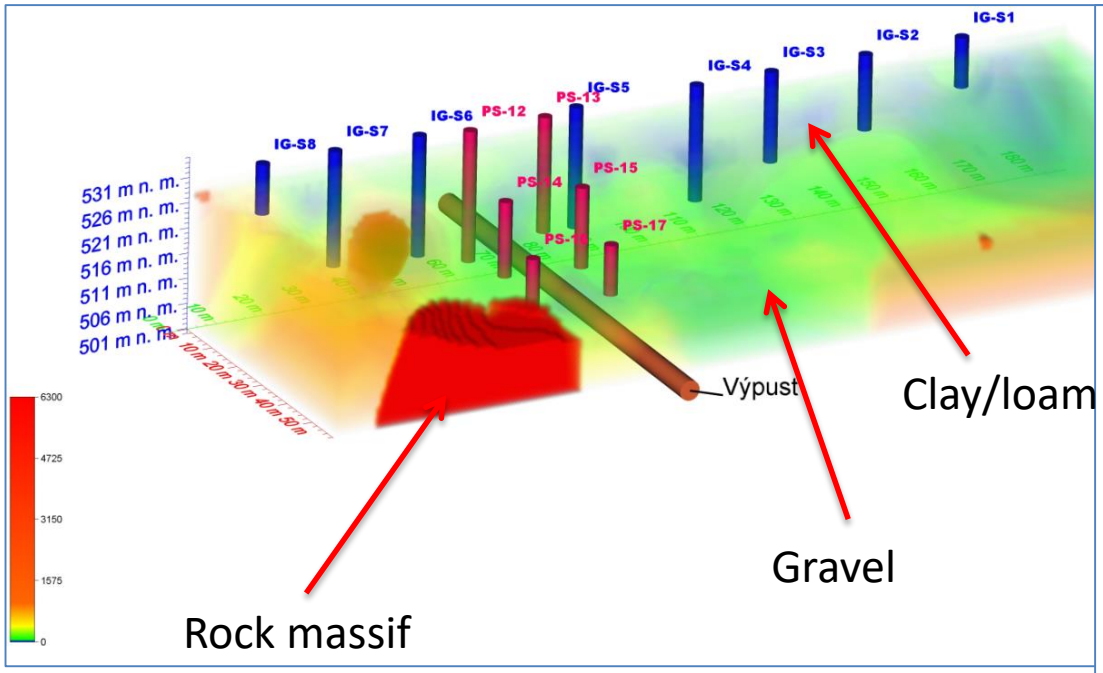


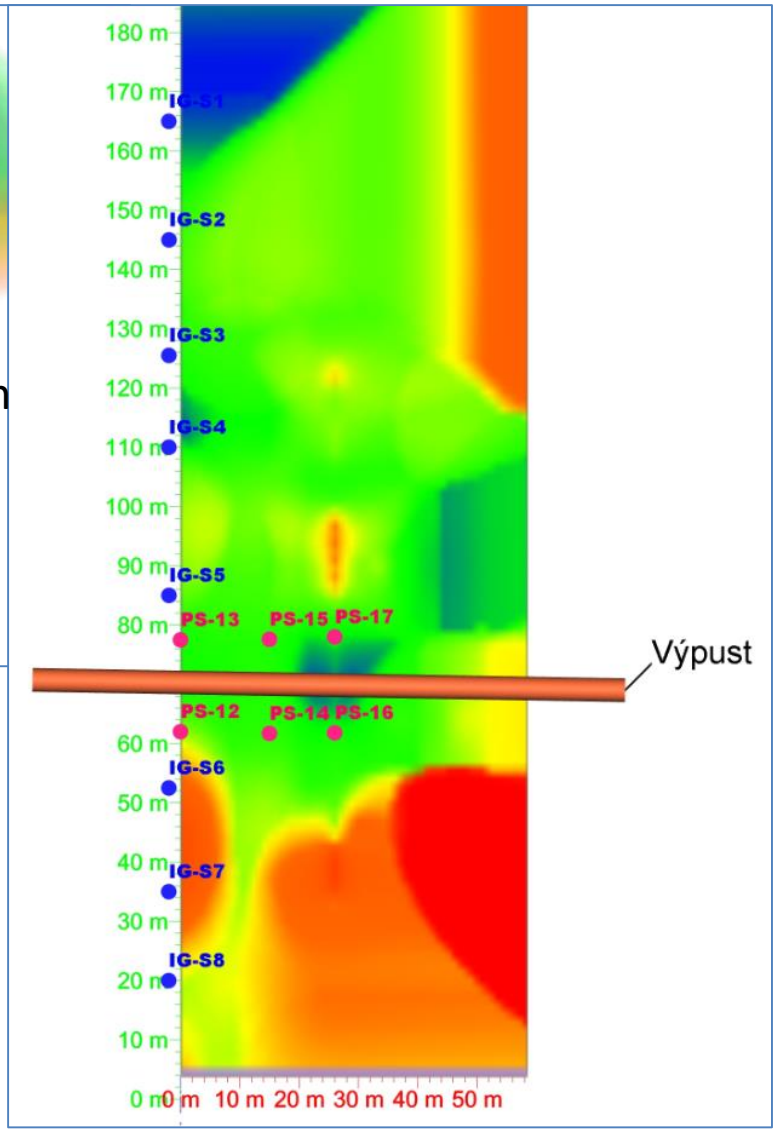


Problem

Schematické znázornenie priebehu výpustu

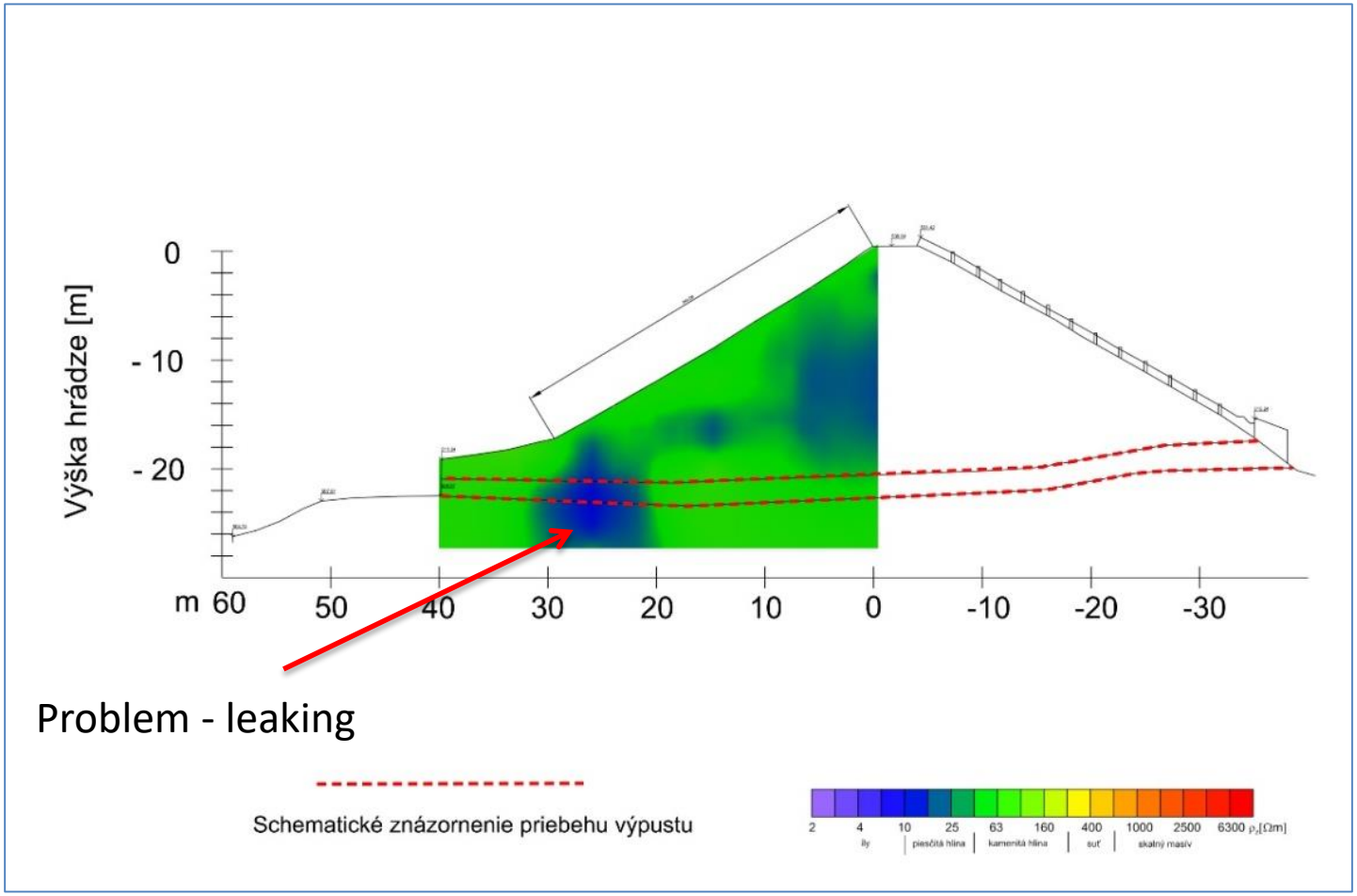
Inside of the dam





Identification of underground composition of the dam in 3D and 2D.

Cross section throught the dam



- Material identification of the dam
- Scematic representation of the output

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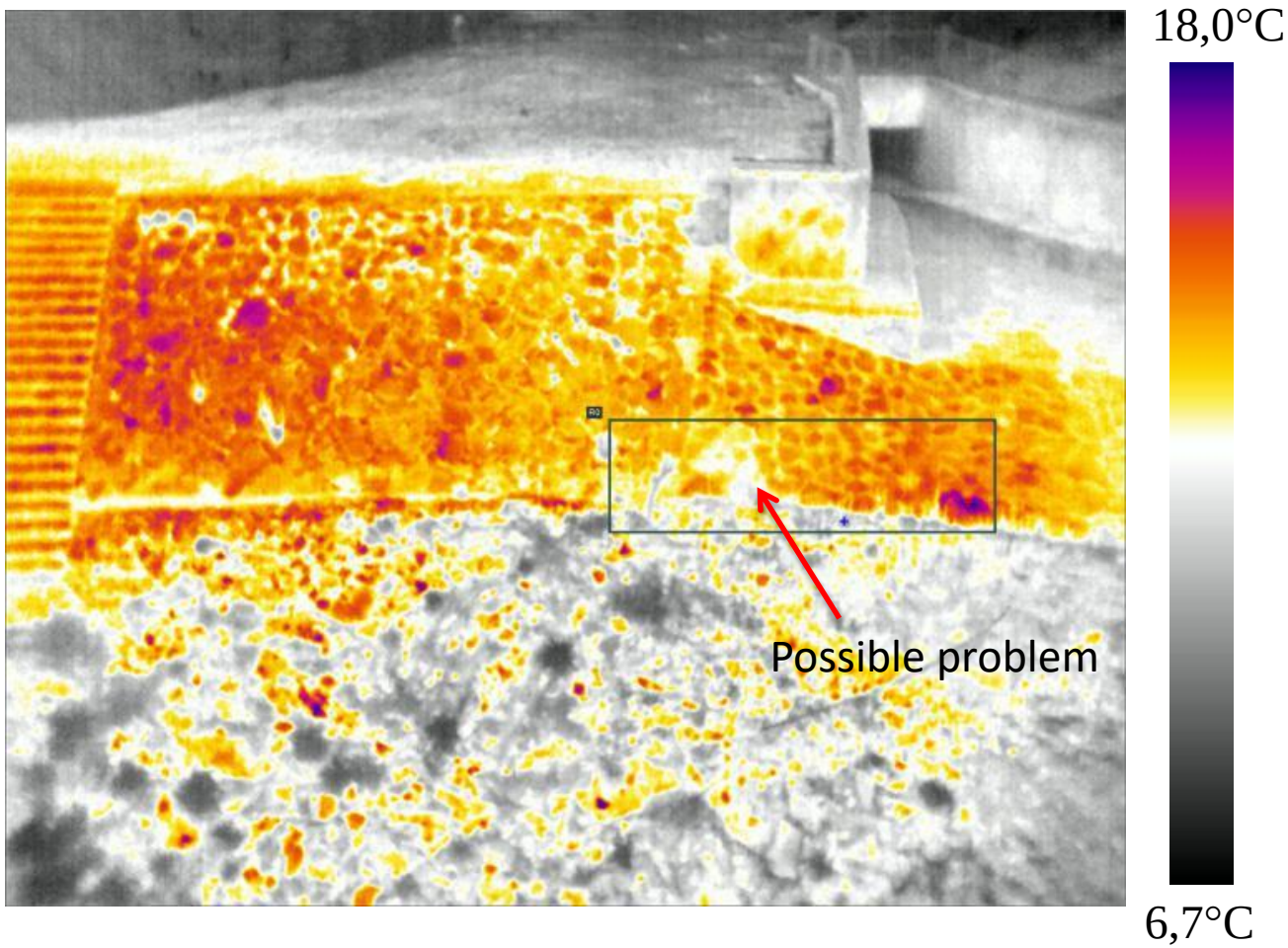
Thermal inspection



- Thermal inspection of potentional leaks

Results

- Basic geodetic outputs
- Thermal images
- Localization of posssible tears in the dam
- Underground composition of the dam

Geophysical Measurements

Can we find a dinosaur underground?

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Geophysical Measurements

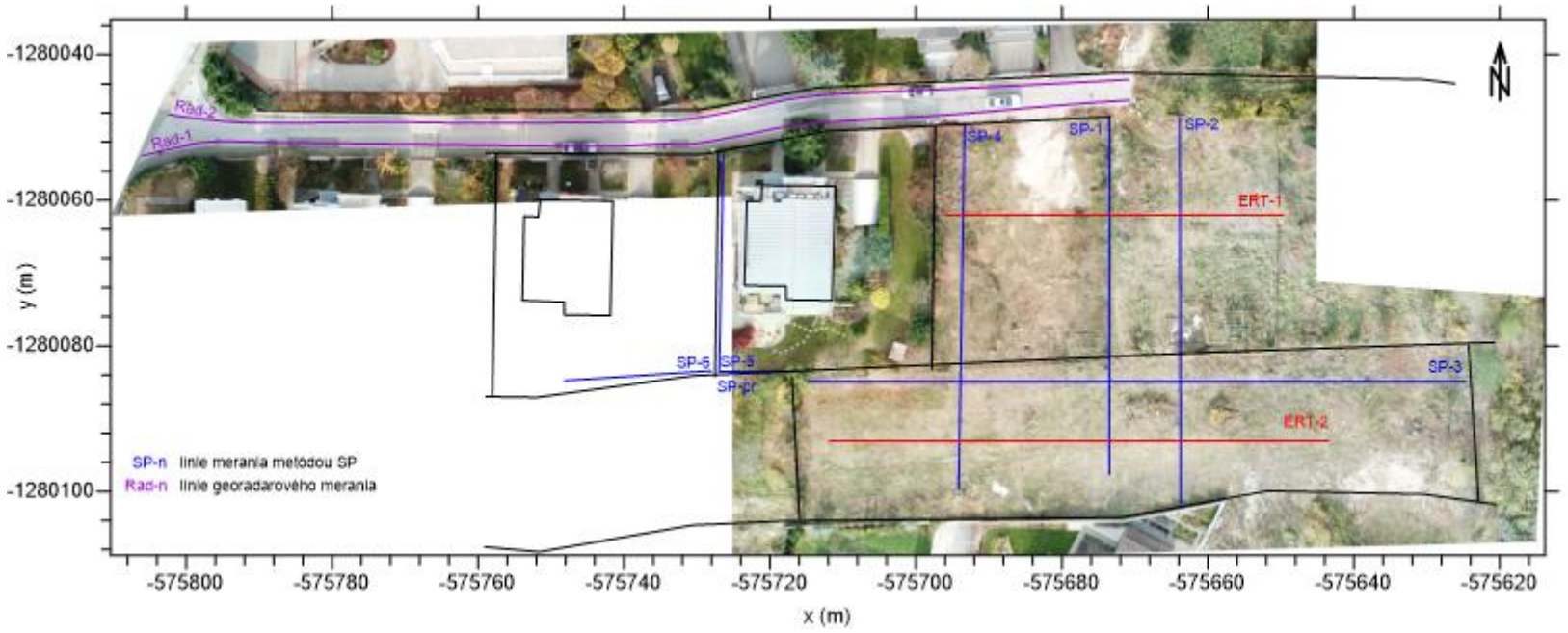
What we had to do:
Find out underground objects before building construction

Used method:
Drone photography, geophysical measurements

Outputs:
Georeferenced orthoimage, cross-sections in needed places, underground geophysical enronment

Conditions:
Inside of a city, construction place, no-fly zone, high constructions

Situation on the locality



According to the customer's requirements, the task of measurement was to assess:

1. Ground condition in the area of planned construction
2. The movement of groundwater on the planned construction area and in relation to the standing houses
3. The state of the road

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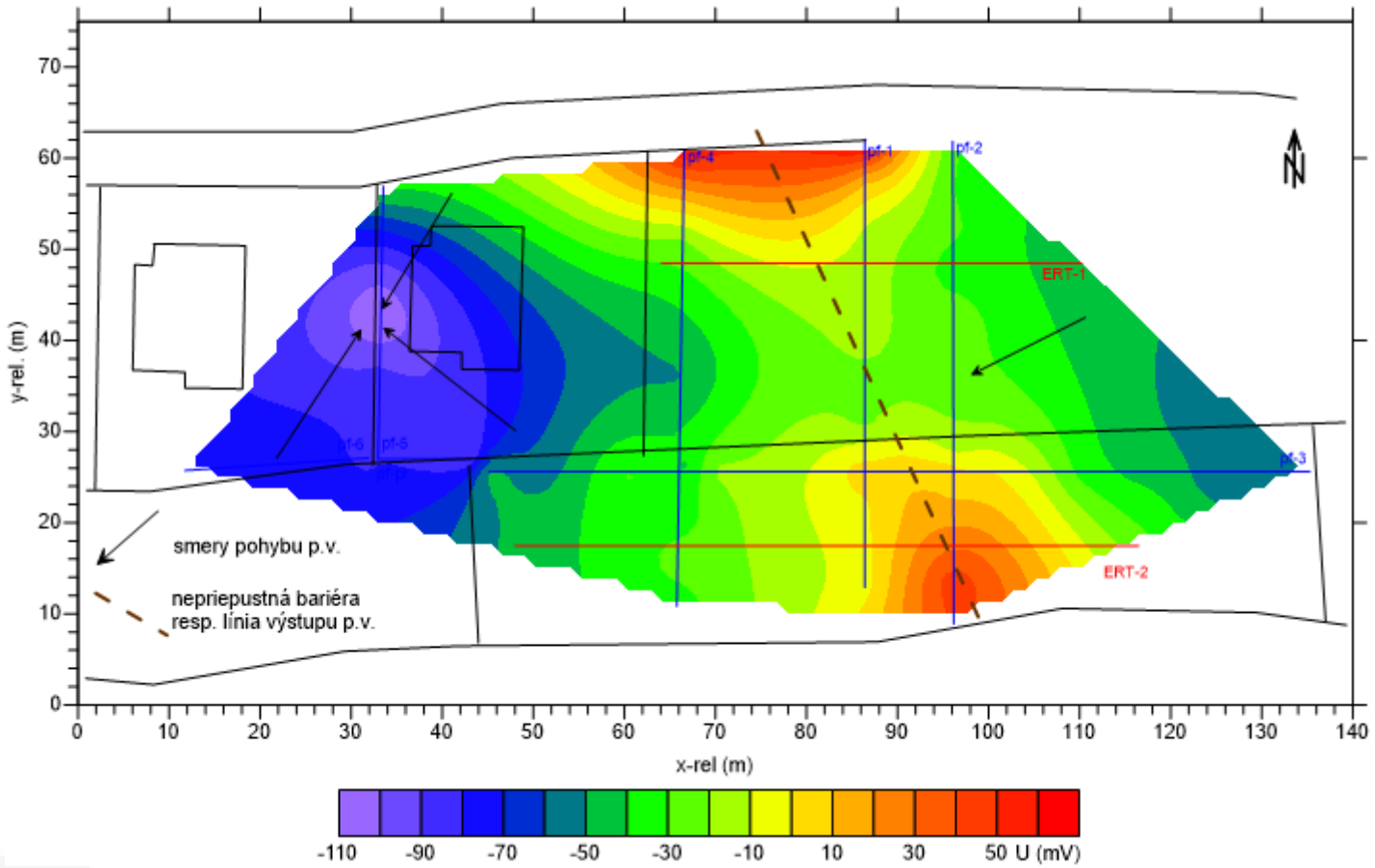
Where will water flow?



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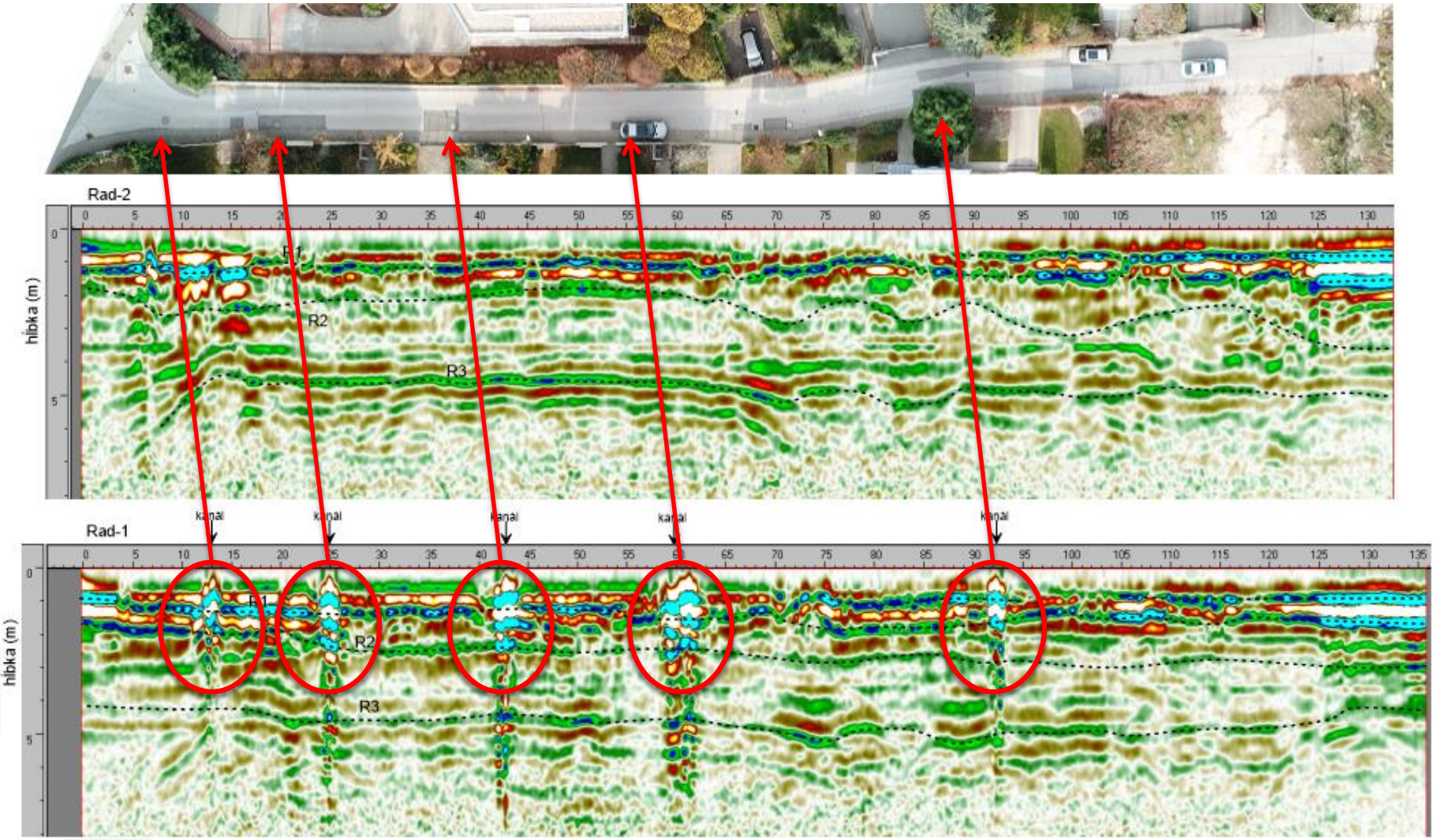
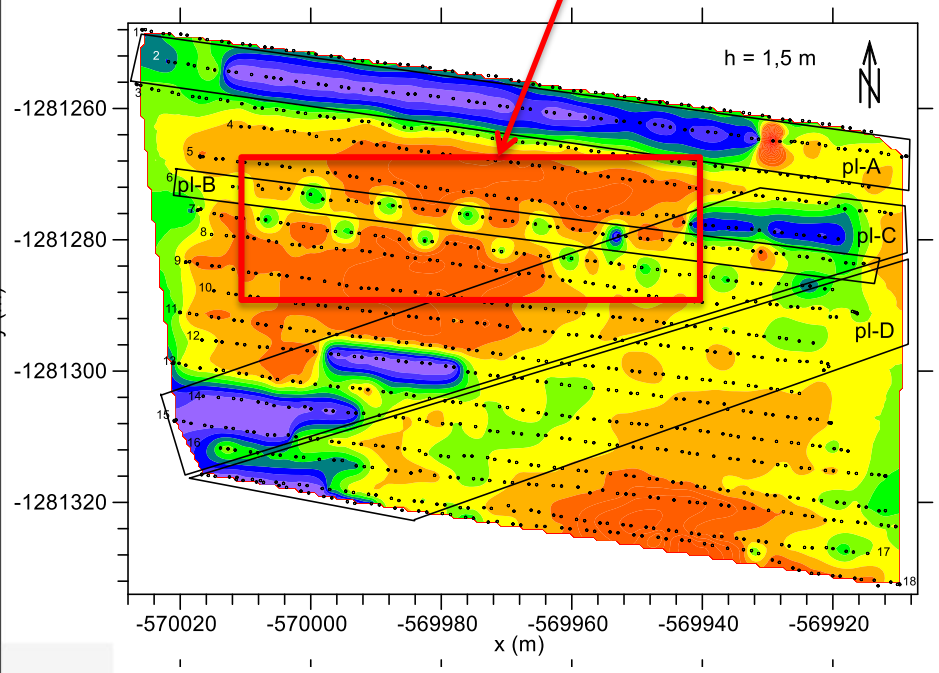
Road deffects

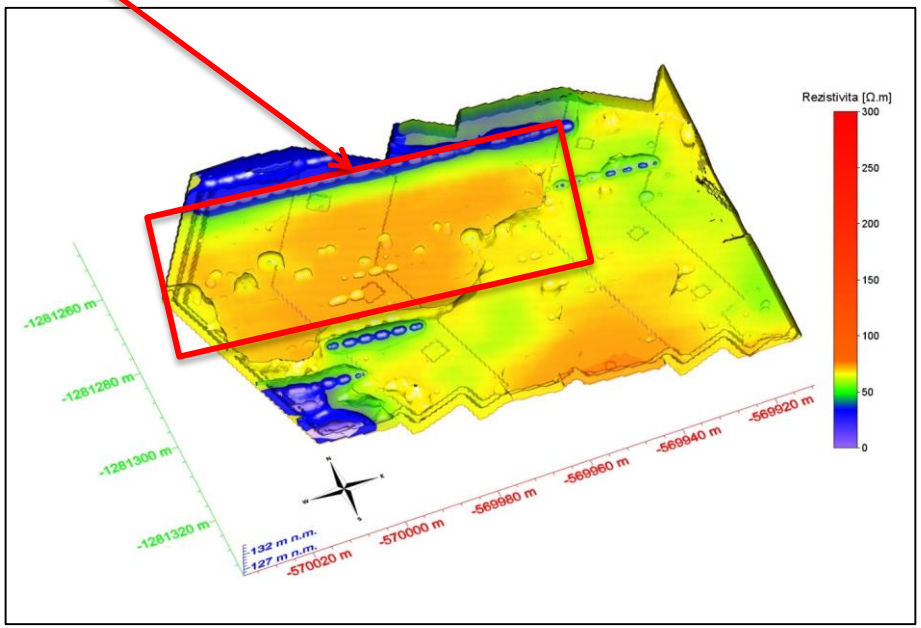


Models of resistivity and underground objects

- Underground objects detected on the base of resistivity



2D view



3D view

Results

- Basic geodetic outputs
- Movement of underground water flow
- Underground road deformations
- Localization of underground objects

Special Measurements

From river model to one to one realistic banks

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Special Measurements

What we had to do:
Scan the model of Danube river before destruction and scale it to realistic model

Used method:
Laser scanning

Outputs:
Pointcloud, realistic one to one model

Conditions:
30 x 10 m model under roof, very sensitive (from clay)

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Realistic model

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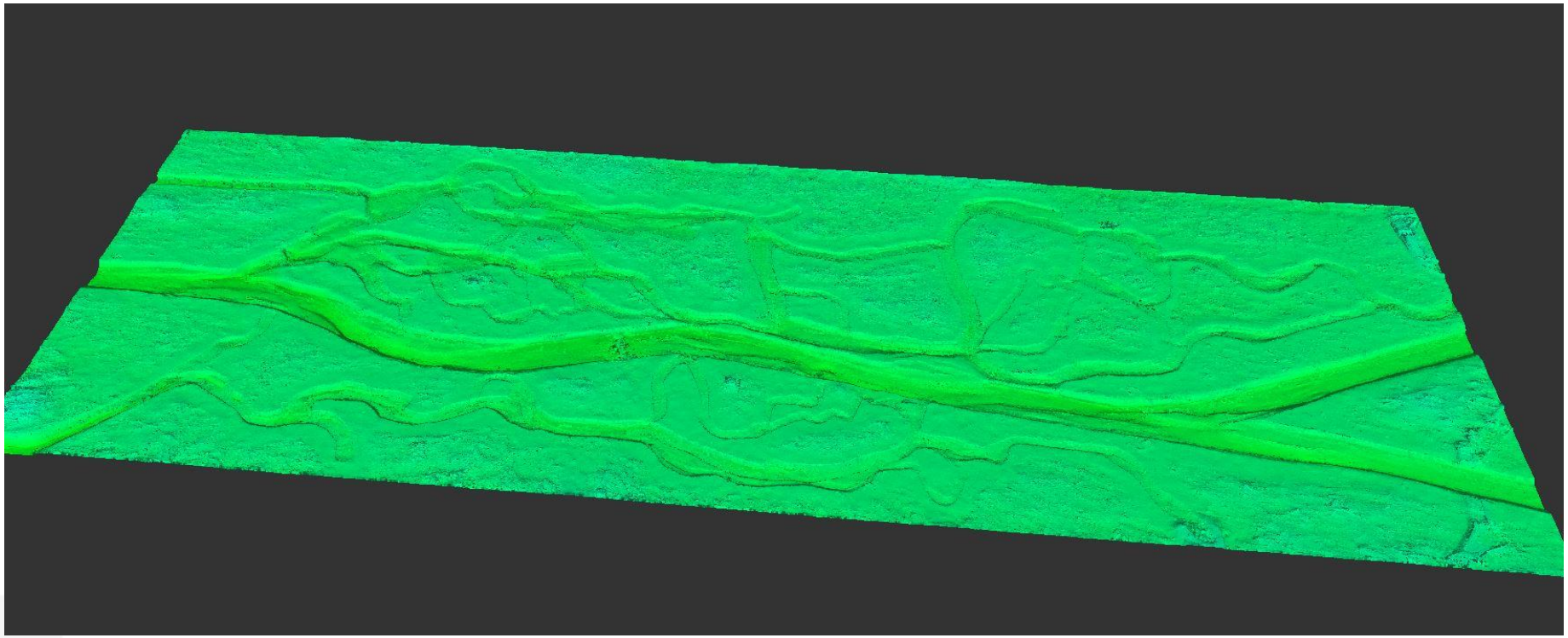
Scanned pointcloud



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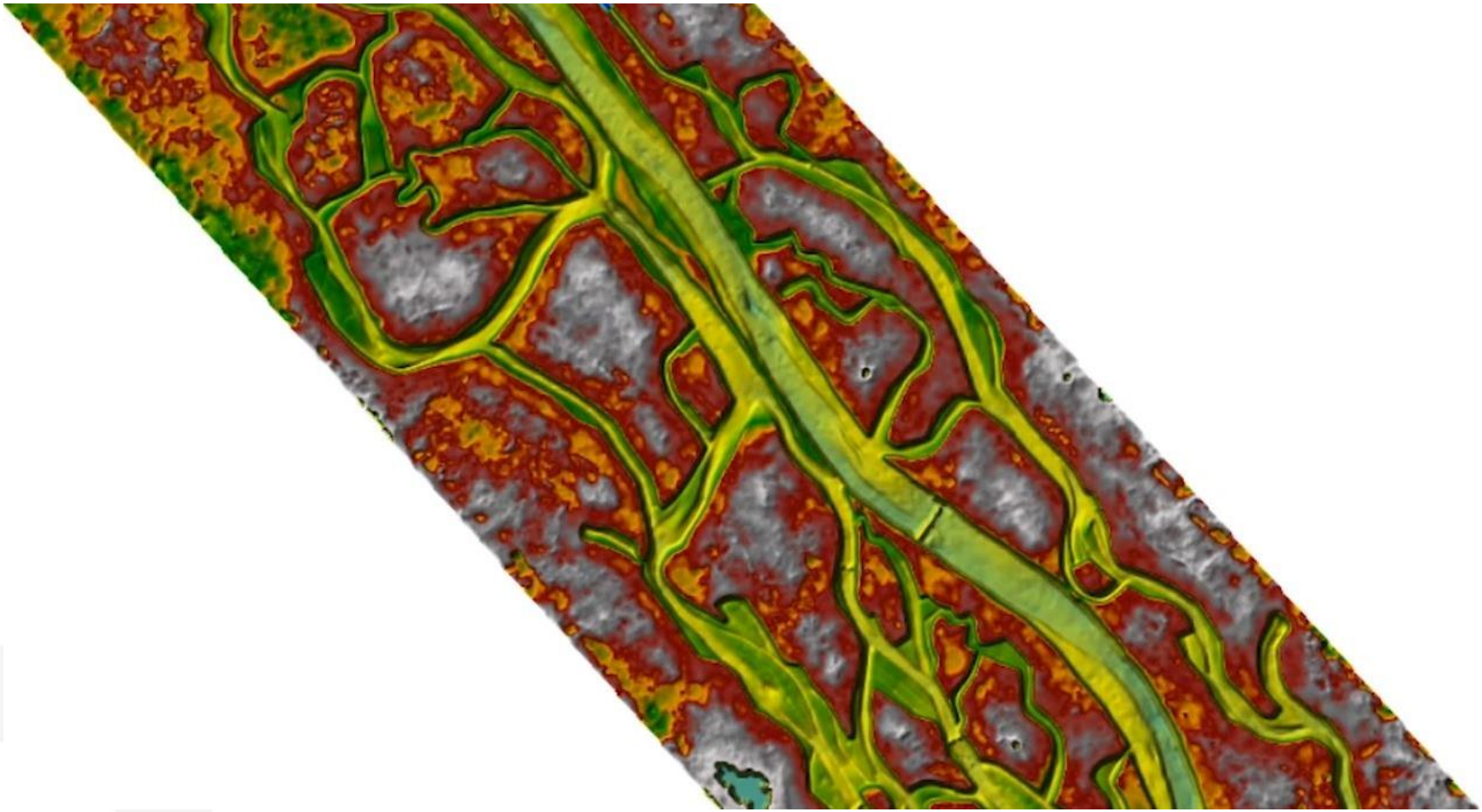
Digital model



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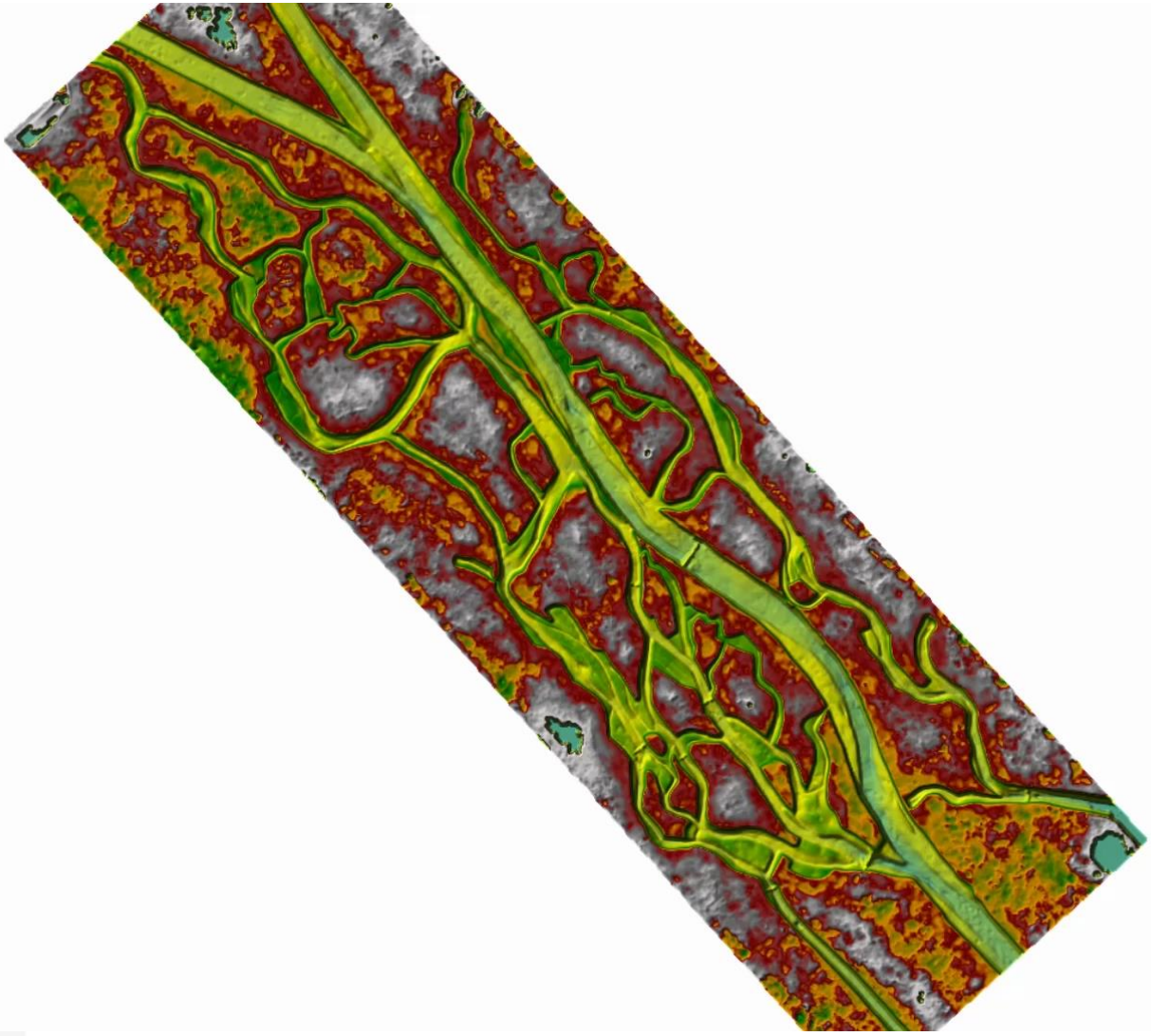
One to one model in real environment

Video



Results

- Pointcloud of destructed model
- Realistic one to one model of river part
- Visualization of river flow

Wires Measurement

How can you save
300 000 €?

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Wires Measurements

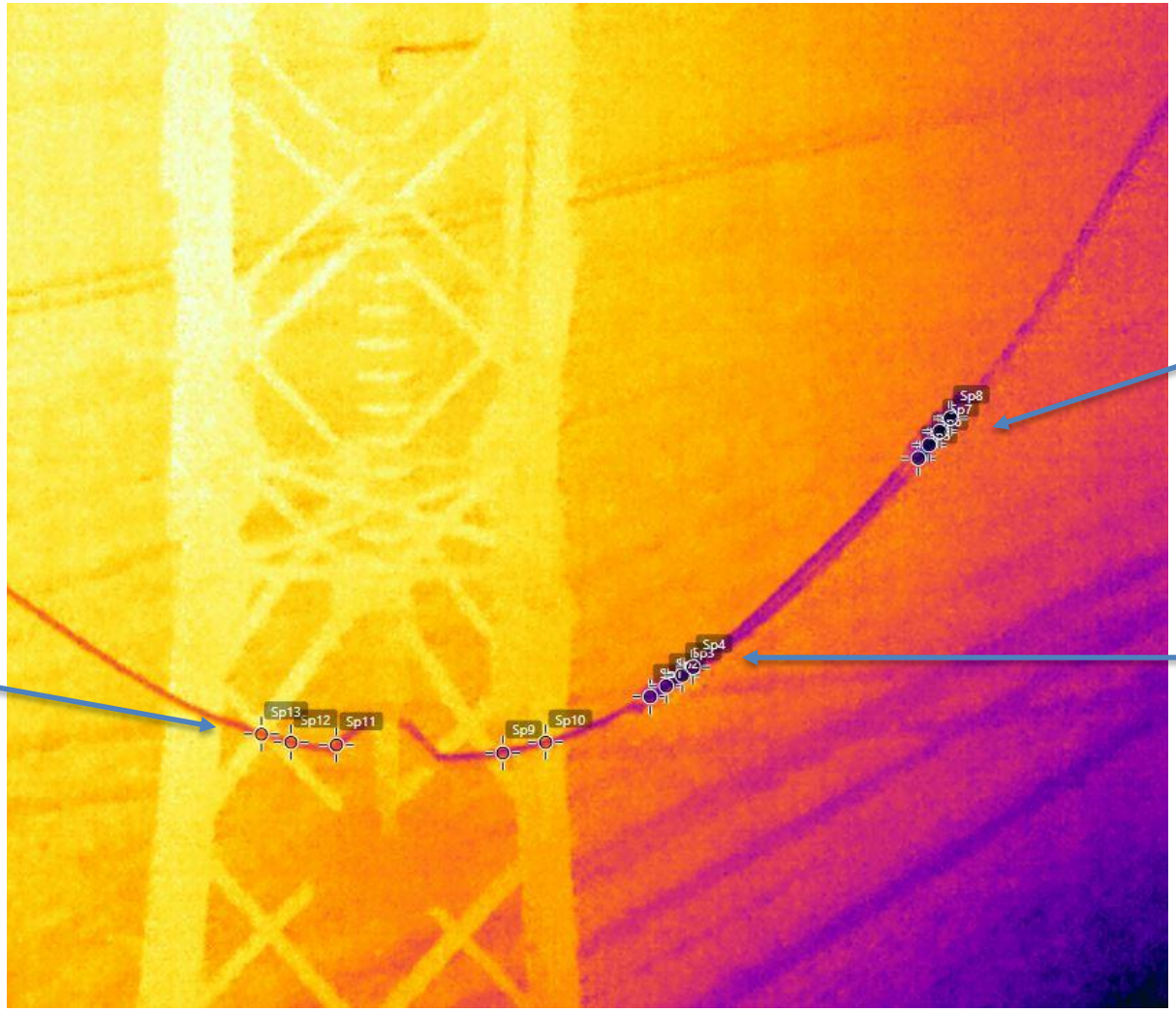
What we had to do:
Detection and documentation of electrical wires

Used method:
Drone photography

Outputs:
Georeferenced pointclouds, orthoimages, poles passports

Conditions:
Near the village, windy, temperature 0°C

Drone thermal photography



Wire

Equipment n.2

Equipment n.1

Thermal photograph with 2 equipments on the wire, measured 8 points on equipments and 5 points on the wire.

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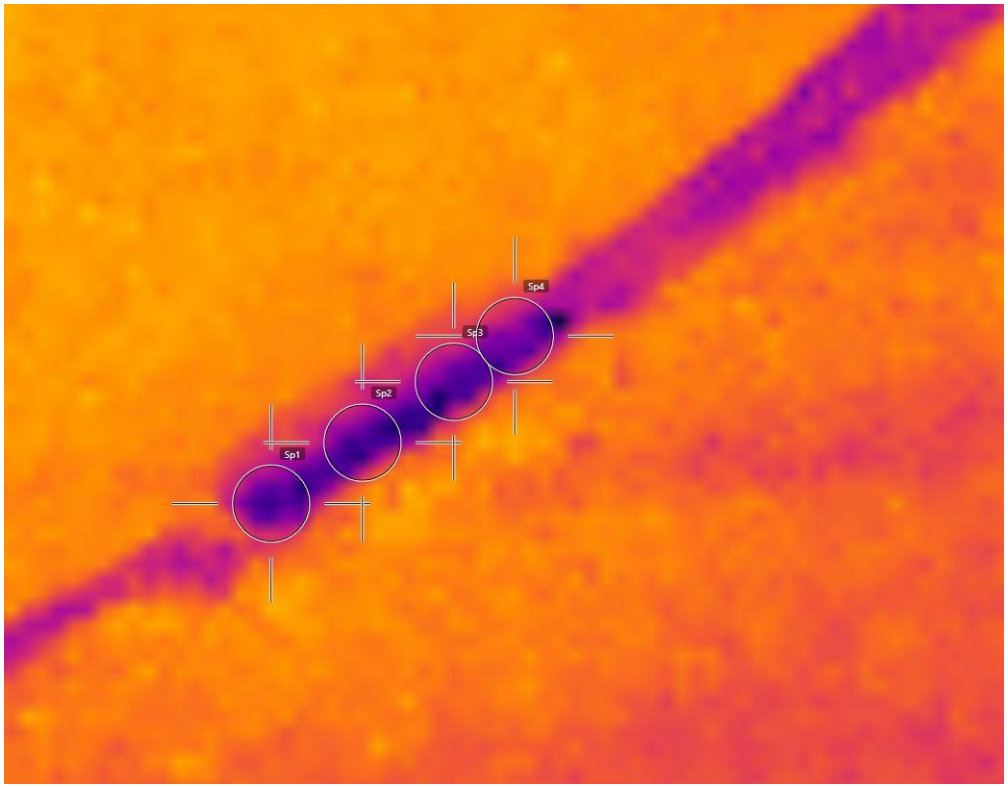
Equipment n. 2



Měření	°C
Sp1	-1,5
Sp2	-1,4
Sp3	-1,4
Sp4	-0,9
Sp5	-2,1
Sp6	-2,2
Sp7	-1,5
Sp8	-1,8
Sp9	0,2
Sp10	0,0
Sp11	0,6
Sp12	0,5
Sp13	0,6

On thermal image of equipment n. 2 are measured points Sp1, Sp2, Sp3 a Sp4.

Its average temperature is **-1,4°C**.

Thermal photography reports

REPORT TERMO SNÍMANIE

TMG Dronity

KLIENT - ZSE, A.S.. DÁTUM SNÍMANIA - 12.2.2016
OZNAČENIE PREDMETOV – SPOJKY, VODIČ

RGB FOTOGRAFIA

LEGENDA

Objekt 1 - Spojka č.1

Objekt 2 - Spojka č.2

Objekt 3 - Spojka č.3

Objekt 4 – Elektrický vodič

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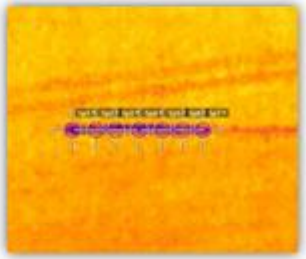
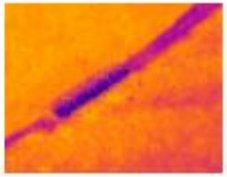
Hodnoty v tabuľkách pri objektoch sú uvádzané v stupňoch Celzia [°C].

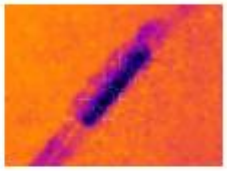
OBJEKT 1	
Sp1	0,7
Sp2	0,7
Sp3	1,0
Sp4	1,0
Sp5	0,8
Sp6	0,9
Sp7	1,0
Priemer	0,87



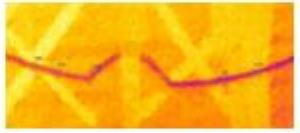
OBJEKT 2	
Sp1	-1,5
Sp2	-1,4
Sp3	-1,4
Sp4	-0,9
Priemer	-1,4



OBJEKT 3	
Sp1	-2,1
Sp2	-2,2
Sp3	-1,5
Sp4	-1,8
Priemer	-1,9



OBJEKT 4	
Sp1	0,2
Sp2	0,0
Sp3	0,6
Sp4	0,5
Sp5	0,6
Priemer	0,38



Rozdiel teplôt medzi vodičom a spojkou č.1 v tejto oblasti je potom 0,49°C.

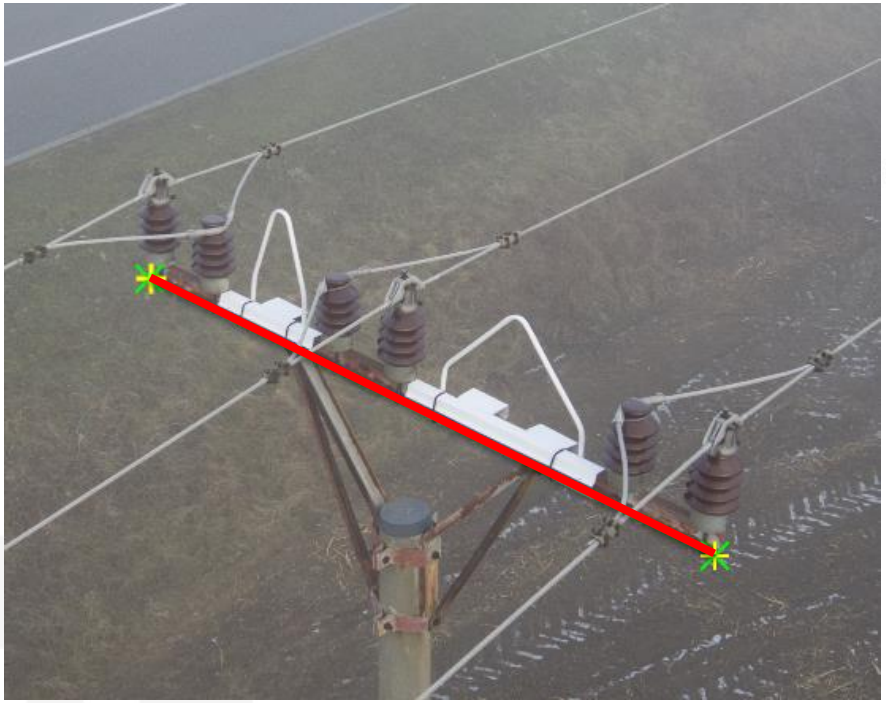
Rozdiel teplôt medzi vodičom a spojkou č.2 v tejto oblasti je potom -1,02°C.

Rozdiel teplôt medzi vodičom a spojkou č.3 v tejto oblasti je potom -1,52°C.

The basic consol measurement

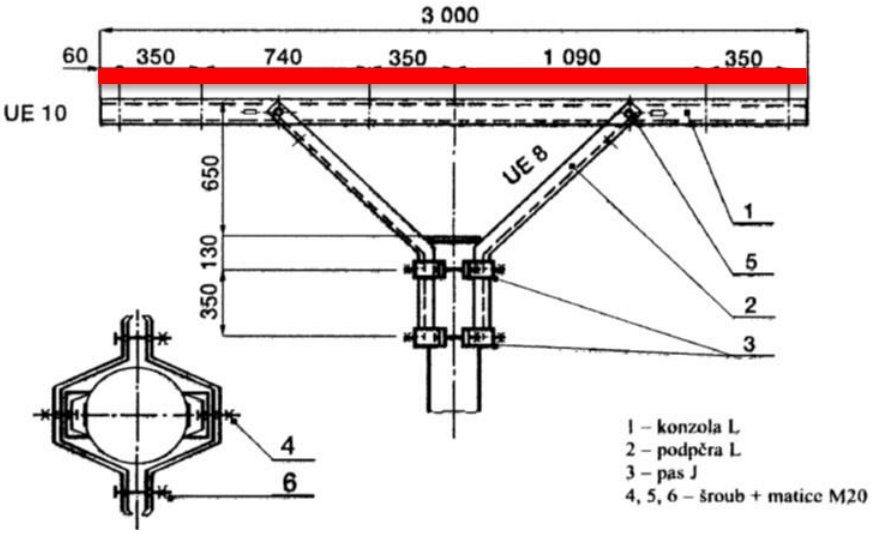
Aerial image

The lenght of the basic consol – **3,02 m**



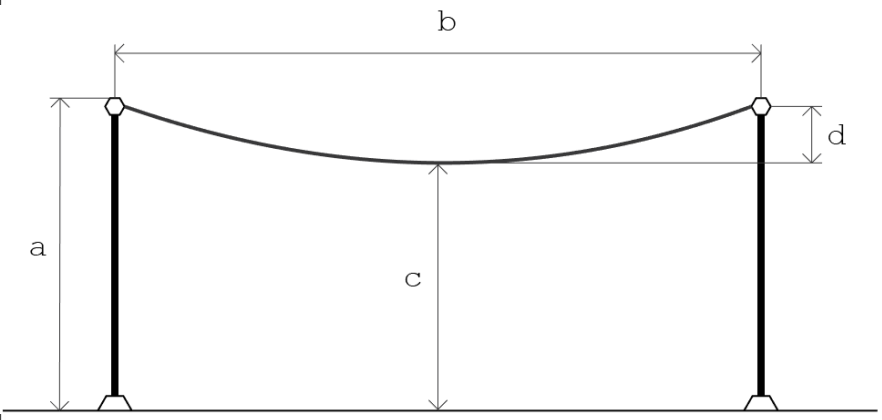
Technical documentation of the basic control

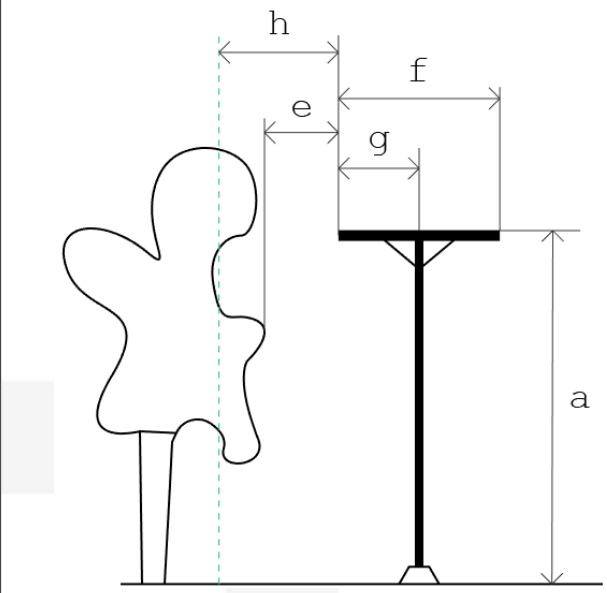
The lenght of the basic consol – **3 m**



Difference **0,02 m**

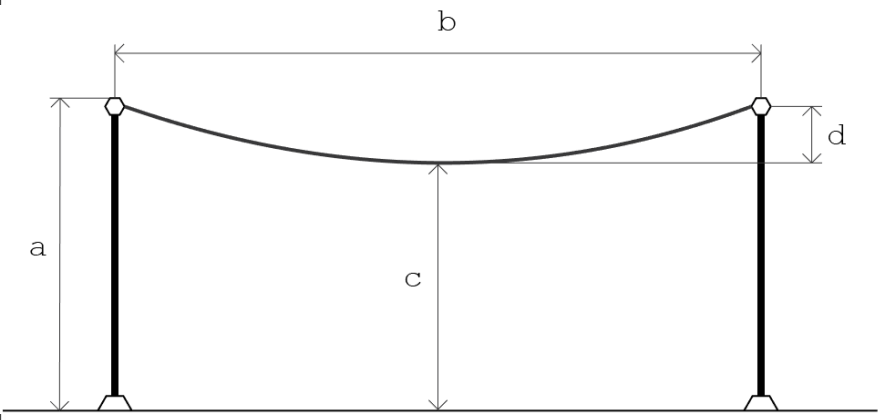
Control measurement on high voltage poles

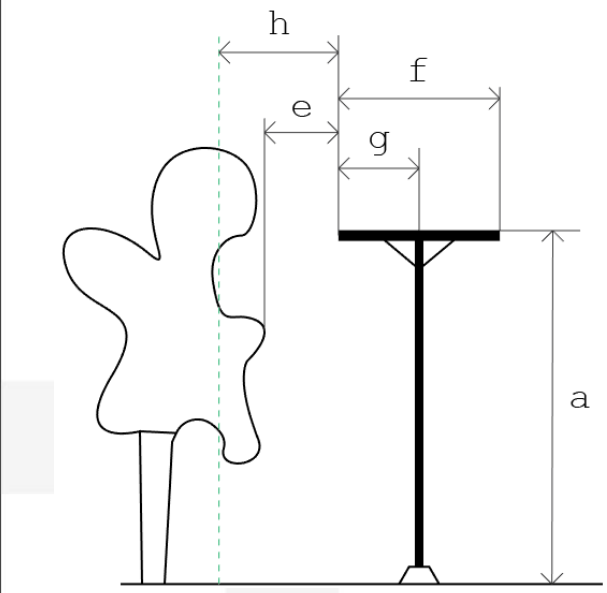




N.	Measurement	Original data [m]	Control measurement [m]	Difference [m]
a	Height of pole 63N	19,30	22,60	**+3,30**
	Height of pole 64RV	14,50	20,50	**+6,00**
b	Distance between poles 63N and 64RV	291,00	290,76	**-0,24**
c	Closes distance of the wire to the ground	-	8,59 10,92 9,02	-
g	Distance between wires	-	6,26 7,87 2,97	-

Control measurement on high voltage poles





Control measurements

N.	Measurement	Value [m]	Mistake
a	Height of pole	9.5	NO
b	Distance between poles	109.86	-
c	Height of wire	8.08	-
d	Sag of wire	1.66	-
e	Distance of objects from wires	3.92	YES
f	Size of main console	3.02	0.02
g	Distance between wires	1.48	NO
h	Protection zone	7	YES

Stĺp 63N

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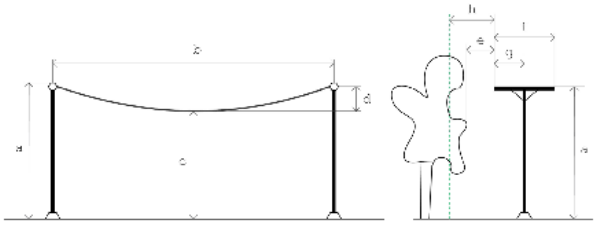
REPORT STĹP / STOŽIAR

KLIENT - ZSE, A.S.. DÁTUM SNÍMANIA - 12.2.2016
OZNAČENIE - 63N V PORADÍ - 1.*1

NÁKRES



LEGENDA

a) Výška stĺpa / stožiara
b) Vzdialenosť dvoch stĺpov / stožiarov
c) Najnižšia vzdialenosť vodiča k zemi
e) Vzdialenosť objektov od vedenia
f) Veľkosť hlavnej konzoly
g) Vzdialenosť vodičov medzi sebou Priehyb vodiča
h) Ochranné pásmo

MERANIA

Hodnoty v tabuľke sú uvádzané v metroch.

a	b	c	d	e	f	g	h
22,60	290,76	8,59	x	x	9,27	6,26; 7,87; 2,97	x

DOPLŇUJÚCE INFORMÁCIE

Namerané GPS súradnice v súradnicovom systéme S-JTSK :
Stred (päta stĺpa / stožiara)

X	Y	Z
549710,01	1280607,46	124,50

Vrchol (špica stĺpa / stožiara)

X	Y	Z
549976,139999	1280724,850000	148,000

Vypracoval: Bc. Pavol Kunovský
V Bratislave, dňa 18.3.2016 Podpis: _____

Vysvetlivky:
**1 – V prípade snímkovania viacerých stĺpov/stožiarov, je snímanie realizované od stĺpa/stožiara s najnižším číslom až po najvyššie.*

Stĺp 64RV

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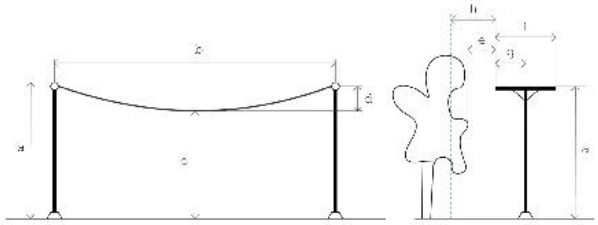
REPORT STĹP / STOŽIAR

KLIENT - ZSE, A.S.. DÁTUM SNÍMANIA - 12.2.2016
OZNAČENIE - 64RV V PORADÍ - 2.*1

NÁKRES



LEGENDA

a) Výška stĺpa / stožiara
b) Vzdialenosť dvoch stĺpov / stožiarov
c) Najnižšia vzdialenosť vodiča k zemi
d) Priehyb vodiča
e) Vzdialenosť objektov od vedenia
f) Veľkosť hlavnej konzoly
g) Rozstup vodičov medzi sebou
h) Ochranné pásmo

MERANIA

Hodnoty v tabuľke sú uvádzané v metroch.

a	b	c	d	e	f	g	h
20,50	x	x	x	x	x	x	x

DOPLŇUJÚCE INFORMÁCIE

Namerané GPS súradnice v súradnicovom systéme S-JTSK :
Stred (päta stĺpa / stožiara)

X	Y	Z
549710,01	1280607,46	124,50

Vrchol (špica stĺpa / stožiara)

X	Y	Z
549710,16	1280607,42	148,3

Vypracoval: Bc. Pavol Kunovský
V Bratislave, dňa 18.3.2016 Podpis: _____

Vysvetlivky:
**1 – V prípade snímkovania viacerých stĺpov/stožiarov, je snímanie realizované od stĺpa/stožiara s najnižším číslom až po najvyššie.*

Control of poles position

Comparison of base and head of the pole

Base of pole 63 N

Base of pole:
Correct data

Head of pole 63 N

Head of pole:
Uncorrect data

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Image inspection of the poles

Identification of actual state of the objects
(various damages and mistakes)

Without protecting of the pole

With protecting of the pole

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DEVELOPER Inspector - VIDEO

Results

- Actual condition of electric poles and wires
- Position coordinates of poles
- Condition of poles parts
- Reports for electric companies and cities

THANK YOU FOR YOUR ATTENTION

DO YOU HAVE ANY QUESTIONS?
WE ANSWER TO YOU LATER...
IF WE WILL KNOW ;)

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