

Surname and first name of the certified verifier:

No. X / 5416 / 31.07.2024.

Sata Lóránd

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Stamp of SATA L. LORAND LÁSZLÓ * Project verification engineer * Romania * MDRAP – Ministry of Regional Development and Public Administration * Series D No. 09599 * Af”

REPORT

regarding the quality check of the **Af** requirement of the geotechnical study for the:

DESIGN COMPETITION FOR THE MUNICIPAL PARK – HIPPODROME - URBAN REGENERATION PROJECT OF THE HIPPODROME-MUNICIPAL PARK-MUREŞ RIVERBANK-TURBINE CANAL AREA

TÂRGU MUREŞ

(2573 / 2024)

Phase: P.U.Z. (Zonal Urban Plan) / D.T.A.C.

1. Identification data:

Executant: **S.C. TERRA DRILL S.R.L.**

Beneficiary: **TÂRGU MUREŞ CITY HALL**

Location: **Municipal Park - Hippodrome area - Mureş river bank, Tg. Mureş
municipality, Mureş county**

Date of submission for verification: **31.07.2024.**

2. Main characteristics

Constructions: urban regeneration

Site conditions: on the low terrace of the Mureş River, to its left, in the W-NW part of the city of Tg. Mureş, the studied area including the Târgu Mureş Hippodrome, the area of the Municipal Park and the Turbine Canal, flat, stable terrain, with a reduced risk of flooding, due to the hydrotechnical developments on the Mureş River.

According to the seismic zoning maps (P100/1-2013), the objective is located in an area corresponding to an acceleration at ground level **ag=0.15g**, with a corner period of the seismic spectrum $T_c=0.7$ sec, corresponding to an earthquake with an average return period of 225 years and a 20% probability of return in 50 years.

According to STAS 6054-77, the frost depth is **H_i=0.80-0.90 m**.

Stratification:

F1

0.00 - 0.50 m - Earth + gravel fills

0.50 - 0.90 m- Clayey sand, consistent plastic

0.90 - 2.50 m- Yellow sand, medium compaction

2.50 - 4.50 m - Gravel with medium compact sand

4.50 - 8.00 m - Greyish-blue marly clay, hard.

F2

0.00 - 0.60 m - Earth + gravel fills

0.60 - 1.00 m- Clayey sand, consistent plastic

1.00 - 2.70 m- Yellow sand, medium compaction

2.70 - 5.20 m - Medium dense sandy gravel

5.20 - 8.00 m - Hard bluish-grey marly clay.

F3

0.00 - 0.40 m - Earth + gravel fills
0.40 - 1.00 m - Black clay (old topsoil)
1.00 - 1.80 m - Clayey, sandy, consistent dust
1.80 - 3.50 m - Soft, yellowish-grey clayey sand
3.50 - 7.10 m - Medium-dense sandy gravel
7.10 - 8.00 m - Hard, bluish-grey marly clay.

F4

0.00 - 0.70 m - Fills + topsoil
0.70 - 1.00 m - Brown sandy clay, consistent plastic
1.00 - 1.50 m - Yellow dusty sand, medium dense
1.50 - 2.00 m - Yellow sand, grey towards the base, medium dense
2.00 - 7.50 m - Medium dense sandy gravel
7.50 - 8.00 m - Blue-grey marly clay, hard.

The hydrostatic groundwater level was intercepted at depths between **-3.50 m - 3.80 m**, continuous, slightly ascending water table, with possible seasonal oscillations.

From the point of view of geotechnical risk, the site is in the "**Low Risk**" category. From the point of view of the geotechnical category, the project is classified in category one (GK1), which corresponds to a low degree of difficulty, in accordance with SR EN 1997-1:2007 (Eurocode 7 Part 1, Geotechnical Design: General Rules), SR EN 1997-2:2008 (Eurocode 7 Part 2, Geotechnical Design: Geotechnical Investigations) and with the NP 074-2022 standard.

3. Documents to be submitted for verification:

- Area plan
- Site plan
- Geotechnical report
- Geotechnical drilling summary sheets
- Grain size distribution diagrams

4. Recommendations regarding the foundation conditions:

The recommendations presented in the geotechnical study will be taken into account.

For constructions with high height regime, the following solutions are recommended:

- Isolated foundations on gravel, possibly with dewatering
- General foundation frame / ballast cushion
- Foundations on piles embedded in marl

For low-height constructions – GF, GF + Attic, GF+1F, the following solutions are recommended:

- Direct foundations on clayey sand/clayey dust/medium-dense sand, at a minimum of -1.00 m CTN (natural terrain elevation).

If the pile foundation solution is chosen, the design will be guided by the **NP123-2022** standard: **Standard on the geotechnical design of pile foundations**.

In the case of choosing the foundation solution for the location of constructions using the direct foundation method, when developing the execution documentation, the provisions of the **NP 112:2014 Standard for the design of direct foundation structures** will be taken into account.

In accordance with NP 112-2014, the calculation method for checking the foundation soil at limit states is chosen based on Table 1.4, as follows:

Calculation method	Limit states		Construction						Foundation land	
			Importance		Sensitivity to differential settlements		Deformation restrictions in operation			
			CO	CS	CNT	CST	CFRE	CRE	TF	TD
Prescriptive			•		•		•		•	
Direct	SLU	SLE	•		•		•		•	
	SLU	SLE		•						
	SLU	SLE				•				
	SLU	SLE						•		
	SLU	SLE								•

Legend

(1) Construction importance: special constructions (CS), ordinary constructions (CO).

(2) Sensitivity to differential settlements: settlement-sensitive constructions (CST), settlement-insensitive constructions (CNT).

(3) Deformation restrictions in normal operation: constructions with restrictions (CRE), constructions without restrictions (CFRE).

(4) Foundation ground composed of soils: favourable soils (TF): good and average soils defined according to NP 074, difficult soils or special loading conditions (TD) (e.g. rapidly loaded saturated cohesive soil).

Note 1 - The use of the prescriptive method in the final design is allowed only when the four conditions (CO+CNT+CFRE+TF) are simultaneously met.

Note 2 - By using the prescriptive method, the verification conditions for SLU and SLE are considered to be met, implicitly.

Note 3 - The prescriptive method can be used for pre-dimensioning.

Note 4 - In the case of using the direct method, the calculation at limit states is mandatory.

Note 5 - In the case of foundation soil consisting of rocky and semi-rocky grounds, under conditions of a practically uniform and horizontal stratification, the use of the prescriptive method is allowed in all cases, except for special constructions.

In case of adopting a prescriptive method, the provisions of paragraph 1.6.1.4 and Annex D will apply.

For direct calculation methods, reference will be made to NP 112-2014 paragraph 1.6.1.5 and Annex F.

Surface water drainage will be ensured by systematizing the land surface with slopes of 1-5% towards the exterior of the buildings.

A concrete sidewalk of at least 1.00m wide and a slope of 1-5% towards the exterior is recommended around the elevation.

To prevent the effects of possible uneven settlements, we recommend taking constructive safety measures.

Measures will be taken to ensure the stability of the surrounding land during both during the execution and the exploitation period. During excavations in dusty, clayey, sandy, gravelly rocks, if the excavation depth exceeds 2.00m, it is recommended to support the excavation or create a natural slope of 1:1.0; 1:1.5.

5. Conclusions on the verification of projects

Following the verification, the documentation is considered appropriate, it is signed and stamped according to the list of documents, for the requirement **Af - Mechanical resistance and stability for earth masses, foundation soil and interaction with buried structures through geotechnical investigations and geotechnical design.**

I received 3 copies.
Beneficiary/Designer

I delivered 3 copies.
Certified technical verifier

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Ministry of Regional Development and Public Administration * Series D No. 09599 * Af”

GEOTECHNICAL STUDY

**DESIGN COMPETITION FOR THE MUNICIPAL PARK – HIPPODROME - URBAN
REGENERATION PROJECT OF THE HIPPODROME-MUNICIPAL PARK-MUREȘ
RIVERBANK-TURBINE CANAL AREA**

BENEFICIARY: *TÂRGU MUREȘ CITY HALL*
EXECUTANT: *S.C. TERRA DRILL S.R.L.*

Study no.: 2573/2024, Terra Drill

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Logo of **TERRA DRILL**
GEOTECHNICAL STUDIES

LIST OF DOCUMENTS

A. WRITTEN MATERIALS:

- Title page
- List of signatures
- Geotechnical report

B. ANNEXES:

- Competition area and drilling points
- Geotechnical drilling sheets
- Dynamic penetration tests

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Ministry of Regional Development and Public Administration * Series D No. 09599 * Af”

TITLE

**GEOTECHNICAL STUDY FOR THE DESIGN COMPETITION: MUNICIPAL PARK –
HIPPODROME - URBAN REGENERATION PROJECT OF THE HIPPODROME-
MUNICIPAL PARK-MUREŞ RIVER BANK-TURBINE CANAL AREA**

BENEFICIARY: TÂRGU MUREŞ CITY HALL

EXECUTANT: S.C. TERRA DRILL S.R.L.

LIST OF SIGNATURES

DRAWN UP BY: GEOLOGICAL ENGINEER DANIEL ROŞCA *illegible signature*

VERIFIED BY: GEOLOGICAL ENGINEER DAN SIMIONESCU *illegible signature*

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-2024-

GEOTECHNICAL REPORT

DESIGN COMPETITION: MUNICIPAL PARK – HIPPODROME - URBAN REGENERATION PROJECT OF THE HIPPODROME-MUNICIPAL PARK-MUREȘ RIVERBANK-TURBINE CANAL AREA

I. INTRODUCTION

This geotechnical study was prepared at the request of TÂRGU MUREȘ CITY HALL, as beneficiary, to establish the foundation conditions on the site.

The geotechnical study was requested in view of the substantiation of the design competition for the urban regeneration of the Hippodrome- Municipal Park- Mureș Riverbank-Turbine Canal area.

To investigate the site in question, 4 geotechnical drillings to identify the local stratification and establish the geotechnical parameters and 2 in situ tests with the superheavy dynamic penetrometer (DPSH), to assess the degree of compaction/consistency of the soils were carried out. The field investigation works, the analyses and the adopted calculation methodologies were carried out in accordance with the standards and regulations in force, of which we mention:

- SR EN 1997-1/2013 EUROCODE 7: Geotechnical design - Part 1. General rules.
- SR EN 1997-2/2010 EUROCODE 7: Geotechnical design - Part 2. Investigation and testing of the ground
- SR EN ISO 14688-1/2018: Geotechnical investigations and tests. Identification and classification of soils - Part 1. Identification and description.
- SR EN ISO 14688-2/2018: Geotechnical investigations and tests. Identification and classification of soils - Part 2. Principles for a classification
- STAS 1242/4-85 Investigations by drilling in soils.
- STAS 3300/2-85 Calculation of the foundation soil in the case of direct foundation.
- SR EN ISO 22476-2:2006 Geotechnical investigations and testing. Field testing. Part 2: Dynamic penetration testing.

The elaboration of the study complies with the provisions of the "Regulation on the preparation and verification of geotechnical documentation for constructions", reference NP 074/2022.

II. GENERAL DATA

2.1. Geographical-geomorphological data

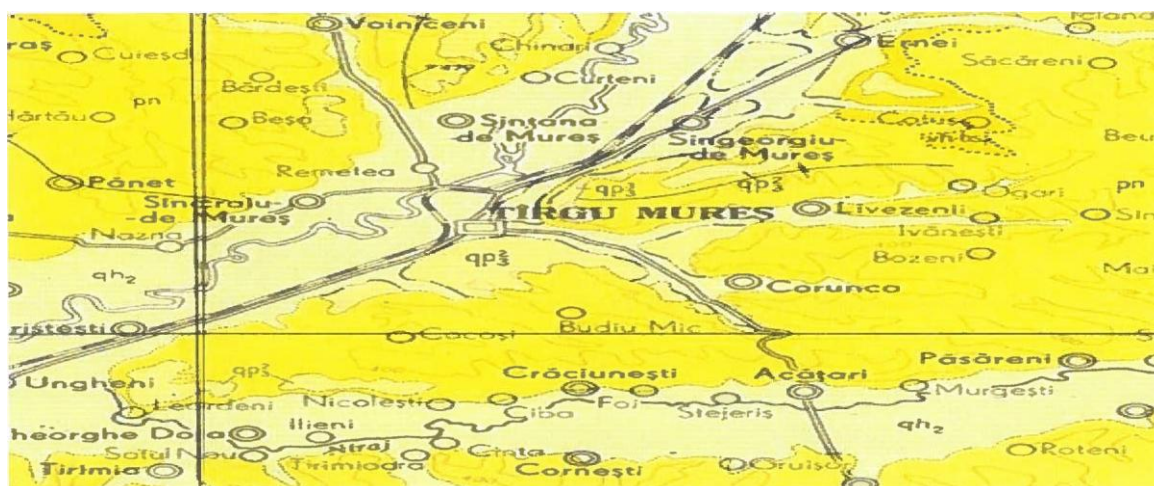
The municipality of Târgu Mureș is located in the central part of the Transylvanian Depression, in the Mures corridor, at its passage between the Târnavelor plateau and the Transylvanian Plain („Câmpia Transilvaniei”). The macromorphology of the region shows the developed riverbed, with well-preserved terraces, with gradual transitions into the hilly area.

The studied area is located on the low terrace of the Mureș, to its left, in the WNW part of the city. The studied area includes the Târgu Mureș Hippodrome, the Municipal Park area and the Turbine Canal.

The terrain is flat, stable, with a low risk of flooding, due to the hydrotechnical arrangements on the Mures River.

2.2. Geology of the area

The rocks in the territory belong to the Sarmatian and Pannonian, representing the Neogene filling of the Transylvanian Basin, consisting of marls, clays, sands and poorly cemented sandstones, over which an alluvial-diluvial sedimentary cover of Quaternary age is found. The Quaternary deposits include terrace deposits (gravels and sands), valley (alluvial), slope (diluvial), dejection cones (proluvial), accumulations and landslides. Alluvial, terrace layers, fine at the upper part, continued with gravel/boulders with sand were intercepted in the drilling. The bedrock, marly clay (marl) was intercepted from depths between -4.50 m and -7.50 m (relative to the terrain elevation at the time of drilling).



Extract from the geological map sheet I.G.R. Tq. Mures sheet - scale 1:200,000

2.3. Groundwater

The surface hydrographic network is represented by the Mureș River, a river that crosses the city from the northeast to the southwest, medium course, forming well-developed meadow areas and terraces. In these areas, significant accumulations of groundwater can be observed, confined in fine-coarse alluvial deposits.

In drilling, groundwater was intercepted at depths ranging from -3.50 m to 3.80 m, continuous, slightly ascending water table, with possible seasonal oscillations.

2.4. Climate of the region

Average annual precipitation - between 600 and 1000 mm.

Air temperature: - multiannual average between 6 and 9°C.
 - minimum average between -3 and -6°C.
 - maximum average between 16 and 20°C.

The snow load, according to standard CR-1-1-3-2012, is 1.5 kN/m².

The reference wind pressure values, according to standard CR-1-1-4-2012, averaged over 10 minutes, at 10 m, with an average recurrence interval of 50 years, are 0.4 kPa, and the average wind intensity on the Beaufort scale has a value of 2.0 - 2.4 m/s.

According to STAS 6054-77, the freezing depth of natural ground is 80-90 cm.

2.5. Seismicity of the region

According to SR 11100/1-93 on the seismic macrozonation of the territory of Romania, the studied perimeter is located in the 7₁ degree zone (MSK scale).

Zoning for earthquakes with the average recurrence interval of the magnitude MRI (mean recurrence interval) = 225 years and 20% probability of exceeding in 50 years (according to the „Seismic Design Code Part I", reference P 100-1/2013), includes the area at $a_g = 0.15g$ (ground acceleration for the design of constructions at the ultimate limit state) and $T_c = 0.7$ sec (control / corner period of the response spectrum for the horizontal components of the seismic motion).

III. SUMMARY OF INFORMATION OBTAINED FROM THE FIELD INVESTIGATION

3.1. Technical-geological conditions

To investigate the foundation soil on the site, 4 geotechnical drillings were carried out using the Nordmeyer Geotool drilling rig, in a mechanical, percussive, dry system. 4 in situ investigations with the superheavy dynamic penetrometer were added thereto. The superheavy dynamic penetrometer (DPSH), type LMSR-SPT, Nordmeyer Geotool brand, was used, with a ram weight of 63.5 kg, conical tip drop angle of 90°, drop 75 cm, sharp cone surface of 20 cm².

The investigation depth was -8.00 m from the 0.00 m ground level at the time of the drillings. The stratification is as follows:

F1

0.00 - 0.50 m - Earth + gravel fills
0.50 - 0.90 m - Clayey sand, consistent plastic
0.90 - 2.50 m - Yellow sand, medium compaction
2.50 - 4.50 m - Gravel with medium compaction sand
4.50 - 8.00 m - Greyish-blue marly clay, hard.

Groundwater NH=-3.50 m

F2

0.00 - 0.60 m – Earth + gravel fills
0.60 - 1.00 m - Clayey sand, consistent plastic
1.00 - 2.70 m - Yellow sand, medium compaction
2.70 - 5.20 m - Gravel with medium compaction sand
5.20 - 8.00 m - Greyish-blue marly clay, hard.

Groundwater NH=-3.50 m

F3

0.00 - 0.40 m - Earth + gravel fills
0.40 - 1.00 m - Black clay (old topsoil)
1.00 - 1.80 m - Clayey, sandy, consistent dust
1.80 - 3.50 m - Soft, yellowish-grey clayey sand
3.50 - 7.10 m - Medium-dense sandy gravel
7.10 - 8.00 m - Hard, bluish-grey marly clay.

Groundwater NH=-3.60 m

F4

0.00 - 0.70 m - Fills + topsoil
0.70 - 1.00 m - Brown sandy clay, plastic consistency
1.00 - 1.50 m - Yellow dusty sand, medium dense
1.50 - 2.00 m - Yellow sand, grey towards the base, medium dense
2.00 - 7.50 m - Medium dense sandy gravel
7.50 - 8.00 m - Blue-grey marly clay, hard.

Groundwater NH=-3.80 m

3.2. Main geotechnical parameters:

Clayey sand/clayey dust

- consistency index (I_c)- 0.68-0.74
- angle of internal friction Φ -13-15° 0 STAS 3300-1-85).
- cohesion $c=10-20$ STAS 3300-1-85).
- linear deformation modulus $E = 9000-10000$ kPa (guide value-STAS 3300-1-85).
- 2-4 blows/ 20 cm with DPSH- cohesive domain
- $P_{conv}=220$ kPa

Medium compaction sands

- 4-6 blows/ 20 cm with DPSH- non-cohesive domain- medium compaction (after penetration)
- internal friction angle Φ -26-28 DPSH/ Geostru
- linear deformation modulus $E = 9000-10000$ kPa (DPSH/ Geostru).
- $P_{conv}=200-220$ kPa

Gravel with sand

- angle of internal friction Φ -29-32 DPSH/ Geostru
- compaction degree depending on no. of blows/ 20 cm in correlation with DIN 4094-3.
- medium compacted/compacted range (variable, see penetration diagrams)
- linear deformation modulus (20000-30000 kPa medium compacted/compacted gravel).
DPSH/ Geostru
- P_{conv} medium=300-350 kPa

Marly clay/ Marl

- cohesion (c)- 45-50 kPa.
- angle of internal friction $\Phi = 18-20^\circ$.
- linear deformation modulus $E = 30000$ kPa
- 15-24 blows/ 20 cm with DPSH- cohesive domain- high consistency, increases with depth.
- $P_{conv}=350-400$ kPa- terrain

The degree of compaction/consistency of the soils were determined in situ with the dynamic superheavy penetrometer (DPSH). The penetration diagrams are presented in the annexes.

IV. CLASSIFICATION OF THE WORK IN THE GEOTECHNICAL CATEGORY

According to **NP 074/2022**, the calculation parameters of the geotechnical risk are the following:

Land conditions	<i>Average foundation soils (clay sand, sand) good foundation soils (gravel + marl)</i>	3
Groundwater	<i>No dewatering</i>	1
Importance category	<i>Low</i>	2
Vicinities	<i>Low risk</i>	1
Seismic zone	<i>ag =0.15</i>	2
Geotechnical risk	<i>Total points</i>	9

The work falls into geotechnical category no. 1 - low geotechnical risk

Note: The classification in the geotechnical category is provisional, valid only for the design theme related to this study (design competition)

V. CONCLUSIONS AND RECOMMENDATIONS

The studied area is located on the low terrace of the Mureş River, to its left, in the WNW part of the city. The studied area includes the Târgu Mureş Hippodrome, the Municipal Park and the Turbine Canal area. The geotechnical study was requested in view of the substantiation of the design competition for the urban regeneration of the Hippodrome-Municipal Park- Mureş Riverbank-Turbine Canal area. There is no proposed furnishing at this design stage.

The geotechnical field investigations included 4 geotechnical drillings, carried out at a depth of -8.00 m, completed by 2 dynamic penetrations, to establish the degree of compaction/consistency of the intercepted strata. All drillings and dynamic penetrations intercepted the bedrock, marly clay (marl), of Pannonian age.

For the penetration tests, the Nordmeyer Geotool super-heavy dynamic penetrometer, type LMSR-SPT, was used, with a ram weight of 63.5 kg, conical tip drop angle of 90°, drop of 750 mm, and a sharp cone surface area of 20 cm² (DPSH).

The equipment and methodology of investigation and interpretation comply with the provisions of SR EN ISO 22476-2-2006 and DIN 4094-3.

The intercepted soils are terrace layers, generally fine on the surface (with variable thicknesses) continued with coarse alluvium (sands with gravel, gravels with sand). All of these are placed on the bedrock bed, marly clay/marl. The geological profile is approximate; the depositional environment related to the meadow facies could be much more complex. Good foundation soils are gravel and marl layers, layers with a high degree of compaction/consistency (verified with penetration tests). The cohesive layer on the surface or medium compaction sands can be considered for direct foundations only for light constructions/low height regime. At the DTAC phase for each construction that will be located on the site, additional geotechnical investigations (drillings and dynamic penetrations) will be carried out.

The groundwater level intercepted in the boreholes is at approximately -3.5 m. It is a continuous, slightly ascending groundwater level, with possible seasonal oscillations.

Foundation solutions:

1. Heavy, high-rise constructions:

a) isolated foundations on gravel, possibly with dewatering. P_{conv} gravel with sand=300-350 kPa.

b) General foundation frame/ballast cushion.

c) Foundations on piles embedded in marl. P_{cnv} marl=350-400 kPa.

2. Low-rise constructions - GF, GF + Attic, GF+1F:

-direct foundations on clayey sand/clayey dust/medium-dense sand, at minimum -1.00 m CTN (natural terrain elevation). P_{conv} =200-220 kPa

This geotechnical study is informative in nature, valid for the substantiation of the design competition stated in the title. For other design phases that include material furnishings in the studied area, geotechnical investigations will be carried out for each individual objective, depending on the design theme.

Verified by:
Geological Engineer Dan Dimionescu
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Drawn up by:
Geological Engineer Daniel Roșca
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GEOTECHNICAL STUDY FOR THE DESIGN COMPETITION MUNICIPAL PARK-HIPPODROME TÂRGU MUREȘ



PROTECTED BUILT AREA

AREA PLAN

PLAN OF THE STUDIED AREA AND LOCATION OF THE DRILLINGS



F1, F2, F3, F4 – Geotechnical drillings
P1, P2 – Dynamic penetration tests

Zoning plan provided by Tg. Mureș City Hall
Completed by Sc Terra Drill Srl

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Apa subterana	Adâncime	Adâncimea stratului	Grosimea stratului	Stratificatie	F1	Numărul/tipul probei	Adâncimea m	Granulometrie				Un - Coeficient de neuniformitate	Limite de plasticitate		Umiditate	Indice de plasticitate	Umflare liberă	Indice de consistență				Indici de structură				Compresie			
m	m	m	m		Clasificare		m	argila	praf	nisip	pietriș	(d ₉₀ /d ₁₀)	W _p %	W _L %	W %	I _p %	U, %	Curgătoare	Moale	Consistență	Vâscasă	Tare	Greutate volumică γ kN/m ³	Porozitate n %	Indicele porilor e	Grad de saturare S _r	Modul de deformare edometrică M _{o-3} kPa	Tensiune specifică la 200 kPa σ _{cs} %	Tensiune specifică prin umedare σ _{cu} %
	0.5	0.50	0.50	U	Umplutură pământ+pietriș																								
	0.90	0.40			Nisip argilos galben, plastic consistent	1	0.5-0.9	15	43	42	0	-	17.86	36.97	23.55	19.11				0.70			19.70	37.83	0.59	0.99			
	1.0					2	1.0-1.5	0	0	100	0	-																	
	1.5				Nisip galben, mediu îndesat																								
	2.0																												
	2.5	2.50	1.80			3	2.5-3.0	0	0	10	90	-																	
	3.0				Pietriș cu nisip, mediu îndesat																								
	3.5																												
	4.0																												
	4.5	4.50	2.00			4	4.5-5.0	42	38	20	0	-	23.86	42.64	18.69	18.78							1.28	25.00	37.80	0.59	0.86		
	5.0																												
	5.5																												
	6.0				Mamă cenușie, tare																								
	6.5																												
	7.0																												
	7.5																												
	8.0	8.00	3.50			5	7.5-8.0	36	49	15	0	-	28.03	44.42	22.24	16.39							1.35	26.00	39.90	0.64	0.94		

Societate Comercială
TERRA DRILL S.R.L.
Etnia 30758755
J26/19/2004
Mureș

S.C. TERRA DRILL S.R.L.

Intocmit: Ing. D. Simionescu
Proiectat: Ing. D. Simionescu
Desenat: Ing. D. Simionescu
Verificat: Ing. D. Roșca

Scara: 1:200
Data: 10.07.2024

Fisa sintetica a forajului executat F.1
Locatie: conform plan anexa

LUCRAREA: STUDIU GEOTEHNIC NECESAR LA FUNDAMENTAREA CONCURSULUI DE SOLUȚII
PARCUL MUNICIPAL HIPODROM PROIECT DE REGENERARE URBANĂ A ZONEI ZONA
HIPODROM PARCUL MUNICIPAL AJALUJ MUREȘ ALI CANALUL TURBINE DIN CADRUL
OBIECTIVULUI DE INVESTIȚII " PARCUL MUNICIPAL HIPODROM "

Ape subterane		Adâncime		Adâncimea stratului		Grosimea stratului		Stratificatie		F2		Numărul/tipul probei		Adâncimea probei		Granulometrie				Un - Coeficient de neuniformitate		Limite de plasticitate		Umiditate		Indice de plasticitate		Umflare liberă		Indice de consistență				Indici de structură				Compresiune	

Apa subterană		Adâncime		Adâncimea stratului		Grosimea stratului		Stratificatie		F3		Numărul tipului probei		Adâncime		Granulometrie				Un - Coeficient de neuniformitate		Limite de plasticitate		Umiditate		Indice de plasticitate		Umflare liberă		Indice de consistență				Indici de structură				Compresiune			
																STAS 1913/5-85 mm																									

S.C. TERRA DRILL S.R.L.

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Proiectat: Ing. D. Simionescu
Desenat: Ing. D. Simionescu
Verificat: Ing. D. Simionescu

Scara: 1:200
Data: 11.07.2024

LLCHARKA: STUDIU GEOTEHNIC NECESAR LA FUNDAMENTAREA CONCURSULUI DE SOLUȚII
PARCUL MUNICIPAL IPODROM PROIECT DE REZERVARE URBANĂ A ZONEI ZONA
IPODROM-PARCUL MUNICIPAL-MAJUL MEREȘULUI-CANALUL TURBINEL DIN CĂRUL
OBIECTIVULUI DE INVESTIȚII - PARCUL MUNICIPAL IPODROM

Fisa sintetica a forajului executat F.3

Locatie: conform plan anexa

Apa subterana		Adâncime		Adâncimea stratului		Grosimea stratului		Stratificare		F4		Tipul probei		Adâncimea probei		Granulometrie				Un - Coeficient de neuniformitate		Limite de plasticitate		Umiditate		Indice de plasticitate		Unitate liberă		Indice de consistență				Indici de structură				Compresiune																			
										STAS 1913/5-85 mm										Limita inferioară		Limita superioară						Curgătoare		Moale		Consistență		Vâscuoasă		Tare		Greutate volumică		Porozitate		Indicele porilor		Grad de saturare		Modul de deformare edometrică		Tensiune specifică la 200 kPa		Tensiune specifică prin umectare							
																				Wp %		Wl %		W %		Ip %		U %		0.25		0.50		0.75		1.00		γ _k kN/m ³		n %		e		Sr		M ₂₀ kPa		E ₂₀₀ %		Im %							
m										m										argila		praf		nisip		pietri		d ₆₀ d ₁₀																													
0.5										0.70 0.70										1		0.7-1.0		42		32		26		0		-		8.37		31.88		18.24		23.51				0.58				16.40		37.83		0.60		0.80			
1.0										1.00 0.30										2		0.7-1.0		16		20		62		2																											
1.5										1.50 0.50										3		1.5-2.0		0		0		100		0																											
2.0										2.00 0.50										4		2.0-2.5		0		0		38		62																											
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8.0										8.00 0.50										6		7.5-8.0		46		22		32		0		-		16.58		38.76		13.47		22.18				1.14		22.21		32.66		0.48		0.75					

Societate cu Capital Privat

TERA DRILL S.R.L.

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011 3756195

S.C. TERRA DRILL S.R.L.

Intocmit: Ing. D. Simionescu

Proiectat: Ing. D. Simionescu

Desenat: Ing. D. Simionescu

Scara: 1:200

Data: 11.07.2024

Fisa sintetica a forajului executat F.4

Locatie: conform plan anexa

LA CĂUTAREA STUDIULUI GEOTEHNIC NECESSAR LA FUNDAMENTAREA CONCURSULUI DE SOLUȚII

PARCUL MUNICIPAL ÎMPODROM PROIECT DE RECONȘTERE URBANĂ A ZONEI ZONA

ÎMPODROM-PARCUL MUNICIPAL-MALLUL MIREȘULUI-CANALUL TURBINEL DIN CADRUL

OBIECTIVULUI DE INVESTIȚII "PARCUL MUNICIPAL ÎMPODROM"

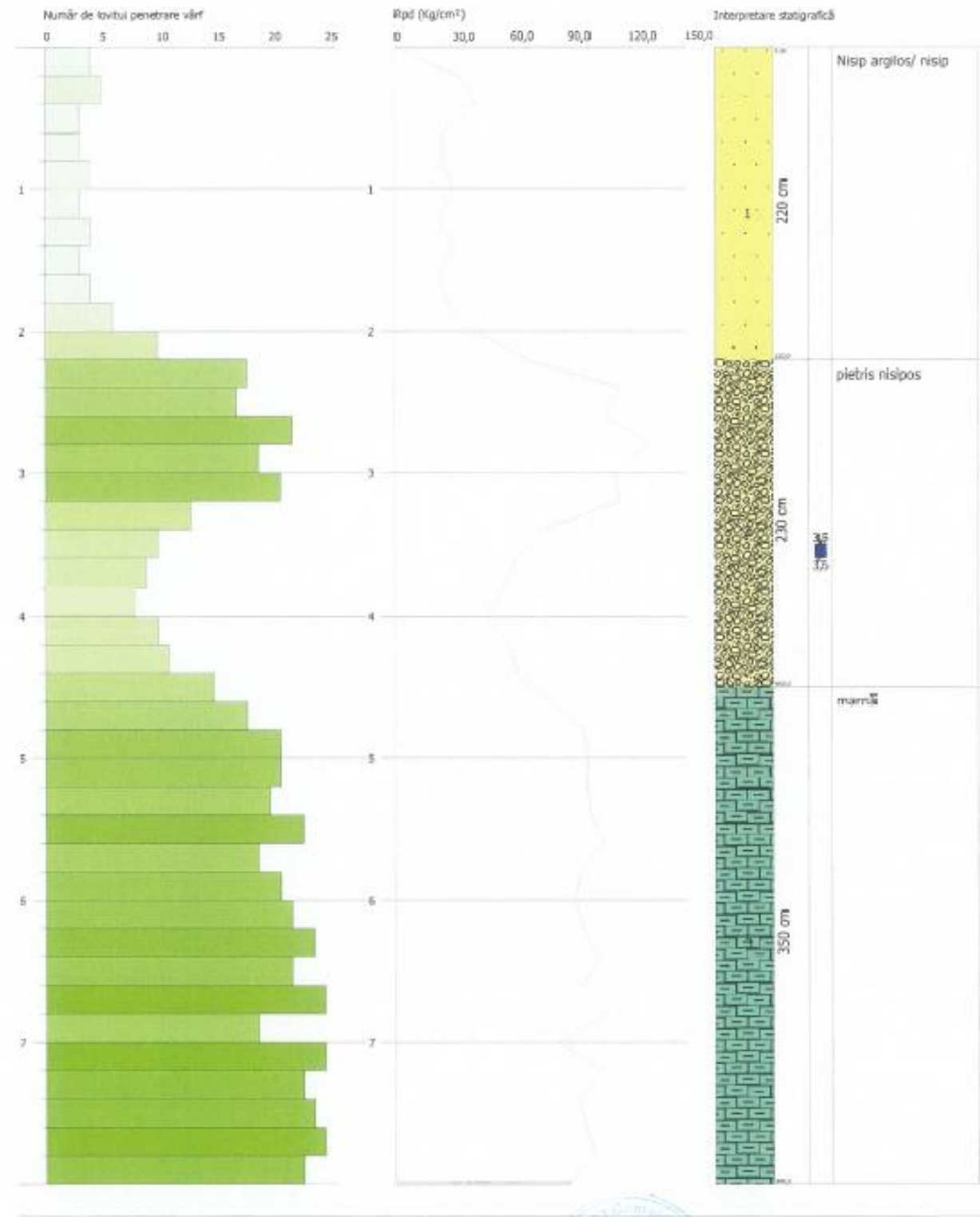
Terra Drill Srl

Dynamic Penetration Test No. 1
Instrument used... DPSH (Dynamic Probing Super Heavy)
Client: Targu Mures City Hall
Description: Dynamic Penetration Test
Location: Hippodrome – Municipal Park

Date: 24/07/2024

Number of peak penetration blows Rpd (Kg/cm²) Stratigraphic interpretation Scale 1:37
Clayey sand/sand /
Sandy gravel /
Marl

Scale:31



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SIGNATURE 2
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Stamp of the company TERRA DRILL S.R.L.

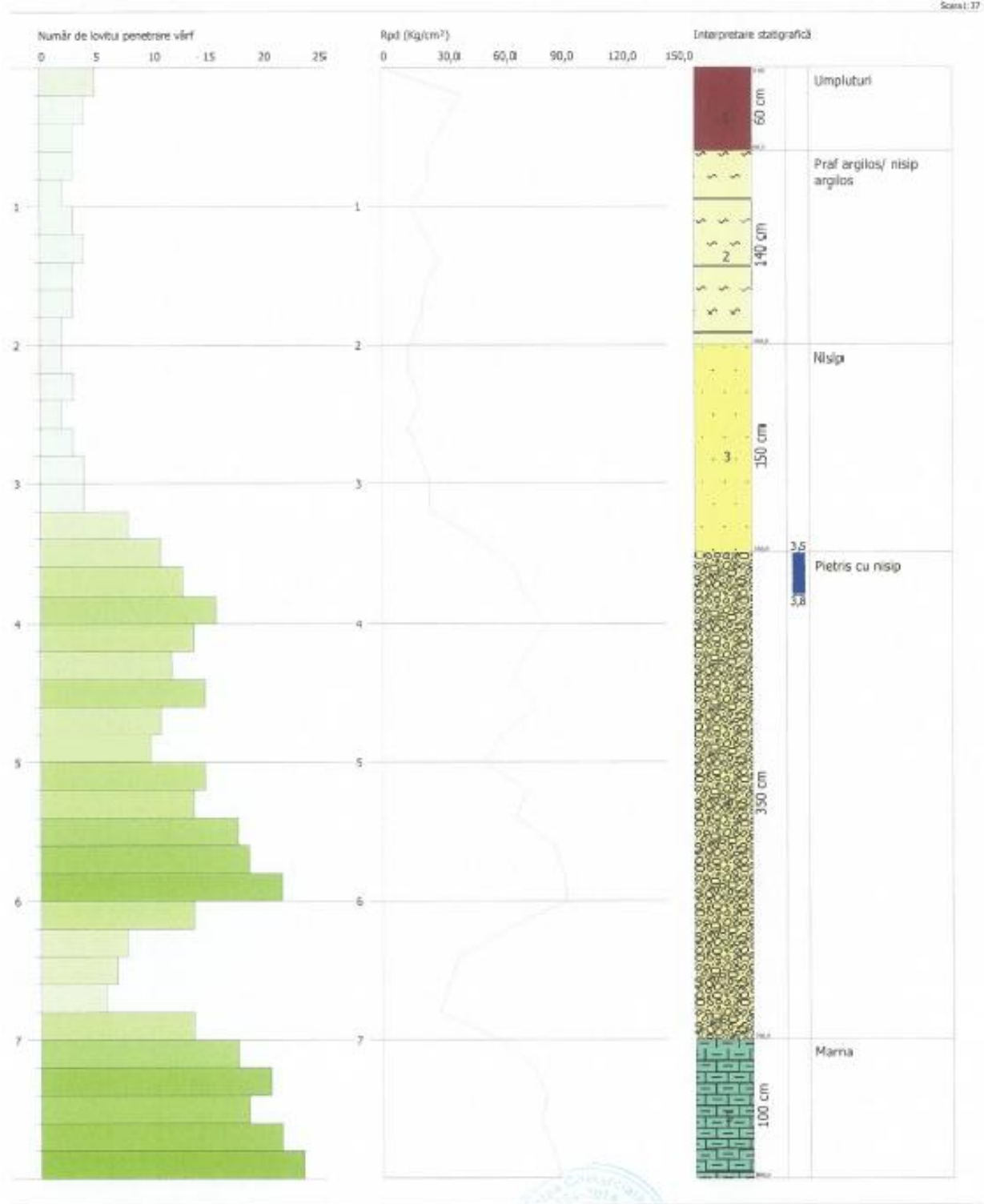
Terra Drill Srl

Dynamic Penetration Test No. 2
Instrument used... DPSH (Dynamic Probing Super Heavy)
Client: Targu Mures City Hall
Description: Dynamic Penetration Test
Location: Hippodrome – Municipal Park

Date: 24/07/2024

Number of peak penetration blows Rpd (Kg/cm²) Stratigraphic interpretation Scale 1:37

Fillers /
Clay dust/ clay sand/
Sand /
Gravel with sand /
Marl



SIGNATURE 1
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SIGNATURE 2
illegible

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