VOLUME D28
GEOPHYSICAL INVESTIGATION
SEISMIC SURVEY

Volum	Km from	Km to	Task	Length	Survey Type
D01	800	1+300	i	0.5	Seismic
D02	27+200	27+500	i	0.3	Seismic
D03	28+400	28+600	i	0.2	Seismic
D04	28+600	29+600	i	1	Resistivity
D05	36+800	37+300	i	0.5	Resistivity
D06	37+300	37+800	i	0.5	Seismic
D07	37+800	38+900	i	1.2	Resistivity
D08	10+200	10+700	iii LLR	0.5	Seismic
D09	300	900	iii	0.6	Resistivity
D10	900	1+300	iii	0.4	Seismic
D11	1+300	2+700	iii	1.4	Resistivity
D12	2+700	3+100	iii	0.4	Seismic
D13	3+100	5+300	iii	3.2	Resistivity
D14	8+500	11+000	iii	2.5	Resistivity
D15	12+000	13+000	iii	1	Resistivity
D16	15+000	18+000	iii	3	Resistivity
D17	20+000	21+000	iii	1	Resistivity
D18	25+200	25+900	iii	0.7	Resistivity
D19	29+500	30+700	iii	1.2	Resistivity
D20	36+400	36+800	iii	0.4	Seismic
D21	38+600	39+300	iii	0.7	Resistivity
D22	39+300	39+700	iii	0.4	Seismic
D23	39+800	41+300	iii	0.5	Resistivity
D24	43+200	43+500	iii	0.3	Seismic
D25	51+700	55+300	iii	3.6	Seismic
D26	68+600	69+800	iii	0.2	Seismic
D27	70+800	71+600	iii	0.8	Resistivity
D28	**90+700**	**91+300**	**iii**	**0.6**	**Seismic**
D29	91+800	92+600	iii	0.8	Resistivity
D30	96+200	98+200	iii	2	Resistivity
D31	1+000	1400	ii	0.4	Seismic
D32	9+000	10+000	ii	1	Seismic
D33	14+500	14+900	ii	0.4	Seismic
D34	20+900	21+600	ii	0.7	Seismic
D35	27+300	27+700	ii	0.4	Seismic
D36	29+500	29+900	ii	0.4	Seismic
D37	32+000	32+400	ii	0.4	Seismic
D38	27+700	29+000	ii	1.3	Resistivity
D39	62+500	64+000	ii	1.5	Seismic
D40	71+000	71+700	ii	0.7	Seismic
D41	73+000	73+400	ii	0.4	Seismic

Introduction

Geophysical Survey presented within this report is part of *Geotechnical Investigation Works in Connection with the Technical Assistance for the Preparation of Road Project Pipeline for the cohesion Fund Contract No.1: Package D.*

Package D comprises delineation by geophysical means of depth to bedrock, bedrock profile as well as nature and extent of the overburden.

Volume D28 requirements: Seismic Measurements within the area delineated by Task iii, Km 90.700 – 91.300 of projected motorway route.

Present report will describe data processing workflow and results within D28 area, as well as recommendation regarding expected nature and extent of overburden and bedrock as well as other detected sources.

Site overview

D28 Area is located east of *Branisca*. Area has accessible terrain morphology with some steep slopes, covered by forest and agriculture lands.

According to available geological information, within D28 Survey Area expected deposits are: Quaternary sand, gravel and clay, Proterozoic crystalline schist and Cretaceous sandstone.

Fieldwork

The recommended survey method, considering project requirements, is Seismic Refraction. This method is widely used, with proven results for delineating near surface lithological features.

At 2.5 spaced geophones and 11 shots per spread, the array used for seismic data acquisition insures high detail results. High signal to noise ratio is insured by stacking functions and level three CDP gather.

Marginal offset shots are included within *plan seismic survey line* representation. These shots, although part of the acquisition process, are not considered part of the Seismic Survey length (*Seismic Velocity Section*).

Workflow

To proceed to interpretation on the nature of the detected sources, velocity values have been linked to the geological data using Material Velocity Tables like the one bellow:

Material	Velocity Range (m/s)
Clay	1000 – 2500
Sand (dry, loose)	200 – 1000
Sand(water saturated)	1500 - 2000
Sand and Gravel	400 - 2300
Sandstone	1400 – 4500
Dolomite	2500 - 6500
Limestone	2800 – 7000
Basalt	5500 – 6500
Gabbros	6400 – 7000
Granite	4600 – 6200

Often the velocity values range overlap requiring additional data to pin-point the exact nature of the source. Variations in velocity ranges are caused by moisture and general structural integrity of the detected source.

Measured velocity values are subject to data inversion having as result an easily interpretable geophysical model of the surveyed area. Over this model, considering distribution of the velocities, primary and secondary lithological lines were drawn in order to delineate intercepted sources/layers.

Secondary lithological lines were placed in areas where more subtle changes in geophysical parameters distribution are visible. These lines represent a less precise delineation of sources.

Primary lithological lines were placed especially on high gradient zones, thus representing high contrast limits.

Generally, for shallow seismic refraction, low velocity values can be linked to areas with weak structural integrity being considered as an indicator for potentially unstable deposits.

The result of seismic interpretation is a velocity section. These values, without additional data, describe seismic boundaries (refractors). The actual geological nature of the sources can not be estimated solely on absolute velocity values.

Data Interpretation

Given the above considerations, within D28 Area the following sources have been detected (see Annex 28/41):

Source Type	Velocity signature	Position / Dimensions	Expected source
So a,b	Very low values (<500 m/s)	Quasi-horizontal layered source and lenticular source, 2-4 meters thick	Very low velocity source (Soil, loose sediments)
S1	Medium-low values 500 – 1700 m/s	Quasi-horizontal continuous layered source, ~5 meters thick	Low velocity source (unconsolidated and/or moist sediments)
S2	Medium-high values (1600 - 3800 m/s)	Quasi-horizontal layered source, 5-10 meters thick	Medium velocity source
S3	High values (3800 - 4700 m/s)	Quasi-horizontal layered source, 5-15 meters thick	High velocity source
S4	Very high values (>4700 m/s)	Quasi-horizontal, intermittently visible, layered source	Very high velocity source

Conclusions and Recommendations

The first source type (So a,b - soil and loose sediments) has very low velocity values. This layer is expected to have structural instability.

The velocities values within D28 Area are very high pointing to fresh rock. Considering geological information, sources S3 and S4 point to Proterozoic schist type of bedrock.

Seismic Survey Project Coordinator
Eng. Serban NEGREA

Report and Drawings prepared by
Eng. Serban NEGREA

Verified by:
Eng. Horia NISTOR

Approved by:
Eng. Dan ONESCU