

ELEVATION SURVEYS FOR THE DETERMINATION OF CLOGGED AREAS ON A SECTION OF THE NERA RIVER

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Abstract: *The topographic elevations for this paper were done within the ballast operations area at Naidas. The area is located along the Nera River, in Caras-Severin County. The topographic and land survey measurements were taken with the Leica TPC 805 Total Station, and the data were downloaded with the LEICA Geo Office Tools software. The total station is an optical device used for topographic measurements. It is a combination of the classic theodolite and an electronic instrument for measuring distances. The total station can include a small computer that provides storage capacity and makes precise calculations. The measurements were taken along the Nera River, on 350 metres, downstream Naidas and upstream from the bridge on DN57 that crosses the river. After field reconnaissance and the identification of the operations area, a planimetric traverse and detailed elevation was performed. The operations area covers 25,335m². The coordinates were determined in Stereo '70 system, and the*

elevation system was sent from the rod on the bridge pier. The "0" elevation on the rod is considered the 107.27 m elevation - the Baltic Sea. The data typed into the computer were processed with special software applications. The calculations of the geo-topographic support networks were done with the TOTAL 2.0 software. The (temporary) coordinates of the points to be determined are done automatically. The compensation of the support network is done with the least squares method, the indirect measurement method. The software creates a DFX file that can be used with the AutoCAD package at a later time. TOTAL 2.0 calculates and, where necessary, compensates any combination of direction and distance measurements, from the easiest (cancellation of registration, multiple intersection, multiple resection) to the most complex ones (various traverses, polygonometric networks, triangulation).

Key words: *topographic elevation, ballast operations area, total station, temporary coordinates*

INTRODUCTION

Land measurement techniques have existed throughout much of recorded history. They materialized as a necessity to draw land maps for economic purposes, construction works, communication means, urban and rural planning, military operations, mining, agriculture, silviculture etc. The development of the science of terrestrial measurements in general and of topography in particular goes hand in hand with the emergence and continuous improvement of land surveying equipment. The technical achievements in the field of geometrical measurement equipment and calculation and report means have determined the improvement of working methods and procedures, leading to high elevation accuracy and efficiency.

MATERIAL AND METHODS

The topographic elevations for this paper were done within the ballast operations area at Naidas. The area is located along the Nera River, in Caras-Severin County. The topographic and land survey measurements were taken with the Leica TPC 805 Total Station, and the data were downloaded with the LEICA Geo Office Tools software.

Total stations are part of the new generation of topographic instruments. Basically, they function like a classic tachymeter. They have been improved continuously since they were created and are now used almost exclusively. They are precise, easy to use and very efficient and have become the symbol of the modern land surveyor.

The calculations of the geo-topographic support networks were done with the TOTAL 2.0 software.

The (temporary) coordinates of the points to be determined are obtained automatically. The compensation of the support network is done with the least squares method, the indirect measurement method.

The software creates a DFX file that can be used with the AutoCAD package at a later time.

TOTAL 2.0 calculates and, where necessary, compensates any combination of direction and distance measurements, from the easiest (cancellation of registration, multiple intersection, multiple resection) to the most complex ones (various traverses, polygonometric networks, triangulation).

Naidas is located in the south-west of Caras-Severin County, Romania. It lies near the border with Serbia, on county road DJ 571C. It is the main village of the commune by the same name and it is 84 km far from Resita and 21 km from Oravita, which is the nearest town. Naidas village covers an area of 6,374 ha, of which 4,572 farmland.

The commune comprises two villages, Naidas and Lescovita. It is part of the hydrographic network of the Nera and it is located on the inferior course of this river. The Nera, which flows from east to west, has the following tributaries: Valea Zbagului, Vl. Calugariei, Ogasul lui Tugui, Og. Gavrova, Og. lui Stancu on the left and Naidasel, Valea Uzumi, Ogasul Lescovitei on the right.

The Nera is 131 km long and springs from the Semenik Mountains in the east of Banat, south of Resita, in Caras-Severin County. It is formed at the confluence of two arms, the Nergana and the headwaters Nerganita. From there it flows straight to the south to Borlovenii Vechi village, where it turns south-west and receives the Rudaria as a tributary. Then it passes by numerous villages like Patas, Prilipet, Dalboset and Moceris. At Sopotu Nou, the Nera turns north-west, entering the Nera Gorges. Next it passes by Sasca Romana, Sasca Montana, Slatina-Nera, Bogodint and Naidas; from that point on it becomes a border river between Romania and Serbia for the remaining 21.9 km.

In the border area, the Nera flows through the Biserica Alba depression (Belocrkvanska kotlina; in Cyrillic: Белоцркванска котлина).

In its last section, the Nera is 20-40 m wide, of variable depth and, as its bed is formed mostly of pebbles, it forms inlets with murky waters. The mouth is a popular fishing destination.

The Nera drains an area of 1,240 km², belonging to the Black Sea drainage basin, and it is not navigable. The hydrographic network comprises the Nera and its tributaries, the Nergana, the Nerganita, the Cosava, the Helisag, the Minis, the Lapusnic, the Moceris, the Ducin, the Prigor, the Rudaria, the Bania, the Sopot, the Valea Rea, the Bei etc. There are two natural lakes in the hydrographic basin: Lacul Dracului, a unique karstic lake in our country covering an area of 700 m² and about 12 m deep, and Ochiul Beiului, with an area of 284 m² and a maximum depth of 3.6 m.

The climate is moderate temperate-continental, with mild Mediterranean influences. The multiannual average temperature varies between 11.10°C (Oravita station) and 11.40°C (Moldova Veche station). The multiannual average amount of precipitations was 895 mm in 1884-1994 (Oravita station).

The vegetation is made of forests, bushes, pastures and ruderals. It is disposed in specific levels determined by the characteristics of the environment. The farmland of the village (4,572 ha) is divided as follows: 1,919 ha arable land, 2,356 ha pastures, 238 ha meadows, 44 ha orchards and 15 ha vineyards.

RESULTS AND DISCUSSIONS

The measurements were taken along the Nera River, on 350 metres, downstream Naidas and upstream from the bridge on DN57 that crosses the river. After field reconnaissance and the identification of the operations area, a planimetric traverse and detailed elevation was performed.

Measurements were taken for the topographic documentation. The perimeter was delimited with boundary stones and the station points were metal pins (Table 1 and 2).

After data processing, the measurements were superposed over the orthophotoplan no 227_379, that represents the study area (figure 1).

Figure is shows the dimensions site plan. The coordinates are given in Stereo 1970 system. The reference of the coordinates is the Baltic Sea.

Table 1

Coordinates of the new station points - STEREO'70

Station point	Coordinates			Materialization
	X [m]	Y[m]	Z[m]	
A1	382034.358	229184.879	108.700	Metal pin
A2	382107.803	229271.611	109.504	Metal pin
A3	382166.461	229356.781	109.094	Metal pin
A4	382177.779	229403.643	111.749	Metal pin

Table 2

Coordinates of the points of the operation perimeter - STEREO'70

Station point	Coordinates			Materialization
	X [m]	Y[m]	Z[m]	
1	382121.132	229130.049	110.727	Concrete stone
2	382212.316	229309.672	110.128	Concrete stone
3	382247.545	229469.460	110.447	Concrete stone
4	382191.133	229462.768	109.823	Concrete stone
5	382165.274	229363.001	109.075	Concrete stone

The operations area covers 25,335m². The coordinates were determined in Stereo '70 system, and the elevation system was sent from the rod on the bridge pier.

The "0" elevation on the rod is considered the 107.27 m elevation - the Baltic Sea.

The data typed into the computer were processed with special software applications.

Field elevations were measured to determine transverse profiles. A number of 13 transverse profiles were determined on 425 m.

The ballast areas were found at the elevation points for the determination of the transverse profile PT1, PT2, PT3, PT4, PT10, PT11, PT12 and PT13. The length of the profiles varies from 81.48 m (PT2) to 166.31 m (PT10). The following figures show the transverse profiles determined on the Nera River.

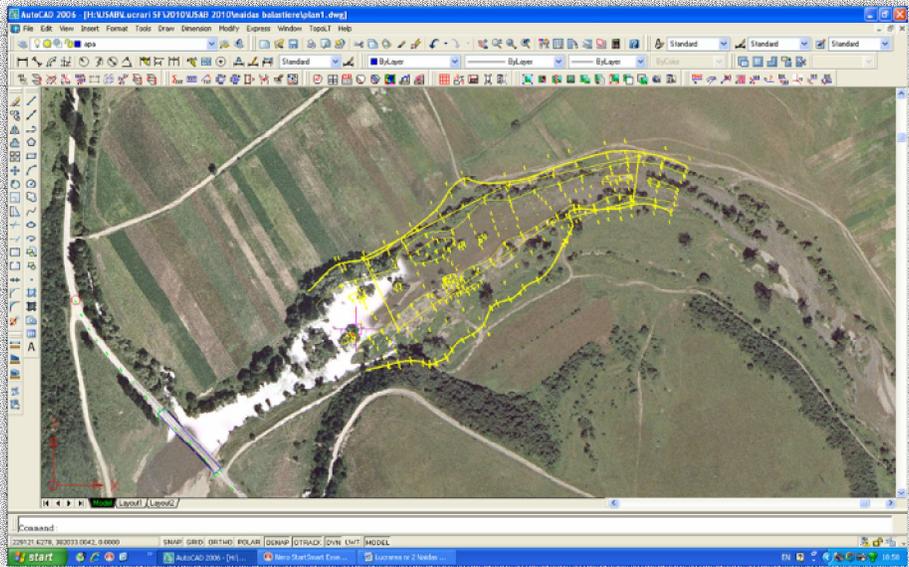


Figure 1: Measurements overlapping orthophotoplan no 227_379

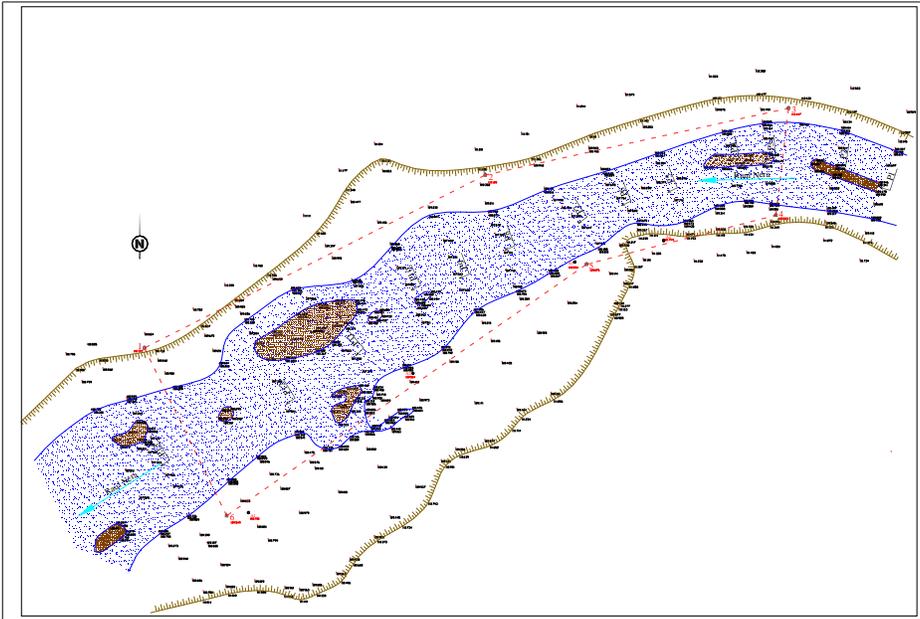


Figure 2: Dimension site plan

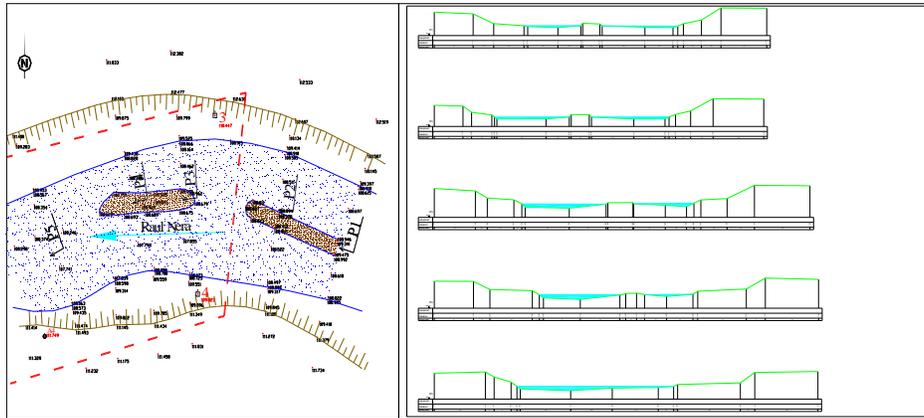


Figure 3: Plan view and characteristic profiles (PT1, PT2, PT3, PT4 and PT5).

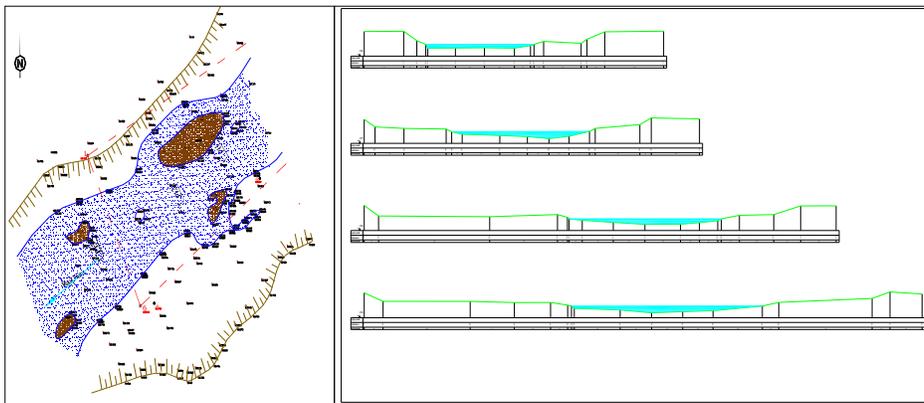


Figure 4: Plan view and characteristic profiles (PT6, PT7, PT8 and PT9)

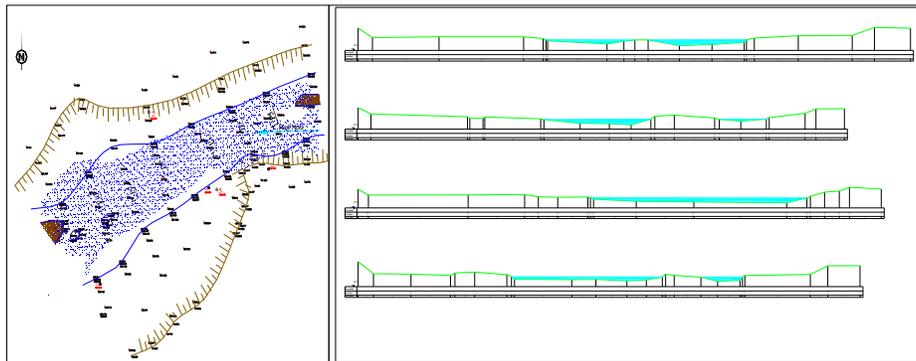


Figure 4: Plan view and characteristic profiles (PT10, PT11, PT12 and PT13)

CONCLUSIONS

The measurements were taken along the Nera River, on 350 metres, downstream Naidas and upstream from the bridge on DN57 that crosses the river.

The operations area covers 25,335m². The coordinates were determined in Stereo '70 system, and the elevation system was sent from the rod on the bridge pier

The "0" elevation on the rod is considered the 107.27 m elevation - the Baltic Sea.

After data processing, the measurements were superposed over the orthophotoplan no 227_379, that represents the study area.

Field elevations were measured to determine transverse profiles. A number of 13 transverse profiles were determined on 425 m.

The transverse profiles indicate that the large deposits have changed the trajectory of the water currents. In the first four profiles, the minor bed is separated in two sectors, while the streambed increases considerably starting with profile 8. Also profile 10 indicates a large deposit at its maximum width of 166.31 m.

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