

TECHNICAL SOLUTIONS ADOPTED FOR REHABILITATION S.P. 6 MOȘNIȚA, TIMIȘ COUNTY

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Abstract: SP 6 Moșnița pumping station is located within the village Moșnița Nouă, and is situated about 1 km from Timisoara, near the county road DN 58 Timisoara - Buziaș. Moșnița Nouă is located on county road linking Timisoara DJ592 Buziaș about 8 km from the center of Timisoara, but recently it almost adjacent to the limits, the partitions area between Moșnița Nouă and the county in last years know a strong municipal development. Distance from other components places of the village is small, and Moșnița Nouă is at the heart of the village territory, linked to other towns with village roads, with Moșnița Veche 1,8 kilometers to the north, Urseni 3 km further south, Albina 3 km east and Rudicica at south-west. Urban development has led to the reduction of actual distance between places components from the nearest buildings Moșnița Nouă and Veche with less than 250 m. Moșnița pumping station, proposed for rehabilitation, works from 1978 year and serves an area of 6320 hectares of agricultural premises of the establishment of draining Moșnița, and presents advanced physical and moral wear.

The station was sized for a flow $Q_{st} = 4,3 \text{ m}^3/\text{s}$, a pumping height $H = 3,6 \text{ mca}$ and equipped with four electropumps with horizontal shaft type BRATEȘ 600 ($Q_p = 1,1 \text{ m}^3/\text{s}$, $H_p = 8,6 \text{ mca}$) driven by induction motors MIB 2315 M90-10 with $P = 90 \text{ kW}$, and 590 rpm and annex relevant equipment (epuisment equipment, striking equipment). Electricity supply to pumping stations to do the post processing located in close proximity to 14 m from the building. Water discharge is via two metal pipes with $D = 1000 \text{ mm}$ which crossing irrigation channel CA1. Overflow pipes $D_n = 1000 \text{ mm}$ with manual valves, operate as discharge pipes for two electro pump. The pipes have a high degree of corrosion and clogging, causing inefficient operation of the pumps. Water discharge is via two metal pipes with $D = 1000 \text{ mm}$ which crossing irrigation channel CA1. Overflow pipes $D_n = 1000 \text{ mm}$ with manual valves, operate as discharge pipes for two electro pump. The pipes have a high degree of corrosion and clogging, causing inefficient operation of the pumps.

Key words: pumping station, aspiration, discharge, draining, physical and moral wear

INTRODUCTION

The analyzed pumping station serving Șag Topolovăț draining system, unit for draining Moșnița, with a surface of 6320 hectares was built in 1978 as a station with 4 horizontal type aggregates Brateș 600, 4 steel suction pipe diameter 600mm and 4 all steel discharge pipe diameter of 600 mm which are connected to three discharge pipes of 1000 mm. Water pumped from the draining system can be evacuated in channel link CE1 (all four units) by 2 steel discharge pipe with 1000 mm diameter, which crossing irrigation canal CA1 or if is necessary in the irrigation canal CA1 through a steel pipe of 1000mm which are connected aggregates 1 and 2.

The station was sized for a flow $Q_{st} = 4,3 \text{ m}^3/\text{s}$, a pumping height $H = 3,6 \text{ m.c.a}$ and equipped with four electropumps with horizontal shaft type BRATEȘ 600 ($Q_p = 1,1 \text{ m}^3/\text{s}$, $H_p = 8,6 \text{ m.c.a}$) driven by induction motors MIB 2315 M90-10 with $P = 90 \text{ kW}$, and 590 rpm and annex relevant equipment (epuisment equipment, striking equipment). Electricity supply to pumping stations to do the post processing located in close proximity to 14 m from the building.

The foundation of pumping station SP6 Moșnița is the type dry shaft, the concrete steel walls present infiltration from the aspiration basin at high levels, but pumping station superstructure due to prolonged operation has a high degree of wear. Category and importance class of works is "D"

MATERIAL AND METHODS

Pumping station due to prolonged operation currently has an overall yield of less than 30%, the aggregates is physically and morally used and other equipment of the station and station building are in an advanced state of degradation (fig. 1, 2, 3). For this station has prepared a feasibility study was based on evidence presented before.

Rehabilitation of pumping for draining SP M Moșnița will be made by replacing the basic and auxiliary aggregates physically and morally waste, because long operation, with others new, improved efficiency and high reliability.

It was intended that the modernization to keep the design features of the pumping station (Q and H).

It was also aimed at reducing electricity consumption by choosing equipment with high yields and thus reduces the operating costs. The four existing horizontal pumps type BRATES 600 will dismantle and will be replaced with new pumps which are mounted on existing footings.

At pumps replacement will dismantle metal manufactures and fittings on the suction and discharge circuit and replace with new ones.

Following tenders received from various manufacturers of pumps resulting 3 categories of pumps with the following characteristics:

- I variant: horizontal axial electropumps with $Q = (5040-3960) \text{ m}^3/\text{h}$, $H = 3.6 \text{ m.c.a.}$, $NPSH_{nec} = 5.9 \text{ m}$, $N = 90\text{Kw}/585 \text{ rpm}$, engine type B5, $U = 380/660\text{V}$, prot. IP 54;



Figure 1: The interior of pumping station, infiltrations and aggregates state



Figure 2: The degraded suction basin of the station



Figure 3: The appearance of the pumping station

- II variant: horizontal axial electropump with $Q = 3870 \text{ m}^3/\text{h}$, $H = 6 \text{ m.c.a.}$, $NPSH_{nec} = 7.5 \text{ m}$, $N = 160\text{Kw}/580 \text{ rpm}$, engine type MIB4, $U = 380/660\text{V}$, prot. IP 54;
- III variant: horizontal axial electropump with $Q = 1.1 \text{ m}^3/\text{s}$, $H = 8.6 \text{ m.c.a.}$, electric motor $P = 90\text{Kw}/730\text{rpm}$.

The position of pumping groups in station in all 3 versions will be made horizontally on the foot plate. Fixing the pumping groups in construction will be done with bolts embedded in common foundation of the tank station (the current location of pumps). Heights of the pumping harvesting from the characteristics of the three proposals received from the equipment manufacturers satisfy the requirements of the order form and therefore were given these choices. Of the 3 models suitable for rehabilitation in the feasibility study has opted for the first variant: - replacement of the basic electropumps and hydro-mechanic and electric equipments facilities serving them with new ones with high reliability such as: $Q = (5040-3960) \text{ m}^3/\text{h}$, $H = 3.6 \text{ m.c.a.}$, $NPSH_{nec} = 5.9 \text{ m}$, $N = 90\text{Kw}/585 \text{ rpm}$, engine type B5, $U = 380/660\text{V}$, prot. IP 54, parameters that fall within the technical requirements required by the note of command.

For prime pumps were provided for two groups of vacuum pumps directly coupled with electric motor. It will replace the entire installation of priming (pipes, fittings). The equipment electropump EPEG 80 will be replaced with a submersible new electropump with parameters: $Q_p = 14 \text{ m}^3/\text{h}$, $H_p = 8 \text{ m.c.a.}$

Existing metal suction pipes, Dn 600mm, pictured buried will be discovered, and dismantle cuts. Replacement will be made with metal pipes, Dn 600 mm (De 611x9mm), spiral welded to SR 6898/1. Metal manufactures (vacuum with grill on slope, elbows, and sections) will be executed under drawings of the project. Pipes and metal manufactures will be insulated on the outside with reinforced insulation, protection cold type and the interior will isolation. Existing metal discharge pipes, Dn 600 mm and Dn 1000 mm, will be discovered, buried pictured, will disassemble cutting and it replace with metal pipes Dn 600 and Dn 1000 mm.

Suction and discharge pipes will fit into existing site after dismantling and removal of their, strictly respecting sitting shares. Electricity supply to pumping station will be the transformer station located near the 14 m building. The link between post processing of 2 x 630KVA, KVA-20/0.4 KV and switchboard T.G.D will be with two armed cable type ACYABY of 3x240+120 mmp pictured in trenches on a bed of sand and covered with bricks. Connection of the main engines to panel T.G.D will be armed with cable type ACYABY of 3x 150+95mmp pictured in built channels.

Auxiliary control devices for consumers, equipment, striking, heating, etc., will be mounted near the aggregate they serve. Automation for four electropump will be provided with

electropump and will contain electrical control panel fitted with:

- short-circuit protection;
- overload protection;
- minimum and maximum voltage protection;
- phase failure protection;
- phase sequence protection;
- winding overheating protection;
- manual and automatic control by water level for the level regulators.

At station has provided the facility of outdoor lighting, extended for another pillar of energy supply in order to feed the grid, and replacement of interior electrical installation. On the draining channel where is located the current basin of aspiration is provide an auto clean grill.

The suction and the discharge basins will be repaired by removing damaged flagstones and casting, on the spot, other flagstones. At the existing building was proposed to replace the existing metal windows with aluminum others of the same size, replace the door with an aluminum access, restoration of existing waterproofing, interior and exterior repairs to plaster, painting interior and exterior, shutter thermo isolation.

RESULTS AND DISCUSSIONS

➤ The initial performance of aggregates mounted in SP 6 Moșnița pumping station was calculated theoretically from the operating diagrams of the pump BRATEȘ 600.

➤ The current performance of the station can appreciate; can not be established because there is no measuring device mounted flow into the station. At the no. 4 aggregate yield is estimated at 10%, no. 1 aggregate is defect valve and aggregates 2 and 3 are assessed to have a yield of 40-50%.

➤ Following station rehabilitee, the station efficiency increases, the volume of water pumped will increase and will reach a price much lower than the current cost. Also from the investment, the station will be equipped with flow system and will be able to measure real parameters of the aggregates, which will be able to calculate the actual cost price.

➤ The mode to use the land from arranged area was initially agricultural

➤ Pumping station is located on land belonging to Romanian state in the ANIF RA Territorial Branch Timis – Mureș administration (no extract CF);

➤ The autocleaning grid what was provided will be placed on land to the Romanian state and private property;

➤ Waters discharged from the constructed get all the pumping station (the issue of building in the area of advice was not taken into account that) and the pumping debt is changed from the initial design requirements.

CONCLUSIONS

So far no material damage was recorded as pumping station operated continuously, but any downtime of the pumping station would raise the groundwater level (derived from infiltration of Bega channel) and flooding of agricultural land in the system, neighboring city of Timisoara, as well as residential neighborhoods built on the surface of the draining system.

The situation on the landowner which is located station must be resolved before the start of rehabilitation works.

Mode of the water management from the establishment of draining surface and areas of housing should be regarded and treated as a whole and regulated.

If the ground conditions would be allowed, a station with vertical aggregates instead of would be the ideal solution. This is not possible because of road access to the area of

housing built nearby which passes by pumping station and which would have meant a widening suction basin, bilateral location of the aggregates and crossing over discharge pipes, which is not possible in terms of constructive.

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