

Object:

"Construction of pedestrian access to the tourist site "The Old Bridge" and elements of the urban environment for recreation and tourism development" in LP 65677.701.9131 of the cadastral map of town Svilengrad

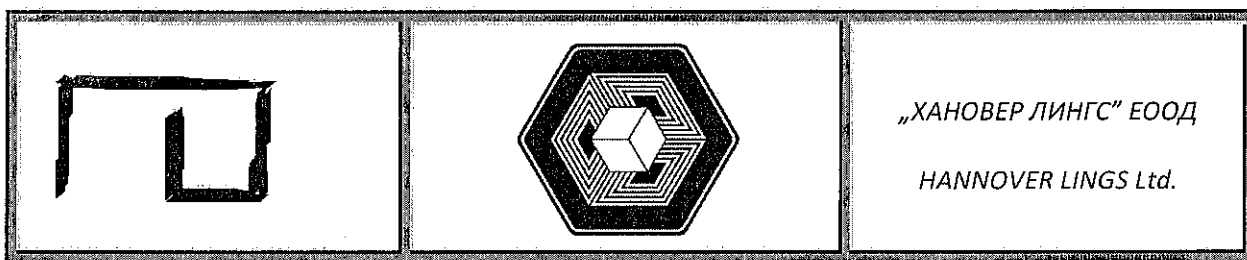
Part: Hydro-meliorative construction

Phase: WP

Contracting authority: CA „Together for Svilengrad“

Designer:
/ eng. D. Tabashki /

Contracting authority:



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ВЯРНО С
ОРИГИНАЛА



EXPLANATORY NOTE

1. GENERAL PROVISIONS

The present development of the Automated Underground Irrigation System (AIS) was developed on the basis of a dendrological project, part of the project "Construction of pedestrian access to tourist site" Old Bridge "and elements of the urban environment for development of recreation and tourism" in PI65677 .701.9131, by the town of Svilengrad.

2. ANALYSIS OF THE EXISTING POSITION

2.1. Technical conditions

1. Water source - the irrigation system will be supplied with water from an existing pumping station.

3. PROJECT DECISION

The AIS project involves watering representative lawns and bush groups adjoining part of Krayrechna Street.

The objective is to achieve an optimal water-air regime in the soil that provides good conditions for the proper development of grass and plants in the complex.

All lawns will be watered by spraying and rotor type sprayers, and a drip hose diameter 16mm, with pressure-compensating drops-condensers, will be used for watering the flower and bush groups.

These elements of the irrigation system will be installed on a pipe network made of polyethylene pipes and fittings and separated into separate irrigation zones. Each zone is controlled by an electromagnetic valve. The solenoid valves for landscape irrigation will be automated by the T-BOSS control system.

The operating voltage of the system is 9 V, with the solenoid control being impulse, which significantly increases the life and reliability of the electrical components of the system.

The solenoid valves will be grouped in several, in individual shafts, each group being operated by a separate module of the system. The irrigation is divided into 10 separate irrigation zones (respectively electromagnetic valves), with 2 zones with deflector spreaders, 6 with rotor and 2 with drip irrigation. The division of the zones is dictated by the possibilities of the water source, taking into account the functional capabilities of the system. It is intended to work on two valves at the same time.

The spreaders are selected and grouped according to their technical parameters, so that in each area they have the same cost rate to ensure a maximum uniform distribution of water throughout the area.

The irrigation system is designed to operate under the following operating parameters:
 $Q_{work} = 19.0 \text{ [m}^3 / \text{h]}$ and $N_{work} = 6.0 \text{ [bar]}$.

The main water pipeline is envisaged to be implemented by tube 075 PE 100 PN 10.

The secondary pipeline will be constructed of polyethylene pipes 063, 050, 040, 032 and 020 PE 100 PN 10.

When installing the irrigation system, it is envisaged to use "quick connection" and the following technology should be observed:

1. Conducting of excavation works.
2. Cleaning trenches of stones.
3. Laying a sand bed / if necessary /
4. Laying of the pipes.
5. Covering pipes with sand/ if necessary /.
6. Covering with soil.
7. Compaction the trenches.

The irrigation rate for grass is 4 to 6 l / m² per day, and for shrubs and trees varies between 5 and 30 l / m², depending on plant type and soil permeability.

Based on these norms, the watering times of each zone are calculated. Runtime of all spreader zones, in

if running sequentially, is 1 h 35 min, allowing the watering cycle to fit within the night when it is advisable to water the lawn, and the areas with shrubs and flowers - 0 h 45 min, with their watering cycle during the day.

4. HYDRAULIC DIMENSION OF THE PRESSURE NETWORK

In the present study, the free pressure at the spreader that is the most unfavorable from a hydraulic point of view is projected to be 30 m.

Water quantities and hydraulic dimensioning

The hydraulic dimensioning of the pipework includes the determination of the dimensional water quantities and the losses of pressure.

D_{stand} is reported from tables - Table 1. It is reported with respect to D_0 diameter obtained by the formula:

$$D = \sqrt{\frac{4 \cdot Q}{\pi \cdot V}} \text{ , mm} \quad (1)$$

at a set initial speed $V = 1,5$

m / s J - hydraulic slope m / m '.

It is determined by the tables provided by the PE pipe manufacturer.

$A h$ - loss of head in the pipeline, m

$A h = J.L$

At the end of each distribution pipeline, I accept a $Nd = 30 m$

Chart 1

	HDPE PE 100			
	PN 10			
	SDR 17			
	Smooth		With sockets	
P stand.	d	Do	d	Do
mm	mm	mm	mm	Mm
25	1,0	21,2	-	-
32	2,0	28,0	-	-

Dc -And. - outside diameter

d - wall thickness

Do - inside diameter

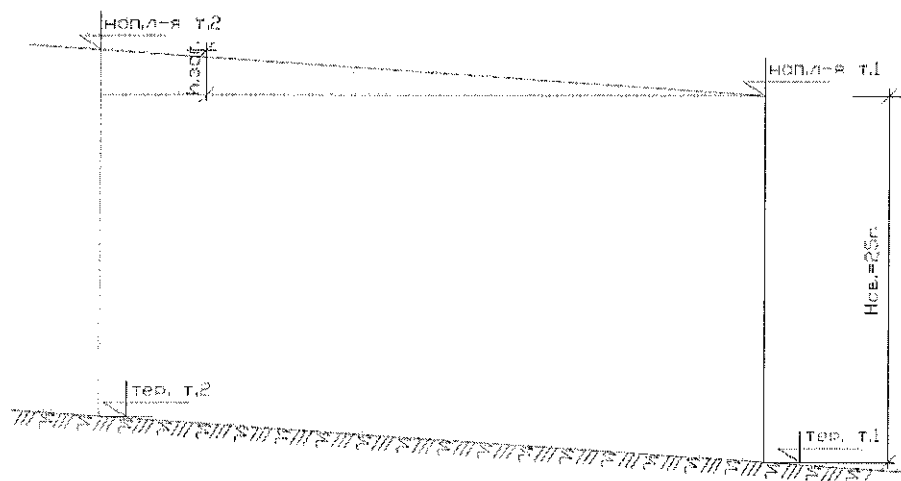


Figure 1

Pressure line $T_{1.1} = \text{Terrain} + H_{CBT.T.1}$

Thus the elevation of the pressure line at the beginning of each is found distribution pipeline.

Pressure line $T_{2.2} = \text{Terrain} + H_{3ar.T.2}$

5. MATERIALS

All materials used are new, of guaranteed quality and clear origin.

The materials must be stored in a separate warehouse, subject to compliance manufacturer's recommendations.

The quantities indicated in the plans and / or the quantity account are identified as accurately as possible but remain approximate.

All quantities listed in the Quantitative account are increased by the following percentages to the plans:

- pipes (polyethylene): + 10%
- cables: + 5%

The final quantities are those listed in the Quantitative account.

Materials or equipment cannot be replaced without prior permission from the Designer.

5.1. Pipes

Polyethylene pipes used in the irrigation system must be HDPE, PE 100 with a nominal pressure of 10 bar and diameters from 20 mm to 75 mm.

5.2. Fittings

Fittings for polyethylene pipes with a diameter of 25 mm to 75 mm should be a "quick connection" type with a nominal pressure of at least 10 bar.

5.3. Spreaders

All spreaders, "deflector" or rotary mechanism, must be of high quality, produced by an established irrigation equipment maker, accompanied by all necessary documents, such as declarations of compliance, quality certificates and operating instructions in Bulgarian language.

Characteristics of the spreaders:

Model	Pressure (bars)	Radius (m)	Debit (m ³ /h)	Dimension in (m) rectangle
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Deflector	2,0	0,9 – 5,5	0,1 – 0,6	1,2 – 4,9
Rotor	3,0	5,2 – 8,2	0,2 – 0,45	5,2 – 7,8
Rotor	3,0	8,8 – 13,9	0,25 – 1,35	8,8 – 12,9

5.6. Inspection shafts

The inspection shafts should be installed on all solenoid valves, stopcocks and cable connections.

Features:

Rectangular shafts:

Type 1: Dimensions 505 mm x 370 mm / h = 305 mm

5.7. Electromagnetic valves

Plastic solenoid valves 1 1/2 ", 9 V

- Solenoid 9V
- Material: PVC
- Option to regulate the flow
- Angular fitting
- The valve cover is attached to the housing by bolts
- Attachment Thread 1"ж
- Filter for the solenoid membrane
- Possibility for manual opening by turning ¼ of the solenoid
- Solenoid with encapsulated slider
- Operating pressure: 1 to 10.4 bar (at a water temperature of 23°)
- Working flow: 6.0 to 21.0 m³ / hr

5.8. Rain sensor

The rain sensor must be compatible with the program. Option to report rain in the range of 5.0 mm to 20.0 mm. The site is provided six rain sensors. Install the sensor in a suitable place for proper reporting of the rainfall.

6. INSTALLATION

General provisions

Carefully follow the manufacturer's recommendations for the installation of pipes, valves, sprinklers, flexible connections, hydrants, programmers and all other components of the system.

The final assembly of all elements must be no more than 20 cm from the trace area or between the sprinklers and the pipe location.

6.1. Width of the trenches

The pipe trenches must be wide enough to fit the pipes according to the manufacturer's recommendations. Minimum width of the trench - 15 cm.

6.2. Depth of trenches

The depth of all trenches should allow a height of at least 30 cm above the upper edge of a pipe with a diameter equal to or less than 75 mm. The bottom of all trenches should be cleaned of sharp stones, metal waste, etc., which could damage the pipe.

6.3. Installation of pipe intersections

All polyethylene pipes should be inspected for junk, stones and others, inside the pipe before installation.

Where it is necessary to cross two pipes, the largest diameter polyethylene pipe should be located at the bottom.

The radius of the horizontal and vertical curves of the installed pipes must not be less than the manufacturer's recommendations.

The fittings mounted on polyethylene pipes should be tightened with tools.

6.4. Reverse embankment

When reversing the embankment, use soil dredged at making the trenches, removing the big stones, and other junk that could damage the pipes.

Fill in staggered steps:

1. Clear and align the trench
2. Lay the pipe and fix it in the trench
3. Filling material with soil without stones

6.5. Components of the irrigation system

6.5.1. Inspection shafts

The inspection shafts should be installed at each shut-off valve, electromagnetic valve or cable connections.

The inspection shafts must be deep enough (40 cm) to provide access to taps, valves and cable joints.

The shaft must be level with the final one level of terrain, and be strong enough to withstand the passage of the maintenance of green areas.

6.5.2. Spreaders

The spreaders should be mounted vertically. To use a teflon strip for threaded joints between spreaders and connecting knees.

All spreaders must be level with the final one terrain level to avoid mowing fracture.

6.5.3. Electromagnetic valves

The spreaders by zones are grouped into separate irrigation rings and are connected to electromagnetic valves. Keep the direction of movement on the fluid when installing the valves. Required to use teflon on threaded connections.

The valves should be located in the shafts so they can be secured access at any time. In order to be more easily accessible, the valves should be installed at a depth of no more than 40 cm from the ground level.

The cable connections to the solenoid valve are filled with waterproofing joints type DBM or DB.

6.5.4. Battery programmers

The programmers shall be installed at the locations specified in plans, in one of the inspection shafts for the valves. The final location should be approved by Designer in order to be avoided incorrect positioning.

Each programmer must be linked to its maximum number of control stations. If there are vacant stations, be considered as spare.

6.5.5. Rain sensor

Three rain sensors are provided for the facility. Sensors to be mounted at a suitable location on a metal stand or on the roof top of the building for proper rainfall reporting. An obligatory condition is the device is to be positioned no more than 25 meters away from the location of the programmer.

Prepared by:

/ eng. D. Tabashki /

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