**TECHNICAL DESCRIPTION**

**1.CONSTRUCTION OF WALKING TRAIL**

**in Municipality of Kriva Palanka**

* 1. GENERAL PART

The basic project is designed after the brought agreement by all the relevant factors for economic and social justification to design a basic project for four pedestrian paths in the settlement called Varovishte, "Walking trail -1" from 0+000,00 km to 0+163.04km, " Walking trail with Riverbed" from 0+000,00km to 1+137.43km, " Walking trail -2" from 0+000,00 km to 0+396.91 km and " Walking trail -3" from 0+000,00km to 0+145.39km verified within the existing legal norms and regulations and the proposed and adopted project program.

This project is based on the:

- Project assignment given by the project investor

- Basement M=1:2500- Topographic basement M1:25000

- Terrain analysis

- Usage of the previously pierced riverbed, which is parallel to the Walking trail, for placement of operative polygon for marking the route in the existing space while the marginal permitted leveling and situational elements are taken in consideration.

The basic project should be divided in two phases.

**The first phase includes:**

**-Walking trail -1from 0+000.00km. to 0+163.04km.**

**-Platy leak -1 or Pedestrian bridge -1**

**-Walking trail with riverbed from 0+000.00km. to 0+722.29km.**

The second phase includes:

-Walking trail with riverbed from 0+722.29km. to 1+143.53km.

-Platy leak -2 , Pedestrian bridge -2

-Walking trail -2 from 0+000.00 km. to 0+396.91km.

-Walking trail -3 from 0+000.00km. to 0+145.39km.

1.2 SIGNIFICANCE OF THE TRAIL The Walking trail which are a subject of this project are placed in Kriva Palanka and Varovishte or more accurately in the places called Babin Dol and Krusha. These paths are of great importance for the development of the tourism and for the cultural and historical significance of the Monastery "St. Joakim Osogovski".

There are existing paths in certain parts of the route which are with variable dimensions on particular sections but not wide more than 1.0m , with large bumps, without pavements, with large longitudinal and cross slopes on particular sections and with drainage problem of the surface water in some places.

1.3 GEOMECHANICAL AND MORPHOLOGICAL FEATURES OF THE TERRAIN

Geomechanical analysis of the Walking trail i.e.of its route, as well as of the soil layers for the purposes of this project are not conducted. The soil layers for the most part would satisfy the requirements for this type of a path.

The route where the newly designed pedestrian path passes through is built upon the existing path in the settlement. The existing path is earthy, bumpy and with holes and there is also mud when it rains. This project takes into consideration all the characteristics predicted with the traffic solution and all the legal regulations are respected for this type of roads. It is designed in accordance with the existing conditions of the route and the directions given by the investor.

1.4 GEOLOGICAL FEATURES

The investor is not obliged to conduct geotechnical research for the route, because there are no signs of high groundwater which would require protection and special conditions for its reception.

1.5 PROJECT ELEMENTS

The following project elements are approved on the bases of the given and adopted criteria with the project assignment for this project:- Rank of the path pedestrian path-Width of the roadway B=2.00m-Authoritative vehicle (intervention vehicle)

The rest and applied technical elements are given according to the valid technical regulations and standards for designing of the pedestrian paths.

1.6 HORIZONTAL SOLUTION

The existing route of the old path is kept within the basic project of the entire part of the designed route. The traffic and safety characteristics should be improved in particular sections, the existing path has been corrected in order to obtain better technical solutions and at the same time to keep the price for the construction of the designed path unchanged.

The twisting of the curves is not predicted due to more effective drainage of the terrain. The cross slope of the roadway is one-sided and is in accordance with the technical norms and regulations for this type of paths and is 2.5%( in relation to the river).

1.7 VERTICAL SOLUTION

The path route is with slopes adjusted to the terrain situation and the requirements of the investor. This vertical solution should provide more economical solution as well as a situation on the spot. The

vertical alignment of the roadway is designed in the way that it is wholly in excavation and embankment.

The adjustment of the terrain conditions and technical norms and regulations are taken into consideration during the project designing.

The fractures of the vertical alignment are rounded with vertical curve whose radius satisfies the needed safety. The longitudinal slope of the vertical alignment along the entire route is different for the walking trail-1 and ranges from i=10.92% to i=13.62%. The walking trail with the riverbed ranges from i=0,90% to i=13,82%, The walking trail-2 ranges from i=8.75% to i=23.72%, at the beginning we impose stairs of stationary from 0,000.00 to 0+ 026.70 km in order to overcome the steep slope , walking trail -3 ranges from i=2,48% to i=24,94%.

1.8 CROSS SECTION

The cross section of the profile includes:

- Width of the road planum 2.50 m

- Width of the path 2.00m

- Width of the riverbed 3,8 m

An extension of the path in a curve is not predicted due to economic reasons of the solution.

The pedestrian path is with one-sided slope of 2.5% towards the river. It is closed on both sides with concrete benchmark and rounded upper surface and the upper layer is made of shale of natural stone.

1.9 DRAINAGE

The route of the road along its entire length is covered with surface atmospheric water.

The drainage of the water represents a big problem because there is no atmospheric sewerage on the pedestrian path. The surface atmospheric water is the major factor for the damage of the pedestrian path. It has been renewed and corrected several times, it is still damaged due to the problem with the surface water.

In order to solve the problem with the atmospheric water, a one-sided slope is predicted on the road planum (towards the right side) of 2.5%.

The water will be accepted in the riverbed, which is parallel with some parts of the pedestrian paths, and the passages over it are solved by two slaty leaks which will function as AB pedestrian bridges. The first is in the end of the "walking trail path-2", whereas the second is on 1+103.00 of the "Walking trail with riverbed".

1.10 ROADWAY CONSTRUCTION

The roadway construction is chosen to enable effective and safe traffic movement for this type of roads. The terrain was not subjected to any research works because the construction of the roadway is predicted to be the same with the other traffic roads from this rank for which have been made needed research tests and it appeared to be good in the exploitation.

The following technical solutions are applied:

- Blinding with crushed stone with layer thickness of 20cm.

- Semi-dry AB screed which is7cm thick.

- Shale of natural stone 5cm thick.

1.11 TECHNICAL CONDITIONS FOR CONSTRUCTION

Before the start of the activities, first the route of the road should be marked and protected according to the technical norms and regulations. After the accomplished marking and protecting of the route, the road works can start only if there is an agreement of a supervisor who has previously controlled the route.

The whole pedestrian path should be swabbed and also a compression of the land should be performed in depth of 20cm with suitable mechanical means of the geomechanical features of the land.

The research of the density is performed by taking of the cylinders or with calibrated sand. The quality control of the density of the land in cutting the section and notch after an approval of a supervisor and in untied materials can be performed as an attempt with a board of 30cm upon Swiss regulations SNB-40317 where the minimum value for a module of stability is Me=500kg/cm2 and humidity close to the optimum. In relation to the materials where it is not possible to control the density through capacity weight, then the density control will be achieved through the required density. The compression will continue by adding gravel , sand or stone material until the stabilization of the land and the achievement of the satisfactory results. This can be performed only with an approval by a supervisor and the work is not paid separately but only the value of the inserted gravel , sand or stone material is paid.Before the beginning of the working activities, the constructor controls the project profiles and if there occurs a disagreement the supervisor should be informed who together with the constructor will conduct another control. The necessary corrections should be included in the profiles and in the construction diary. The corrected profiles are performed by the constructor and supervisor and only the correct profiles are accepted in the calculation.The designed slopes in cuts and embankments in the cross profiles are not fixed for the realization so they can be performed during the constructing works according to the category and the other geomechanical features of the material.The cross-section of the slope should be rounded.

The procedure of construction and mechanical compression of the embankments contains spreading of the materials for construction of embankment with layers which are 20-60cm according to the type of the material and the use of the technical means for compression and with the entire depth the constructed layer must reach the required density. The layers should have cross slope during the construction of the embankment to provide better drainage in case of rain. If the construction of the embankment is of mixed material, soil with stone, then the maximum size of the stone should be 2/3 from the thickness of the layer. The material for embankment construction must not contain organic impurities.Each compacted layer of the embankment has to be examined on every 30 m in length or on every 200m3 of embankment. The examination is conducted by taking the cylinders out or according to the method of the calibrated sand wherein the density should be:-For layers with embankment which are 2m high measured from the point of the vertical alignment of the road should be 100% from the maximum laboratory density obtained from the standard "Proctor" procedure. - For layers which are over 2m high, the density should be from 95% from the maximum laboratory density obtained through the standard "Proctor" procedure.- The humidity of the inserted material should be close to the optimum and if it is necessary the material can be dried or soaked before the compression of the layer.The prepared embankments must have designed slopes with flat inclines and accuracy of +-5%, but if the embankment is wider by mistake of the contractor is not paid.After the completed construction of the embankments and the compression of the land in cutting, a planning and rolling should be made of the berth in width predicted with the designed cross profiles.The curves should be incised and the holes filled with the material of the constructed embankment so the berth after the rolling have the designed continued cross slope with tolerance of 2+-cm. The rolling and watering are needed to achieve completely flat surface which will enable regular movement of the stagnant water. The density control of the berth in earthen materials will be performed on the basis of запремнинска weight and the density must be 100% from the laboratory density, according to the "Proctor" procedure and will be performed with a board of F30cm., and Me=500kg/cm2 is required according to the material of which is constructed the berth. For this type of research the constructor will give a free vehicle or a machine which is heavy more than 5t for counter load.A compensation of the price is predicted for the planning of the berth in cuttings of rock materials. When the excavations of the cuttings are completed then a plan should be made about the slopes with an accuracy of +-3cm/m2 and transport to 50 km. After the completed planning there should be a flat surface and a particular slope.When the substructure is completed, the next step is the construction of the superstructure which is positioned for placing and constructing of the blinding layer with vibration of the gravel-sand material which in compact condition is 20cm thick.

The quality of the materials and their mixture for a swab should be according to the Swiss regulations SNB-40375. It should consist of solid and constant particles mixed in natural state and artificially with natural sand, dust impurities, stone dust and other similar materials originated from approved locations in order to obtain single mixture. This mixture should match the Swiss regulations in terms of the granular composition and in terms of the compression suitability in compact and stable basement .The biggest grain of gravel in the blinding layer should be 60mm, but if there is a grain bigger than 60mm then this material must be subject of sifting and crushing processes. The material can be used only if it has been previously laboratory tested in terms of its suitability for usage. It should not contain organic substances, lumps, bigger percent of mould or any other harmful materials.If the investor agrees crushed stone or natural grinded stone can be used if the quality is according to the previously named regulations.

The percent of particles smaller than 0.2mm calculated in the total mixture can be at least 6% for the lower limit and from 10-12% for the upper limit in case the content of the massive fractions is 80%. If the content is between 80-90% then the lower limit of the particles smaller than 0.02mm in terms of the total mixture can be 6-3% and for the upper limit 10-5%.

The lower limit allows particles of 0.02mm in binder and can be tolerated without damaging the surface of the ice impact during the most adverse circumstances, in terms of the humidity of the land, the level of the groundwater, climate etc.The upper limit permits particles smaller than 0.02mm which can be tolerated according to the experience acquired so far without causing damages on the surface from the ice impact, during the most adverse circumstances, in terms of the humidity of the land, the level of the groundwater, climate etc. from the laboratory density after the modified: "Proctor" procedure.The material should be replaced or corrected if such density cannot be achieved.The gravel sand material for the blinding layer is received in embedded state.It is estimated for completed work (supply, transport, spreading and rolling) of 1m3.After the construction and reception of the blinding layer it should be approached on construction of the final layer of stone shale -5cm thick, placed above a layer of semi-dry 7cm thick. The fugues on both sides should be covered with concrete MB 30. Closing of the paths from the left and right side is performed by plinth made of concrete MB 30.

On the right side of the "Pedestrian path with riverbed" is placed "Wooden fence" 1+143.52km long, which continues along the right side of the "Pedestrian path-2". There are four areas to rest with two benches and a waste bin on the "Pedestrian path with riverbed", and along all pedestrian paths there are candelabras given in the electrotechnical project. The plain of a completed traffic should be +-4mm in all directions.

**2. REGULATION OF THE RIVERBED (BABIN DOL)**

2.1 INTRODUCTION

The purpose of this project is regulation of the watercourse and the regulation of the riverbed of "Babin Dol". In the first phase it starts from the newly designed AB pedestrian bridge which is long from 0+000.00 to 0+722.29 km and in the second phase starts from 0+722.29km at the point 103.00 and joins the Pedestrian path-3 with the second AB pedestrian bridge and finishes at the station point 1+143.53km.

The basic project is constructed according to the designed requirements and data given by the investor as well as according to the terrain conditions of the previously regulated riverbed.

2. USED DATA AND BASEMENT

Facility: Regulation of "Babin Dol"

The basic project for Regulation of a river is designed on the basis of:

- project assignment;

- data of previously designed Basic project

- data for maximum quantity of a river flow

- existing norms and regulations

- insight of the location

- existing cross-section of the riverbed

The constructor used the following data and basements which were on his disposal during the designing of the Basic project:

- Staff card 1:25 000

- Situation 1:2 500

- Data of previously regulated riverbed

- The geodetic recording (recording, coordinates, the needed terrain elevations) was performed by constructor.

Updated geodetic basement and data for characteristic flows are used in the project preparation for a certain period. The maximum flow of the observed period is Q=24 m3/sec.

3. HYDRAULIC CALCULATION

The maximum water quantity which would have occurred in the period of 100 years Q=10.13 m3/sec. on the objective part of the riverbed of the atmospheric water is determined by the hydraulic calculation in order to control the obtained data according to the given data from the previously prepared project.

4. TECHNICAL SOLUTION

The cross profile of the riverbed should leak out the greater water quantity which would appear in a certain period, as well as to concentrate the smaller water quantity in the riverbed etc. The slope at the

bottom of the regulatory riverbed should be as long as the natural slope of the existing riverbed as well

as of the previously regulated one. The minimal slope is I=0.9%. The minor riverbed is dimensioned with trapezoidal profile and inclination of the slopes of m=200%. The bottom and the slopes of the riverbed should be covered with stone on surface of cement mortar 20cm thick and beneath is placed a layer of gravel 20cm thick. For this type of riverbed an asperity coefficient of n=0.23 is suitable and also a cross-section is obtained with the following dimensions: b=2.0m; h=1.0m and B=3.0m.

The following points should be taken into consideration while tracing the riverbed:

• To continue the already existing route of the regulated riverbed

• To use the route of the existing earthen-bed to reduce the costs

• Newly designed walking trail on the right side opposite the river flow

• The designed route of the regulated riverbed should fit the conditions dictated by the location.

The riverbed should be made of stone boards from natural stone with fugues covered with cement mortar.

At the point of 0+000.00 from the "Path with riverbed" A Slaty leak or AB pedestrian bridge is predicted to connect the walking trail -1 with the path with a riverbed.

At the point of 0+111.00 00 from the "Path with riverbed" another Slaty leak or AB pedestrian bridge is predicted to connect the Walking trail -3 with the path with a riverbed.

Along the length of the regulated riverbed a fence should be placed made of rounded wooden material which is protectively colored and on four places are predicted areas for rest with park benches made of wood and metal as well as metal waste bins. Along the all four sides are predicted candelabras which are 20.0m apart and from 3.0m high.

1. TECHNICAL CONDITIONS

The constructor should perform all the planned activities according to the predicted technical conditions.

The investor is obliged to solve all the legal property issues before the start of the construction works in the construction area as well as to finish all the preparation works such as the organization of the construction site, accommodation for the staff, installation of toilets, sheds for accommodation, sheds for the tools and materials and other necessary contents for placing the HTZ conditions according to the regulations.

The contractor is obliged to hand the Dynamic plan to the supervisory engineer about the construction works which includes: the quantity and type of the works, material and workforce, the available mechanization.

The contractor starts with the construction works after the approval of the working plan.

The supervisor is authorized to stop the construction if there are other works not predicted in the

approved working plan which prevent the effective performing of the works.

The excavation type is selected by the constructor according to the available mechanization, terrain conditions and other circumstances.

All the variations from the basic project must be included in the project and the construction paper.

The constructor is also obliged to be concerned with the constructed works until the final realization, technical inspection and the reception and delivery of the work to the investor.

Furthermore, the investor is obliged to implement all of the HTZ measures during the construction works.

On the other hand, the supervisor is authorized to control the construction works and can stop the construction due to unprofessional working.

If the material is inserted unprofessionally and contrary to the regulations, the constructor must correct it, to break or undo it on proper account.

The constructor is obliged to accomplish the order given by the supervisor, but if the constructor proves that the order was not properly given by the supervisor then the constructor will have the right of compensation.

After the completed construction works, the constructor is obliged on proper account to clean and to organize the surfaces within the facility and construction site.

All these works the constructor will calculate in single prices and these costs will not be separately charged.