# VOLUME 3

# TECHNICAL SPECIFICATIONS

**INTRODUCTION**

The Amazon of Europe bike trail in the Republic of Serbia stretches over the area from border crossing Bogojevo to border crossing Backi Breg, through Apatin and Sombor. The subject matter of this contract is traffic signage for guiding (directing) bicycle traffic on the Amazon of Europe Bike Trail from Sombor to Backi Breg. The main route connects the settlements of Sombor, Backi Monostor, Bezdan, Kolut and Backi Breg. One detour leads from the center of Sombor through Kupusina to the main route to Apatin. The second detour leads through the center of Backi Monostor. The third detour leads to the border crossing Bezdan (Batina).

In order to simplify positioning of the designed signalization, the general maps show the entire bike trail, with identification marks (**ID number - ID**) of intersections and other characteristic locations where cyclists were directed or informed about along the route "Amazon of Europe". Each intersection or location where the placement of signage is planned according to this design, has its own unique ID number which is shown on general maps and in Location Plans and details in the graphical part.

Within the Amazon of Europe Bike Trail in the territory of the Republic of Serbia, the following itineraries have been defined:

* The main route from point 240 to point 390, stretches over the state road IB class no. 12 through Sombor, along municipal road to Backi Monostor, along embankment around Backi Monostor, along municipal road to Bezdan, street network through Bezdan, state road IB class no. 16 through Bezdan, state road IB class no. 15 through Bezdan, Kolut, Backi Breg to the border crossing Backi Breg, 33.4 km in length.
* Detour Kupusina stretches over the area from the center of Sombor via Kupusina to the main route to Apatin (from point 240 to D130), 6.7 km long (counting to the intersection of the state road IIA class no. 107 and the road to Kupusina). Other locations on this detour are located in the municipality of Apatin. There are two tourist attractions on this detour and cyclists are directed towards them: “Railway Bridge” and “Tromedja”.
* Detour through Backi Monostor (from point 290 to point 300), 3.7 km long.
* Detour for Batina has several tourist attractions and stretches over the area from point 350 to point D330, 6.0 km long. Through additional detours, you can reach the weekend settlement of Kendjija and Eco Center, the weekend settlement of Baracka, the Memorial Complex of the Battle of Batina, Conk Charda and the weekend settlement of Darazi Fok.

1. **TRAFFIC SIGNANGE**

**1.1 ELEMENTS OF VERTICAL TRAFFIC SIGNS**

The designed traffic signage is divided into two groups:

* Traffic signs for managing cycle traffic (III-407);
* Informing cyclists about information boards.

**Direction Signs (III-407)**

Direction signs for cyclists guide cyclists to pre-defined destinations on the route. These are most often larger/ nodal settlements and cities through which the route passes.

Direction signs are placed one below the other (if there are several panels on one post) and are oriented according to the location plan, in the direction of the cyclist's movement at the angle most visible to cyclists. In the case of placing several direction signs on one post, the direction sign for the main direction of travelling is placed at the highest position on the post, the direction sign indicating the opposite direction is placed below it, while direction signs indicating detour are at the lowest position.

The main route of the route is Sombor - Backi Breg. In case the direction signs for “Amazon of Europe” are placed on the same post with the signpost for "Eurovelo 6", the direction signs for “Eurovelo 6” are placed on the highest position on the post.

The dimensions of direction signs are 1000x200mm, and heights of letters and other necessary dimensions for making this type of boards/panels are given in detailed drawings in the graphical part of the design. In addition to information written in Serbian language, the direction signs also contain an inscription in English. Cyrillic and Latin narrow letters according to SRPS U.S4.204 and SRPS U.S4.202 were used for traffic signs.



*Figure 1. Direction board for the main route*



*Figure 2. Direction board for the Detour*

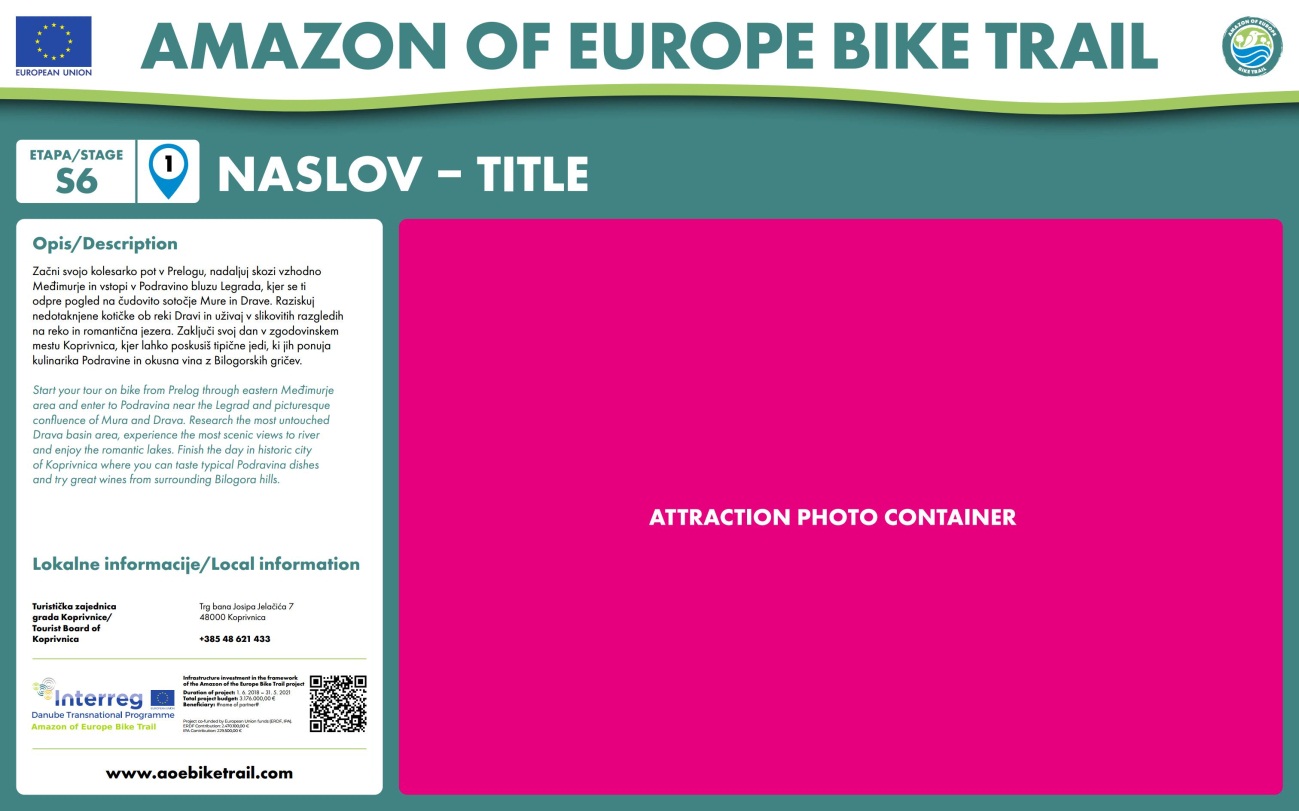
**Medium Information Panel**

This type of signalization provides additional information on how cyclists move, a description of the road sections they should go on, a description of the destination and etc.

The location of their placement is planned according to the design, as well as required quantities in the bill of quantities. The form of the panel is predefined and shown in Figure 3, and its final content and appearance will be defined before execution. If the information panels are placed on a post with direction boards, the information panels are placed under all direction boards, as shown in the details of the sign placement. Information panels, in addition to the text written in Serbian, also contain a translation into English.

In cases when information panels are placed on a post in combination with direction signs, they are placed below them. If there is only an information panel on the post, its lower edge is placed in height of 1.40 m.

Medium Information Panel are placed in the following locations: D152, 240, 290, 300, 350 and D323.



*Figure 3. Medium information panel*

**Small Information Panel**

Small information panels are used to inform cyclists about the required way to ride a bike. The dimensions of the panel are also 1000x200mm. Information panels are placed under all direction boards, as shown in the details of the sign placement. Information panels, in addition to the text written in Serbian, also contain a translation into English.



*Figure 4. Small information panel*

The donor’s sticker "Danube Transnational Programme" should be placed on the back of each sign. The required quantities are provided in the bill of quantities, and the material for making the sticker is given in pdf in a digital form.



*Figure 5. Donor’s sticker*

Spatial arrangement of the designed signalization is shown in the graphical part, in location plans (orthophotographs are substrates). At these locations or intersections, the positions of the signs are determined by a mobile device in the field and are displayed in the Gauss–Krüger coordinate system for Serbia. In addition, microlocation of the placement is shown in the photographs and is determined by the position of the red vertical line. If traffic signs are placed on state roads, chainage where signs are placed is also shown.

The "front part" of panels for managing bicycle traffic planned is made of retroreflective foil/film class I with the addition of anti-graffiti film.

On the part of the route that coincides with the cycle route "EuroVelo 6", the existing boards are retained, while the existing tubular posts are removed, and new, longer ones are placed, where panels of "EuroVelo 6" and " Amazon of Europe" are placed. The order of placing the boards/panels is shown in the location plans and details, for each location separately.

The general map shows the locations and intersections of the traffic signage placement.

Locations and intersections where the placement of signage is planned, are classified in relation to whether they are located on the state or municipal road.

**The placement of traffic signage is planned at the following intersections and locations:**

**Main route**

* + - 1. (ID location 240): Sombor, intersection of Venac Vojvode Radomira Putnika street and approach Zmaj Jovina street;
      2. (ID location 250): Sombor, intersection of 12. Vojvodjanska udarna brigada, Jovana S. Popovica and Janka Veselinovica streets;
      3. (ID location 260): Sombor, intersection of 12. Vojvodjanska udarna brigada, Jovana S. Popovica and Janka Veselinovica streets;
      4. (ID location 270): Sombor, intersection state road of IB class no. 12 (12. Vojvodjanska udarna brigada street), Tome Roksandica i Skopljanska street;
      5. (ID location 280): Sombor, intersection of Rasadnicka Street and state road of IB class no. 12 (Vamoserska and Bezdanska streets);
      6. (ID location 290): Road Backi Monostor - Sombor, a turn to the road along Veliki Backi Kanal;
      7. (ID location 230): Backi Monostor, intersection of Bastovanska and Dolska streets;
      8. (ID location 300): Road Bezdan - Backi Monostor, a turn to the road along Veliki Backi Kanal;
      9. (ID location 310): Road Bezdan - Backi Monostor, a turn to a walking trail "Strbac";
      10. (ID location 320): Bezdan, intersection of Mala Street and Žrtava fašizma Street;
      11. (ID location 330): Bezdan, intersection of Kanalska obala Street and Mala Street;
      12. (ID location 340): Bezdan, intersection of Kanalska obala Street and Petefi Sandor Street;
      13. (ID location 350): Bezdan, intersection of Žrtava fašizma Street (state road of IB class no. 16) and Kanalska obala Street;
      14. (ID location 360): Bezdan, intersection of Žrtava fašizma Street (state road of IB class no. 16) and Kolutska Street;
      15. (ID location 370): Bezdan, intersection of Kolutska Street (state road of IB class no. 16) and Nova Street (state road of IB class no. 15);
      16. (ID location 380): Kolut, intersection of Marka Oreskovica Street (state road of IB class no. 15) and Stanka Opsenice street;
      17. (ID location 390): Backi Breg, intersection of Brace Radic Street (state road of IB class no. 15) and Jugoslovenska Street.

**Detour to Kupusina**

1. (ID location 130): Road Sombor- Apatin (State road II A class no. 107), a turn to Kupusina.
2. (ID location 140): Road Sombor- Apatin (State road II A class no. 107);
3. (ID location 150): Sombor, intersection of Apatinski put (State road II A class no. 107) and Strand streets;
4. (ID location 160): Sombor, intersection of Venac Vojvode Petra Bojovica street and Apatinski put.
5. Detour to “Railway bridge”
   * + 1. (ID location 150): Sombor, intersection of Apatinski put (State road II A class no. 107) and Strand streets;
       2. (ID location D151): Sombor, a cycle path along Veliki Backi Kanal, below Apatinski put;
       3. (ID location D152): Sombor, the end of a cycle path along Veliki Backi Kanal, before the railway.
6. Detour to “Tromedja”
7. (ID location 150): Sombor, intersection of Apatinski put (State road II A class no. 107) and Strand streets;
8. (ID location D151): Sombor, a cycle path along Veliki Backi Kanal, below Apatinski put;
9. (ID location D153): Sombor, a cycle path along Veliki Backi Kanal, Tromedja 1".

**Detour through Backi Monostor**

* + - 1. (ID location 290): Road Backi Monostor - Sombor, a turn to the road along Veliki Backi Kanal;
      2. (ID location 230): Backi Monostor, intersection of Bastovanska and Dolska streets;
      3. (ID location D200): Backi Monostor, intersection of Ivana Gorana Kovacica Street and Oslobodjenja street;
      4. (ID location 300): Road Bezdan - Backi Monostor, a turn to the road along Veliki Backi Kanal.

**Detour to Batina**

* + - 1. (ID location 350): Bezdan, intersection of Žrtava fašizma Street (state road of IB class no. 16) and Kanalska obala Street;
      2. (ID location D300): Intersection of the road Batina - Bezdan, (state road of IB class no. 16) and the road towards Eco-center "Karapandza";
      3. (ID location D310a): Intersection of the road Batina - Bezdan, (state road of IB class no. 16) and the road towards weekend settlement Baracka;
      4. (ID location D310b): Intersection of the road Batina - Bezdan, (state road of IB class no. 16) and the road towards weekend settlement Baracka;
      5. (ID location D310c): Intersection of the road Batina - Bezdan, (state road of IB class no. 16) and the road towards weekend settlement Baracka;
      6. (ID location D320): Road Batina - Bezdan, a turn to the museum of the Battle of Batina and the weekend settlement "Darazi fok" (state road of IB class no. 16);
      7. (ID location D330): Road Batina - Bezdan, intersection of Siget Street (state road of IB class no. 16).

1. The weekend settlements of Kendjija and Eco-center can be reached via the following locations:
   * + 1. (ID location D300): Intersection of the road Batina - Bezdan, (state road of IB class no. 16) and the road towards Eco-center "Karapandza";
       2. (ID location D301): Road towards Eco-center "Karapandza", intersection of St. Sava Street".
2. The weekend settlements of Baracka can be reached via the following locations:
   * + 1. (ID location D310a): Intersection of the road Batina - Bezdan, (state road of IB class no. 16) and the road towards weekend settlement Baracka;
       2. (ID location D310b): Intersection of the road Batina - Bezdan, (state road of IB class no. 16) and the road towards weekend settlement Baracka;
       3. (ID location D310c): Intersection of the road Batina - Bezdan, (state road of IB class no. 16) and the road towards weekend settlement Baracka.
3. Memorial Complex of the Battle of Batina, Conk Charda, weekend settlement Darazi Fok can be reached via the following locations:
   * + 1. (ID location D320): Road Batina - Bezdan, a turn to the museum of the Battle of Batina and the weekend settlement "Darazi fok" (state road of IB class no. 16);
       2. (ID location D321): The intersection of the road towards the Museum of the Battle of Batina and the weekend settlement "Darazi Fok";
       3. (ID location D322): The intersection of the road towards the weekend settlement "Darazi Fok" and a dirt road";
       4. (ID location D323): The end of the road towards the weekend settlement "Darazi Fok".

**It is planned to place traffic signage on state roads at the following intersections and locations:**

State road of IB class no. 12:

01. (ID location 270): Sombor, intersection state road of IB class no. 12 (12. Vojvodjanska udarna brigada street), Tome Roksandica i Skopljanska street;

02. (ID location 280): Sombor, intersection of Rasadnicka Street and state road of IB class no. 12 (Vamoserska and Bezdanska streets).

State road of IB class no. 15:

01. (ID location 370): Bezdan, intersection of Kolutska Street (state road of IB class no. 16) and Nova Street (state road of IB class no. 15);

02. (ID location 380): Kolut, intersection of Marka Oreskovica Street (state road of IB class no. 15) and Stanka Opsenice street;

03. (ID location 390): Backi Breg, intersection of Brace Radic Street (state road of IB class no. 15) and Jugoslovenska Street.

State road of IB class no. 16:

01. (ID location 350): Bezdan, intersection of Žrtava fašizma Street (state road of IB class no. 16) and Kanalska obala Street;

02. (ID location 360): Bezdan, intersection of Žrtava fašizma Street (state road of IB class no. 16) and Kolutska Street;

03. (ID location D300): Intersection of the road Batina - Bezdan, (state road of IB class no. 16) and the road towards Eco-center “Karapandza”;

04. (ID location D310a): Intersection of the road Batina - Bezdan, (state road of IB class no. 16) and the road towards weekend settlement Baracka;

05. (ID location D310b): Intersection of the road Batina - Bezdan, (state road of IB class no. 16) and the road towards weekend settlement Baracka;

06. (ID location D320): Road Batina - Bezdan, a turn to the museum of the Battle of Batina and the weekend settlement "Darazi fok" (state road of IB class no. 16);

07. (ID location D330): Road Batina - Bezdan, intersection of Siget Street (state road of IB class no. 16).

State road of IIА class no. 107:

01. (ID location 130): Road Sombor- Apatin (State road II A class no. 107), a turn to Kupusina;

02. (ID location 140): Road Sombor- Apatin (State road II A class no. 107);

03. (ID location 150): Sombor, intersection of Apatinski put (State road II A class no. 107) and Strand streets.

**It is planned to place traffic signage on municipal roads, streets and other roads, at the following intersections and locations:**

**City of Sombor**:

01. (ID location 160): Sombor, intersection of Venac Vojvode Petra Bojovica street and Apatinski put;

02. (ID location 240): Sombor, intersection of Venac Vojvode Radomira Putnika street and approach Zmaj Jovina street;

03. (ID location 290): Road Backi Monostor - Sombor, a turn to the road along Veliki Backi Kanal;

04. (ID location 230): Backi Monostor, intersection of Bastovanska and Dolska streets;

05. (ID location D200): Backi Monostor, intersection of Ivana Gorana Kovacica Street and Oslobodjenja street;

06. (ID location 300): Road Bezdan - Backi Monostor, a turn to the road along Veliki Backi Kanal;

07. (ID location 310): Road Bezdan - Backi Monostor, a turn to a walking trail “Strbac”;

08. (ID location 320): Bezdan, intersection of Mala Street and Žrtava fašizma Street;

09. (ID location 330): Bezdan, intersection of Kanalska obala Street and Mala Street;

10. (ID location 340): Bezdan, intersection of Kanalska obala Street and Petefi Sandor Street;

11. (ID location D301): Road towards Eco-center “Karapandza”, intersection of St. Sava Street”;

12. (ID location D310c): Intersection of the road Batina - Bezdan, (state road of IB class no. 16) and the road towards weekend settlement Baracka.

**Water Management Company "Vode Vojvodine" and "Zapadna Bačka":**

01. (ID location D151): Sombor, a cycle path along Veliki Backi Kanal, below Apatinski put;

02. (ID location D152): Sombor, the end of a cycle path along Veliki Backi Kanal, before the railway;

03. (ID location D153): Sombor, a cycle path along Veliki Backi Kanal, “Tromedja 1”;

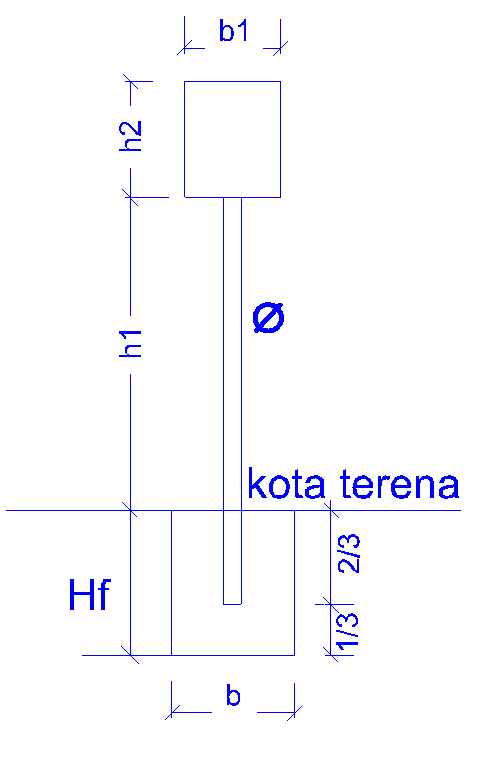
04. (ID location D321): The intersection of the road towards the Museum of the Battle of Batina and the weekend settlement “Darazi Fok”;

05. (ID location D322): The intersection of the road towards the weekend settlement “Darazi Fok” and a dirt road;

06. (ID location D323): The end of the road towards the weekend settlement “Darazi Fok”.

**1.2 STRUCTURAL ANALYSES FOR STRUCTURE OF POST CARRYING ROAD SIGNS AND PANELS ALONG THE CARRIAGEWAY**

Based on dimensions and number of road signs placed on one post, typical solutions for sign installation on tubular posts are given. The table shows diameter and thickness of the pipe wall, dimensions of the base and depth at which the pipe is laid.



Initial elements for calculation:

|  |  |
| --- | --- |
| Wind impact II zone of exposure  Terrain characteristics (loess):  Cohesion  The angle of internal friction  Bulk density of terrain  Angle of friction between concrete foundation and soil  Depth of foundation engineering  Sign weight (sheet iron)  Weight of post support Ø 60,3 / 10 mm  Section characteristics | w = 0,70 KN/m2  c = 15KN / m2  ᵩ = 300  ϒ1 = 18,00 KN/m3  ρ= 250  Hf = 60 – 80 cm  g1 = 0,26 KN / m2  g2 = 0,12 KN / m  A = 15,8 cm2 W = 17,9 cm2 |

**Dimensions of signs and height of post support to below the sign with static influences**

POS 1 Metal Post – Sign Post Support

Stress control at point ‘‘1’’

σ = G / A + M / W <σdop = 16,00 KN / cm2

I Case:

Adopted profile Ø 60,3 / 2,9 mm A = 5,23 cm2 W = 7,16 cm3

σ = 0,487 / 5,23 + 104,90 / 7,16 = 14,74<16,00 KN / cm2

II Case:

Adopted profile Ø 60,3 / 4,0 mm A = 7,07 cm2 W = 9,34 cm2

σ = 0,586 / 7,07 + 141,10 / 9,34 = 15,19<16,00 KN / cm2

III Case:

Adopted profile Ø 70,0 / 4,0 mm A = 9,21 cm2 W = 11,26 cm3

σ = 0,665 / 9,21 + 173,90 / 11,26 = 15,52 <16,00 KN / cm2

IV Case:

Adopted profile Ø 80,0 / 5,0 mm A = 10,87 cm2 W = 15,62 cm2

σ = 0,761 / 10,87 + 234,40 / 15,62 = 15,10 <16,00 KN / cm2

Needed profile of post supports for certain signs is given in the table.

POS 2 Concrete Foundation – Sign Post Support

A - For depth of foundation engineering Hf = 0,60 cm; and foundation dimensions 0,40 x 0,40 x 0,60 m

ᵩ = 300 i ϒ1 = 18,00 KN / m3

Λa = tg2( 45 - ᵩ/2) = 0,333

Λp = tg2( 45 + ᵩ/2) = 3,000

Ea = 18 x 0,602 x 0,40 x 0,333 x 0,50 = 0,43 KN

Ep = 18 x 0,602 x 0,40 x 3,000 x 0,50 = 3,89 KN

G1 max = 0,430 KN;

wMmax = 1,075 KNm

G2 = 0,40 x 0,40 x 0,60 x 25 = 2,40 KN

Lateral friction force T = 18,00 x 0,60 x 0,333 x 0,40 x 0,423 / 3 = 0,203 KN

Roll moment in axis A-A

Ma A-A  = 0,781 + 0,43 x 0,60/3 = 0,866 KNm

Mp A-A  = (0,430 +2,400 ) x 0,20 +3,89 x 0,60 /3 + 0,203 x 0,30 x 2 = 1,466 KNm

Safety coefficient Ks = Mp A-A / Ma A-A  = 1,466 / 0,866 = 1,69 > 1,50

Post is stable.

B - For depth of foundation engineering Hf = 0,80 cm; and foundation dimensions 0,40 x 0,40 x 0,80 m

ᵩ = 300 i ϒ1 = 18,00 KN / m3

Λa = tg2( 45 - ᵩ/2) = 0,333

Λp = tg2( 45 + ᵩ/2) = 3,000

Ea = 18 x 0,802 x 0,40 x 0,333 x 0,50 = 0,760 KN

Ep = 18 x 0,802 x 0,40 x 3,000 x 0,50 = 6,910 KN

G1 max = 0,586 KN;

wMmax = 1,814 KNm

G2 = 0,40 x 0,40 x 0,80 x 25 = 3,20 KN

Lateral friction force T = 18,00 x 0,80 x 0,333 x 0,40 x 0,423 / 3 = 0,271 KN

Roll moment in axis А-А

Ma A-A  = 1,814 + 0,760 x 0,80/3 = 2,016 KNm

Mp A-A  = (0,586 +3,200 ) x 0,20 +6,91 x 0,80 /3 + 0,271 x 0,40 x 2 = 2,817 KNm

Safety coefficient Ks = Mp A-A  / Ma A-A  = 2,817 / 2,016 = 1,40

Post is stable

C - For depth of foundation engineering Hf = 0,80 cm; and foundation dimensions 0,50 x 0,50 x 0,80 m

ᵩ = 300 i ϒ1 = 18,00 KN / m3

Λa = tg2( 45 - ᵩ/2) = 0,333

Λp = tg2( 45 + ᵩ/2) = 3,000

Ea = 18 x 0,802 x 0,50 x 0,333 x 0,50 = 0,96 KN

Ep = 18 x 0,802 x 0,50 x 3,000 x 0,50 = 8,64 KN

G1 max = 0,761 KN;

wMmax = 2,948 KNm

G2 = 0,50 x 0,50 x 0,80 x 25 = 5,00 KN

Lateral friction force T = 18,00 x 0,80 x 0,333 x 0,40 x 0,423 / 3 = 0,270 KN

Roll moment in axis А-A

Ma A-A  = 2,948+ 0,96 x 0,80/3 = 3,20 KNm

Mp A-A  = (0,761 +5,00 ) x 0,25 +8,64 x 0,80 /3 + 0,270 x 0,50 x 2 = 4,02 KNm

Safety coefficient Ks = Mp A-A  / Ma A-A  = 4,02 / 3,20 = 1,34

Post is stable

D - For depth of foundation engineering Hf = 0,80 cm; and foundation dimensions 0,30 x 0,30 x 0,60 m

ᵩ = 300 i ϒ1 = 18,00 KN / m3

Λa = tg2( 45 - ᵩ/2) = 0,333

Λp = tg2( 45 + ᵩ/2) = 3,000

Ea = 18 x 0,802 x 0,30 x 0,333 x 0,50 = 0,58 KN

Ep = 18 x 0,802 x 0,30 x 3,000 x 0,50 = 5,18 KN

G1 max = 0,398 KN;

wMmax = 0,521 KNm

G2 = 0,30 x 0,30 x 0,60 x 25 = 1,35 KN

Lateral friction force T = 18,00 x 0,60 x 0,333 x 0,30 x 0,423 / 3 = 0,152KN

Roll moment in axis A-A

Ma A-A  = 0,521+ 0,58 x 0,60/3 = 0,637 KNm

Mp A-A  = (0,398 +1,35 ) x 0,175 +5,18 x 0,60 /3 + 0,152 x 0,30 x 2 = 1,433 KNm

Safety coefficient Ks = Mp A-A  / Ma A-A  = 1,433 / 0,637 = 2,25

Post is stable

**Stability of the post concerning the roll moment around the axis А – А**

| Sign dimension (cm) | Surface (m2) | Height of a set sign  (m) | Depth of a laid pipe  (m) | Wind force (KN) | Weight (KN) | Ms  in t ’’1’’  (KNm) | Depth of fou.eng. (m) | Ms in axis ’’A’’ (KNm) |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 40x40 | 0,16 | 1,40 | 0,60 | 0,112 | 0,258 | 0,179 | 0,60 | 0,246 |
|  | 0,16 | 1,80 | 0,60 | 0,112 | 0,306 | 0,224 | 0,60 | 0,314 |
|  | 0,16 | 2,20 | 0,60 | 0,112 | 0,354 | 0,269 | 0,60 | 0,358 |
| 60x60 | 0,36 | 1,40 | 0,60 | 0,252 | 0,334 | 0,428 | 0,60 | 0,580 |
|  | 0,36 | 1,80 | 0,60 | 0,252 | 0,382 | 0,529 | 0,60 | 0,680 |
|  | 0,36 | 2,20 | 0,60 | 0,252 | 0,430 | 0,630 | 0,60 | 0,781 |
| 90x90 | 0,81 | 1,40 | 0,60 | 0,567 | 0,487 | 1,049 | 0,80 | 1,502 |
|  | 0,81 | 1,80 | 0,60 | 0.567 | 0,535 | 1,276 | 0,80 | 1,730 |
|  | 0,81 | 2,20 | 0,60 | 0.567 | 0,583 | 1,503 | 0,80 | 1,956 |
| 40x60 | 0,24 | 1,40 | 0,60 | 0,168 | 0,302 | 0,286 | 0,60 | 0,386 |
|  | 0,24 | 1,80 | 0,60 | 0,168 | 0,350 | 0,353 | 0,60 | 0,454 |
|  | 0,24 | 2,20 | 0,60 | 0,168 | 0,398 | 0,420 | 0,60 | 0,521 |
| 60x90 | 0,56 | 1,40 | 0,60 | 0,392 | 0,322 | 0,725 | 0,80 | 0,872 |
|  | 0,56 | 1,80 | 0,60 | 0,392 | 0,470 | 0,882 | 0,80 | 1,003 |
|  | 0,56 | 2,20 | 0,60 | 0,392 | 0,518 | 1,039 | 0,80 | 1,135 |
| 40x80 | 0,48 | 1,40 | 0,60 | 0,336 | 0,389 | 0,605 | 0,80 | 0,806 |
|  | 0,48 | 1,80 | 0,60 | 0,336 | 0,437 | 0,739 | 0,80 | 0,941 |
|  | 0,48 | 2,20 | 0,60 | 0,336 | 0,485 | 0,874 | 0,80 | 1,075 |
| 60x120 | 0,72 | 1,40 | 0,60 | 0,504 | 0,490 | 1,008 | 0,80 | 1,411 |
|  | 0,72 | 1,80 | 0,60 | 0,504 | 0,538 | 1,210 | 0,80 | 1,613 |
|  | 0,72 | 2,20 | 0,60 | 0,504 | 0,586 | 1,411 | 0,80 | 1,814 |
| 40x120 | 0,48 | 1,40 | 0,60 | 0,336 | 0,437 | 0,617 | 0,80 | 0,941 |
|  | 0,48 | 1,80 | 0,60 | 0,336 | 0,485 | 0,806 | 0,80 | 1,075 |
|  | 0,48 | 2,20 | 0,60 | 0,336 | 0,533 | 0,941 | 0,80 | 1,210 |
| 60x180 | 1,08 | 1,40 | 0,60 | 0,756 | 0,665 | 1,739 | 0,80 | 2,344 |
|  | 1,08 | 1,80 | 0,60 | 0,756 | 0,713 | 2,041 | 0,80 | 2,646 |
|  | 1,08 | 2,20 | 0,60 | 0,756 | 0,761 | 2,344 | 0,80 | 2,948 |



**Tabular Overview of Signs**

| No. | Sign dimension  (cm) | Height of set sign  (m) | Total length of post support (cm) | Depth of laid pipe  (m) | Post support profile (mm) | Depth of fou.eng. (m) | Foundation dimensions (cm) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1. | 40x40 | 1,40 | 240,00 | 0,60 | Ø 60,3 / 2,9 | 0,60 | 30x30x60 |
| 2. |  | 1,80 | 280,00 | 0,60 | Ø 60,3 / 2,9 | 0,60 | 30x30x60 |
| 3. |  | 2,20 | 320,00 | 0,60 | Ø 60,3 / 2,9 | 0,60 | 30x30x60 |
| 4. | 60x60 | 1,40 | 260,00 | 0,60 | Ø 60,3 / 2,9 | 0,60 | 40x40x60 |
| 5. |  | 1,80 | 300,00 | 0,60 | Ø 60,3 / 2,9 | 0,60 | 40x40x60 |
| 6. |  | 2,20 | 340,00 | 0,60 | Ø 60,3 / 2,9 | 0,60 | 40x40x60 |
| 7. | 90x90 | 1,40 | 290,00 | 0,60 | Ø 60,3 / 2,9 | 0,80 | 40x40x80 |
| 8. |  | 1,80 | 330,00 | 0,60 | Ø 60,3 / 4,0 | 0,80 | 40x40x80 |
| 9. |  | 2,20 | 370,00 | 0,60 | Ø 60,3 / 4,0 | 0,80 | 40x40x80 |
| 10. | 40x60 | 1,40 | 260,00 | 0,60 | Ø 60,3 / 2,9 | 0,60 | 30x30x60 |
| 11. |  | 1,80 | 300,00 | 0,60 | Ø 60,3 / 2,9 | 0,60 | 40x40x60 |
| 12. |  | 2,20 | 340,00 | 0,60 | Ø 60,3 / 2,9 | 0,60 | 40x40x60 |
| 13. | 60x90 | 1,40 | 290,00 | 0,60 | Ø 60,3 / 2,9 | 0,80 | 40x40x80 |
| 14. |  | 1,80 | 330,00 | 0,60 | Ø 60,3 / 2,9 | 0,80 | 40x40x80 |
| 15. |  | 2,20 | 370,00 | 0,60 | Ø 60,3 / 2,9 | 0,80 | 40x40x80 |
| 16. | 40x80 | 1,40 | 280,00 | 0,60 | Ø 60,3 / 2,9 | 0,80 | 40x40x80 |
| 17. |  | 1,80 | 320,00 | 0,60 | Ø 60,3 / 2,9 | 0,80 | 40x40x80 |
| 18. |  | 2,20 | 360,00 | 0,60 | Ø 60,3 / 2,9 | 0,80 | 40x40x80 |
| 19. | 60x120 | 1,40 | 320,00 | 0,60 | Ø 60,3 / 2,9 | 0,80 | 40x40x80 |
| 20. |  | 1,80 | 360,00 | 0,60 | Ø70,0 / 4,0 | 0,80 | 40x40x80 |
| 21. |  | 2,20 | 400,00 | 0,60 | Ø 70,0 /4,0 | 0,80 | 40x40x80 |
| 22. | 40x120 | 1,40 | 320,00 | 0,60 | Ø 60,3 / 2,9 | 0,80 | 40x40x80 |
| 23. |  | 1,80 | 360,00 | 0,60 | Ø 60,3 / 2,9 | 0,80 | 40x40x80 |
| 24. |  | 2,20 | 400,00 | 0,60 | Ø 60,3 / 2,9 | 0,80 | 50x50x80 |
| 25 | 60x180 | 1,40 | 380,00 | 0,60 | Ø 70,0 / 4,0 | 0,80 | 50x50x80 |
| 26. |  | 1,80 | 420,00 | 0,60 | Ø 80,0 / 5,0 | 0,80 | 50x50x80 |
| 27. |  | 2,20 | 460,00 | 0,60 | Ø 80,0 / 5,0 | 0,80 | 50x50x80 |

1. **REST AREA FOR CYCLISTS WITH STREET FURNITURE AND INFORMATION PANELS**

It is planned to place six rest areas for cyclists that have several functions (bicycle parking and rest area), which contain defined street furniture (bicycle racks, small or medium bench, seating area with table, information panel), one large information panel and four small information panels.

All listed elements, materials and equipment as well as all works must meet technical characteristics given in the technical conditions and be made according to the detailed drawings shown in graphical part and Trail Implementation Standards (an implementation handbook, where binding standards for the whole distance of the bike trail, are defined. Installation works should be performed in accordance with the requirements given in the technical conditions. The required quantities are shown within the bill of quantities.

Rest areas and information panels are to be placed at the proposed locations, while their price should include the procurement, delivery and quality control of the necessary elements, as well as all work on the installation of elements and construction of rest areas. The proposed locations for placement may change during the execution of works, depending on the condition of the location and special requirements of the contracting authority.

**2.1 PREPARATORY WORKS**

**Facilities setting out and marking**

Prior to the commencement of works, the Contractor is obliged to carry out necessary markings of rest areas for cyclists and information panels all in accordance with the attached graphical documents at defined locations, in accordance to valid Serbian standards. When performing works, secure and keep permanent points of the marked facility in question.

* 1. **EARTH WORKS**

**Topsoil excavation**

Excavation of topsoil should be done by machine 80% and manually 20%, and within the designed thicknesses and widths below-above the rest area base and information panels. The excavation of top soil should begin only after marking the designed widths in accordance with the attached graphical documents. Thickness of topsoil layer to be removed is determined on the spot together with the supervisor and may vary depending on the location with a minimum topsoil excavation thickness of 30 cm. If it is necessary to change thickness during construction, this change will be written in the construction log by the supervisor. Topsoil is pushed away so that it does not mix with other materials needed for the construction of the facility, as well as to enable drainage of the surrounding areas. The excavated topsoil in the amount that will be used for green areas topsoiling should be deposited in regular figures, and prepared the extra material for transport.

**Excavation of earth material**

After topsoil excavation, start excavating earth material to the level provided by graphical documents, in order to create space for the construction of reinforced foundation slabs. It is planned to excavate soil manually. During the excavation, take care of underground installations, and if damage occurs, the contractor is obliged to return the installations to their original condition at his own expense in consultation with the owner of the installations. Excavated earth material should be deposited or prepared for transport.

**Subgrade Compression**

After excavation of topsoil and earth material, subgrade is compressed. Subgrade compression is done by machines. Subgrade compression according to the standard Proctor procedure is required 100% of the maximum laboratory compaction, and in depth up to t=50 cm. In case that required compression cannot be achieved on certain places, compression will continue with the addition of sandy-gravel material until required compression values ​​are achieved. This additional work is not paid separately, but only the costs of sandy-gravel material procurement.

**Topsoiling of flat and aslant surfaces**

After the completion of all works on the construction and placement of rest areas and / or information panels, it is necessary to topsoil and put grass on flat and aslant surfaces in a layer of 20 cm around them and if there is a need for it. If topsoil is dry on the landfill, it should be spread and soaked with water during application. Topsoil should be compressed lightly after spreading and planning. If there is not enough topsoil on the spot, deliver it from the borrow pit or from a place determined by the supervising authority.

**Transport of earth material**

The surplus of excavated topsoil and earth material should be loaded and transported to the landfill determined by the supervising authority. This item includes loading into vehicles, transport, unloading of materials at the landfill.

**Spreading of earth material at the landfill**

Surplus topsoil and excavated earth material that was brought to the landfill should be spread in layers on the landfill by machine and roughly planned according to the instructions of the supervisor.

* 1. **CONCRETE WORKS**

**Construction of a gravel base layer**

Work includes procurement, delivery, filling, spreading and planning of the gravel base layer (natural gravel) of the foundation reinforced slab in accordance with the attached graphical documents. Works can only start when the supervisor receives subgrade in terms of flatness, designed levels and compression. Materials for making the base layer are made of natural gravel.

Gravel material is put on previously compressed subgrade, spread by machine or manually, wetted and compressed to the required compaction with suitable static and vibrating tools up to the total layer thickness of t=20 cm. After filling each layer, compression is repeated until the required compression. Placed material must meet certain conditions in terms of mechanical characteristics, grading, bearing capacity and other conditions, all according to the valid Serbian standards. The base course is made in layers whose thickness is shown in graphical documents.

The upper surface of base layer should be made according to the designed levels and grades, while flatness of made layer is controlled by a lath of appropriate length, and the allowed deviation is (+,-) 1 cm. Control testing in terms of compression should be performed with a circular plate 30 cm in diameter and the smallest compressibility modulus should be:

* spread and compressed gravel Ме=30 MN/m2.

**Casting in Foundation Using Concrete MB 30**

The work involves construction of foundation slabs of concrete MB 30 reinforced with reinforcing mesh Ø6-Q84 and foundations for placement of street furniture presented in detail in graphical documents. Work consists of casting the foundation with precast concrete on a previously prepared gravel base and over reinforcementthat is placed in the lower zone of the foundation slab, which includes providing all plants, equipment, materials and work and performing all operations related to production, transport, placement and care of placed concrete, as well as all work and material for making and removing the formwork. The reinforcing mesh must be welded to the metal frame of the canopy /information panel.

The foundation slabs must be minimum concrete class MB 30 with built-in reinforcing mesh Ø6-Q84 and are made in respects according to current Serbian standards. Construct foundation slabs in accordance with the attached graphical documents.

* 1. **OTHER WORKS**

**Canopy**

The item includes procurement, delivery, installation and assembling and quality control, as well as all work on the installation of a canopy for cyclists with a one-sided information panel. The canopy with a one-sided information panel should be made with dimensions shown in detail in graphical documentation. It is designed as a free-standing building, with two separate units: a seating area and the remaining part planned for reading the information panel placed on the back side of the canopy. The canopy makes a direct connection with the space next to the planned one for installing bicycle racks. The mentioned street furniture is included within special items. The construction of the canopy is designed as a skeletal one, and the roof is single-pitched.

Canopy pillars and roof structure are made of steel plasticized profiles 100x100x5mm, everything according to the detailed instructions and details in the graphical documentation.

The final roof shingles, steel plasticized trapezoidal profiled tin of a roof TR 40/250/05, should be made according to the presented details and the manufacturer's instructions, in the color chosen by the contracting authority.

The canopy is made of steel profiles, tin, angles, steel flat bars, slab base, anchors and similar, according to the details and instructions. Joints and welds should be ideally made, cleaned and ground. Before installation, clean all elements from corrosion and dust, apply impregnation and basic paint, and repair it after installation.

According to the details and instructions from graphical documentation, place wooden elements made of dry oak with a protective coating on an oil base with a high percentage of wax on the back and lateral side of the canopy.

Prepare the textual content of the information panel for printing according to the investor's instructions, print on pvc self-adhesive foil with protective lamination resistant to damage. Printing must be UV and waterproof and have reflective properties of the material (anti-graffiti film) class 1. Glue the film to a plasticized tin that is 0.5 mm thick.

Procurement, construction and installation of anchors, base slabs, screws, etc., do and install according to the details and instructions from graphical documentation. Clean and grind the joints. Clean everything from corrosion and dust and paint with the paint base twice before installation.

All completed works and placed materials must have the appropriate attestations/certificates.

The price should include procurement, delivery, installation and assembling, quality control, as well as all work on the construction and installation of the canopy with information panel. In addition to the abovementioned things, the price should include additional elements needed for connection, installation and assembling, as well as preparation and printing.

**Small bench**

The item includes procurement, delivery, installation and assembling and quality control, as well as all work on the installation of a standard bench. The bench is simple and does not take up much space. It is discreet/small and harmonious. It forms a unique whole with other street furniture and canopy with its appearance and materials used.

Make the bench according to the details and instructions with dimensions shown in detail in graphical documentation. The bench seat is made of wooden elements assembled on a substructure made of steel square profiles made according to the instructions shown in the graphical appendices. Wooden elements of the seat are made of dry oak with a protective coating on an oil base with a high percentage of wax. Before installation, clean all metal elements from corrosion and dust, apply impregnation and basic paint, and repair it after installation. The metal construction and the seat of the bench are painted in the same shades of color as the canopy and thus form a uniform compact whole. The way how to connect all elements and set up the bench is shown in detail in the graphical part.

Procurement, construction and installation of anchors, base slabs, screws, etc., do and install according to the details and instructions from graphical documentation. Clean and grind the joints. Clean everything from corrosion and dust and paint with the paint base twice before installation.

All completed works and placed materials must have the appropriate attestations/certificates.

The price should include procurement, delivery, installation and assembling, quality control, as well as all work on the construction and installation of the bench. In addition to the abovementioned things, the price should include additional elements needed for connection, installation and assembling (small mounting accessories, screws, bolts, nuts, washers, etc.) as well as the attestation of the structure.

**Medium bench**

The item includes procurement, delivery, installation and assembling and quality control, as well as all work on the installation of a standard bench. The bench is simple and does not take up much space. It is discreet/small and harmonious. It forms a unique whole with other street furniture and canopy with its appearance and materials used.

Make the bench according to the details and instructions with dimensions shown in detail in graphical documentation. The bench seat is made of wooden elements assembled on a substructure made of steel square profiles made according to the instructions shown in the graphical appendices. Wooden elements of the seat are made of dry oak with a protective coating on an oil base with a high percentage of wax. Before installation, clean all metal elements from corrosion and dust, apply impregnation and basic paint, and repair it after installation. The metal construction and the seat of the bench are painted in the same shades of color as the canopy and thus form a uniform compact whole. The way how to connect all elements and set up the bench is shown in detail in the graphical part.

Procurement, construction and installation of anchors, base slabs, screws, etc., do and install according to the details and instructions from graphical documentation. Clean and grind the joints. Clean everything from corrosion and dust and paint with the paint base twice before installation.

All completed works and placed materials must have the appropriate attestations/certificates.

The price should include procurement, delivery, installation and assembling, quality control, as well as all work on the construction and installation of the bench. In addition to the abovementioned things, the price should include additional elements needed for connection, installation and assembling (small mounting accessories, screws, bolts, nuts, washers, etc.) as well as the attestation of the structure.

**Element for sitting with a table**

The item includes procurement, delivery, installation and assembling and quality control, as well as all work on the installation of the element for sitting with a square table. It forms a unique whole with canopy with its appearance and materials used.

The specified element should be made according to the details and instructions with dimensions shown in detail in graphical documents. Seating area of the element – benchesshould be made of wooden elements (dry oak with a protective coating on an oil base with a high percentage of wax) connected by self-tapping screws for a small metal frame. The table top is made of wooden elements (dry oak with a protective coating on an oil base with a high percentage of wax) connected by self-tapping screws for a metal middle frame of a rectangular cross-section 7/7/0.4 cm, which rests on a metal pipe Ø 20 cm in diameter. This whole structure is attached to the foundation via a washer connected together with 4 anchors.

Before installation, clean all metal elements from corrosion and dust, apply impregnation and basic paint, and repair it after installation. The metal construction and the seat of the bench are painted in the same shades of color as the canopy and thus form a uniform compact whole. The way how to connect all elements and set up the bench is shown in detail in the graphical part.

Procurement, construction and installation of anchors, base slabs, screws, etc., do and install according to the details and instructions from graphical documentation. Clean and grind the joints. Clean everything from corrosion and dust and paint with the paint base twice before installation.

All completed works and placed materials must have the appropriate attestations/certificates.

The price should include procurement, delivery, installation and assembling, quality control, as well as all work on the construction and installation. In addition to the abovementioned things, the price should include additional elements needed for connection, installation and assembling (small mounting accessories, screws, bolts, nuts, washers, etc.) as well as the attestation of the structure.

**Bicycle Racks**

The item includes procurement, delivery, installation and assembling and quality control, as well as all work on the installation of bicycle racks. With its simple shape, the bicycle rack does not take up much space. It forms a unique whole with other street furniture and canopy with its appearance and materials used.

The bicycle rack should be made of a square metal profile with dimensions shown in graphical documents. The upper part is made of wooden elements (dry oak with a protective coating on an oil base with a high percentage of wax) connected by self-tapping screws for the metal frame. Installation and assembling should be done according to the details and with dimensions shown in detail in graphical documents.

Before installation, clean all metal elements from corrosion and dust, apply impregnation and basic paint, and repair it after installation. Paint it in the same shade of paint as the metal structure of the canopy and the remaining part of rest area street furniture. The way how to connect all elements and set up the bench is shown in detail in the graphical part.

Procurement, construction and installation of anchors, base slabs, screws, etc., do and install according to the details and instructions from graphical documentation. Clean and grind the joints. Clean everything from corrosion and dust and paint with the paint base twice before installation.

All completed works and placed materials must have the appropriate attestations/certificates.

The price should include procurement, delivery, installation and assembling, quality control, as well as all work on the construction and installation of the bicycle rack. In addition to the abovementioned things, the price should include additional elements needed for connection, installation and assembling (small mounting accessories, screws, bolts, nuts, washers, etc.) as well as the attestation.

**Small Information Panel**

The item includes procurement, delivery, installation and assembling and quality control, as well as all work on the production and installation of a small information panel. Make it with dimensions shown in detail in graphical documentation. Place a laser engraving metal plate ang information panel with the inscription, dimensions and construction and method of installation shown in detail in the graphical documentation on the front side of the panel. It was designed as a free-standing building. The structure of the panel is designed as skeletal with a gable roof.

Make a small information panel according to the details and instructions shown in detail in graphical documentation. Pillars of the panel and roof should be made of steel plasticized profiles with dimensions and everything according to the detailed instructions and details given in graphical documentation. The final shingles and steel plasticized tin metal of a roof should be made according to the presented details and the manufacturer's instructions, in the color chosen by the contracting authority.

The panel is made of steel profiles, tin, angles, steel flat bars, slab base, anchors and similar, according to the details and instructions. Joints and welds should be ideally made, cleaned and ground. Before installation, clean all elements from corrosion and dust, apply impregnation and basic paint, and repair it after installation. According to the details and instructions from graphical documentation, place wooden elements made of dry oak with a protective coating on an oil base with a high percentage of wax.

Procurement, construction and installation of anchors, base slabs, screws, etc., do and install according to the details and instructions from graphical documentation. Clean and grind the joints. Clean everything from corrosion and dust and paint with the paint base twice before installation.

Prepare the textual content of the information panel for printing according to the investor's instructions, print on pvc self-adhesive foil with protective lamination resistant to damage. Printing must be UV and waterproof and have reflective properties of the material (anti-graffiti film) class 1. Glue the film to a plasticized tin that is 0.5 mm thick. Place the panel on carriers made of square box profiles according to the dimensions and instructions shown in graphical documentation.

Before installation, clean all metal elements from corrosion and dust, apply impregnation and basic paint, and repair it after installation. Paint the metal structure in the same color shades as street furniture and thus form a uniform compact whole. Connection of all elements and placement of the panel are shown in detail in graphical documentation.

All completed works and placed materials must have the appropriate attestations/certificates.

The price should include procurement, delivery, installation and assembling, quality control, as well as all work on the construction and installation of the information panel. In addition to the abovementioned things, the price should include additional elements needed for connection, installation and assembling, as well as preparation and printing.

**Large Information Panel**

The item includes procurement, delivery, installation and assembling and quality control, as well as all work on the production and installation of a large information panel with the area for bicycle racks. Make it with dimensions shown in detail in graphical documentation. Bicycle racks are included in a separate item. Place a laser engraving metal plate and information panel with the inscription, dimensions and construction and method of installation shown in detail in the graphical documentation on the front side of the panel. It was designed as a free-standing building. The structure of the panel is designed as skeletal with a gable roof.

Make a large information panel according to the details and instructions shown in detail in graphical documentation. Pillars of the panel and roof should be made of steel plasticized profiles with dimensions and everything according to the detailed instructions and details given in graphical documentation. The final shingles and steel plasticized tin metal of a roof should be made according to the presented details and the manufacturer's instructions, in the color chosen by the contracting authority.

The panel is made of steel profiles, tin, angles, steel flat bars, slab base, anchors and similar, according to the details and instructions. Joints and welds should be ideally made, cleaned and ground. Before installation, clean all elements from corrosion and dust, apply impregnation and basic paint, and repair it after installation. According to the details and instructions from graphical documentation, place wooden elements made of dry oak with a protective coating on an oil base with a high percentage of wax.

Procurement, construction and installation of anchors, base slabs, screws, etc., do and install according to the details and instructions from graphical documentation. Clean and grind the joints. Clean everything from corrosion and dust and paint with the paint base twice before installation.

Prepare the textual content of the information panel for printing according to the investor's instructions, print on pvc self-adhesive foil with protective lamination resistant to damage. Printing must be UV and waterproof and have reflective properties of the material (anti-graffiti film) class 1. Glue the film to a plasticized tin that is 0.5 mm thick. Place the panel on carriers made of square box profiles according to the dimensions and instructions shown in graphical documentation.

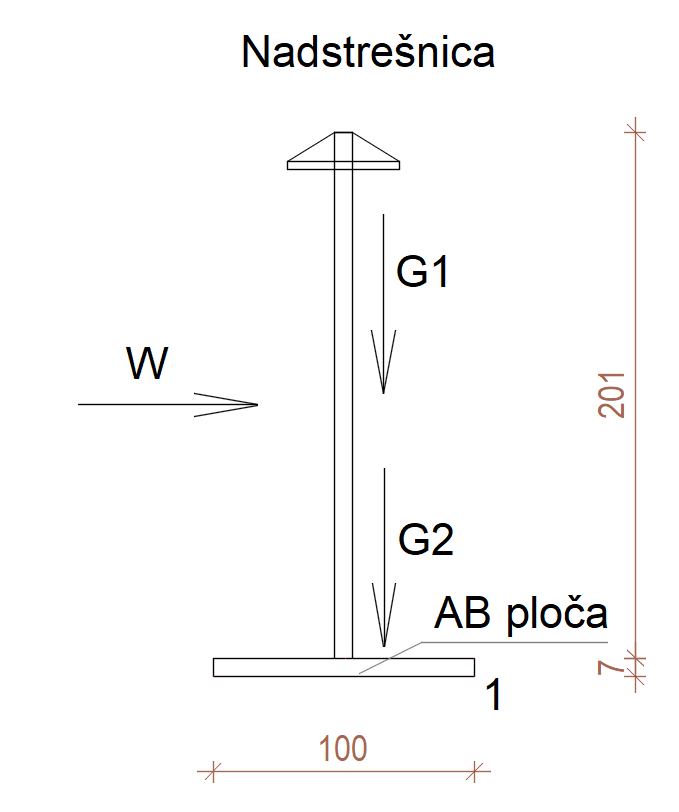
Before installation, clean all metal elements from corrosion and dust, apply impregnation and basic paint, and repair it after installation. Paint the metal structure in the same color shades as street furniture and thus form a uniform compact whole. Connection of all elements and placement of the panel are shown in detail in graphical documentation.

All completed works and placed materials must have the appropriate attestations/certificates.

The price should include procurement, delivery, installation and assembling, quality control, as well as all work on the construction and installation of the information panel. In addition to the abovementioned things, the price should include additional elements needed for connection, installation and assembling, as well as preparation and printing.

* 1. **CONTROL OF ROLLING DUE TO WIND**

**Small Information Panel**



Control of rolling around the axis 1-1:

Wind force W=1,00x2,08x0,70 (basic wind action w = 0,70 KN/m2)=1,46 KN

Real force of the structure G1 =1,00x1,00x1,00=1,00 KN

RC slab force (1,00x1,00x0,13+0,86x0,86x0,07)x25=4,54 КN

(total thickness of RC slab 13+7=20cm)

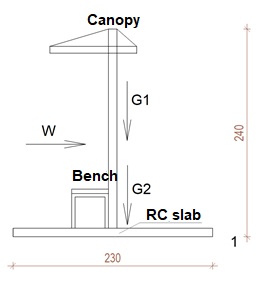
WМ1-1=1,46x1,04=1,52КNm

STM1-1=(1,00+4,54)x0,50=2,77КNm

К=2,77/1,52=1,82>1,50→ The structure is stable to the influence of wind.

Note: The structure has stability against wind overturning, with the lower steel frame to be anchored in a 20 cm thick reinforced concrete slab reinforced with Q 84 mesh.

**Big Information Panel**



Control of rolling around the axis 1-1:

Wind force W=2,40x2,30x0,70 (basic wind action w = 0,70 KN/m2)= 3,86KN

Assumed structure force G1 =2,30x2,30x0,30=1,59 KN

RC slab force 2,10x2,10x0,10x25=11,02KN

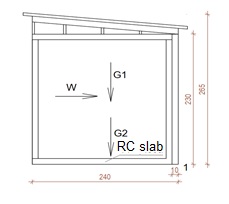
WM1-1=3,86x1,20=4,63 KNm

STM1-1=(1,59+11,02)x1,15=14,50 KNm

K=14,50/4,63=3,13>1,50 → The structure is stable to the influence of wind.

Note: The structure has stability against wind overturning, with the lower steel frame to be anchored in a 10 cm thick reinforced concrete slab reinforced with Q 84 mesh.

**Rest Areas**



Control of rolling around the axis 1-1:

Wind force W=2,65x4,70x0,70 (basic wind action w = 0,70 KN/m2)= 8,72KN

Assumed structure force G1=2,40x4,70x0,40=4,51 KN

RC slab force 2,10x2,10x2x0,10x25=22,05 KN

WM1-1=8,72x1,33=11,60 KNm

STM1-1=(4,51+22,05)x1,20=31,87 KNm

K=31,87/11,60=2,74>1,50 → The structure is stable to the influence of wind.

Note: The structure has stability against wind overturning, with the lower steel frame to be anchored in a 10 cm thick reinforced concrete slab reinforced with Q 84 mesh.

1. **OCCUPATIONAL SAFETY AND ENVIRONMENTAL PROTECTIVE MEASURES**

**3.1 SAFETY MEASURES AT THE WORKPLACE**

In terms of the Law on Occupational Safety in Construction, hazards that may occur during the construction and operation of roads and traffic signage, as well as protective measures to be taken can be classified into two groups, as follows:

* Hazards during the execution of works and
* Hazards during operation of facilities/structures

**Hazards during the execution of works may occur**:

* Due to damages and injuries because of electrical and other lines and installations,
* Traffic hazards,
* Hazards caused by mechanical machines and tools
* Other hazards of injuries to persons when working with construction materials and their transport.

In order to eliminate hazards during the execution of works, the following measures should be taken:

1. Defining the place, space and manner of depositing construction materials

When organizing the construction site, it is necessary to take into account the place and manner of depositing construction materials. Materials resistant to external influences such as timber, finished formwork, reinforcement, concrete curbs, pipes, sand, store outdoors near the installation site or near the site where material should be processed. In case of heavy rains, wind or frost, they would be protected by covering with nylon, paper or fabric covers. For works executed in free space under unfavorable climatic, atmospheric or other influences, the use of appropriate personal protective equipment or equipment during the performance of these works is planned. A first aid kit must be placed on the construction site.

1. Protective measures during transport, loading, unloading and disposal of construction materials

The provision of the Rulebook on Occupational Safety during Maintenance of Motor Vehicles and Transport by Motor Vehicles (Official Gazette of the SFRY No. 55/65) and the Rulebook on Occupational Safety during Loading of Cargo into Freight Motor Vehicles (Official Gazette of SFRY No. 17/66). The necessary construction material is transported by trucks. Asphalt mass is transported from the asphalt base by trucks, whereby the truck box is coated with a potassium soap solution. Vehicles for the transport of construction materials and other loads may be loaded up to the permissible weight on public road and on the construction site.

Transport of machinery from the base to the construction site shall be performed by appropriate means of transport, with the prior approval of the competent authorities and in a manner prescribed by such approval.

1. Protective measures by providing storage space for hazardous materials

Hazardous materials on the construction site are considered to be all those materials that can cause fire, explosion, poisoning and similar harmful consequences that affect life and health of workers, and damage to material goods. Therefore, the following protective measures should be taken:

* Store all flammable materials (beams, slats, boards ...) on places far enough away from the heat source
* Make secure all places on the construction site where there is a possibility of fire outbreak with special protective measures in accordance with applicable regulations
* visiting all places where harmful gases and excessive dust occur, and securing those places

1. The manner of securing hazardous places and jeopardized areas on the construction site

The provisions of the Rulebook on jobs with special working conditions determine jobs and tasks where there is an increased danger to life and health of workers, and which cannot be eliminated by previous general measures of protection at work. These jobs include:

* handling of construction machinery
* maintenance of installations, construction machinery and vehicles
* placement of asphalt mass

Working on places where conditions adversely affect the lives and health of workers, according to the mentioned Rulebook, the following conditions must be met:

* that the worker is older than 18 years and younger than 55 years
* that the worker is physically and mentally healthy
* that he is professionally capable of jobs he needs to finish
* be familiar with hazards and safety measures at work
* that personal protective equipment is provided and made available to workers in accordance with the provisions of the Rulebook on the use and maintenance of PPE and equipment
* Place where construction machines are kept and the manner of their protection

Construction machines, before being installed at the place of work, must be inspected and checked if they function well. Mechanization is located along the route of the road. Security of construction machinery is done by an organized security service.

The operator of a construction machine driven by an internal combustion engine must be protected from the harmful effects of exhaust gases. Parts of self-propelled construction machines must be easily and safely replaceable. The area where the operator of machine can handle it must be positioned in such a way that he can easily see the terrain where he is moving. Self-propelled construction machines must have a device for giving sound signals.

1. Safety measures at workplace during earth works and asphalt works

During the execution of earthworks, special attention should be paid to taking protective measures against landslides. If it is a land where there is a possibility of collapse, it is necessary to take into account the grade of slope, i.e. the angle of internal friction, which will not cause sliding. The handling of machines during earthworks can be entrusted only to workers professionally trained for the job who are familiar with hazards that can occur.

When digging by machine, the excavated soil should be deposited at a distance that does not jeopardize the stability of the excavation sides, due to other excavation works.

Prior to casting, all sharp tips or edges of the fasteners protruding from the formwork must be bent or covered. Casting is done by trained workers.

Regarding asphalt works, the material used during road casting (bitumen) may only be heated in special closed containers. If the asphalt mass catches fire, it must not be extinguished with water. Extinguishing agents (sand, tarpaulins, etc.) must be prepared in advance. Coating and wetting of asphalt leveling roller is done with the help of a specially designed device. It is forbidden for a worker to coat and wet the front part of the roller while it is working.

Asphalt works can be executed only by persons who are medically fit to work and specially trained and equipped for those works.

1. Protective measures for electrical installations

All works on the execution, repair, maintenance and removal of electrical installations, devices and equipment should be done by a professionally trained person according to technical regulations and standards. All cables laid on the ground should be protected from mechanical or other damage. Before commissioning, carry out a detailed inspection of all electrical installations, devices and equipment.

1. Personal protective equipment

Personal protective equipment should be provided for all workers on the construction site that are exposed to the bad weather conditions.

The material quality of equipment as well as the resistance to harmful effects (high or low temperature, fire, shocks, corrosion, water, toxic gases and dust) primarily depends on the purpose, i.e. workplace of workers. All workers in the open space, as well as people visiting the construction site, must wear protective helmets. Protective suits and footwear, etc. are personal protective equipment.

1. Fire protection

It is mandatory to take all hygienic technical protective measures at all locations on the construction site where there is a danger of ignition of flammable materials. It is necessary to provide a sufficient number of fire extinguishers, barrels with sand, two casks with water, pickaxe, shovel, etc.

It will also require all means of fire protection placed on accessible places and painted in red, as well as keeping them in proper condition.

1. Organization how to give first aid

In order to give first aid to injured workers on the construction site, it is necessary to ensure that a worker who is trained in first aid has a medical kit with the prescribed medical supplies at his disposal.

**Hazards during operation of facilities/structures may occur:**

* as a result of traffic accidents for which they are intended for and possibility of damages to certain parts of the building.

Aiming at removing all hazards that can occur in traffic and can be seen in the project-technical documentation, the appropriate traffic signage is planned, and participants in traffic must obey the rules, as well as be in compliance with the Law on Road Safety.

**3.2 ENVIRONMENTAL PROTECTION MEASURES**

In terms of environmental protection, monitoring is required:

* air pollution protection measures and
* green area protection measures

In order to protect the environment, it is necessary to implement preventive measures in accordance with the conditions of environmental protection during designing and design development.

**Air pollution protection measures**

Air protection is achieved by taking systematic measurements of air quality, reducing air pollution by polluted matter below the prescribed limiting values, and taking into account technical and other necessary measures for people’s health. Air pollution protection measures provide atmospheric protection as a whole with all processes and climatic features.

**Green area protection measures (soil and lands)**

Protection, using and arranging soil, agricultural and forest lands and public interest goods include preserving productivity, structures, layers, formation of rocks and minerals, as well as their natural and transient forms and processes.

Activities can be performed and materials that do not pollute or damage the soil can be deposited on the surface or below the surface of land.

During the realization of the design, as well as its development (construction, operation of mineral resources, etc.), protection of soil and land is ensured.

1. **BILL OF QUANTITIES**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **4.1 BILL OF QUANTITIES OF TRAFFIC SIGNAGE** | | | | |
| **Ord. No.** | **TYPE OF WORKS** | **Unit measure** | **Quantity** | **[m2], [m1], [m3]** | |
|
|  |  | | | | |
| **1** | **TRAFFIC SIGNS (Tourist attraction signs, with retroreflective foil class I and anti-graffiti film (production of signs with prefabricated elements, without assemblying and delivery to the place of installation)** | | | | |
|  |  | | | | |
| Tourist attraction signs at location D130 | | | | |
| III-407 - D130.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D130.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location D140 | | | | |
| III-407 - D140.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D140.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location D150 | | | | |
| III-407 - D150.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D150.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D150.3 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D150.4 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location D151 | | | | |
| III-407 - D151.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D151.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location D152 | | | | |
| ST - D152.1 (800 x 500 mm) | pcs. | 1 | 0.40 | |
|  | | | | |
| Tourist attraction signs at location D153 | | | | |
| III-407 - D153.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location D160 | | | | |
| III-407 - D160.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D160.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location 240 | | | | |
| III-407 - 240.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 240.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 240.3 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 240.4 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| MT - 240.5 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| ST - D240.6 (800 x 500 mm) | pcs. | 1 | 0.40 | |
|  | | | | |
| Tourist attraction signs at location 250 | | | | |
| III-407 - 250.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 250.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location 260 | | | | |
| III-407 - 260.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 260.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location 270 | | | | |
| III-407 - 270.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 270.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location 280 | | | | |
| III-407 - 280.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 280.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location 290 | | | | |
| III-407 - 290.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 290.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 290.3 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 290.4 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| ST - 290.5 (800 x 500 mm) | pcs. | 1 | 0.40 | |
|  | | | | |
| Tourist attraction signs at location 230 | | | | |
| III-407 - 230.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 230.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 230.3 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 230.4 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location D200 | | | | |
| III-407 - D200.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D200.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location 300 | | | | |
| III-407 - 300.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 300.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 300.3 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| ST - 300.4 (800 x 500 mm) | pcs. | 1 | 0.40 | |
|  | | | | |
| Tourist attraction signs at location 310 | | | | |
| III-407 - 310.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 310.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| ST - 310.3 (800 x 500 mm) | pcs. | 1 | 0.40 | |
|  | | | | |
| Tourist attraction signs at location 320 | | | | |
| III-407 - 320.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 320.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location 330 | | | | |
| III-407 - 330.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 330.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location 340 | | | | |
| III-407 - 340.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 340.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location 350 | | | | |
| III-407 - 350.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 350.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 350.3 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 350.4 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 350.5 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 350.6 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| ST - 350.7 (800 x 500 mm) | pcs. | 1 | 0.40 | |
|  | | | | |
| Tourist attraction signs at location 360 | | | | |
| III-407 - 360.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 360.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location 370 | | | | |
| III-407 - 370.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location 380 | | | | |
| III-407 - 380.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 380.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location 390 | | | | |
| III-407 - 390.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 390.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location D300 | | | | |
| III-407 - 300.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 300.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 300.3 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 300.4 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 300.5 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - 300.6 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location D301 | | | | |
| III-407 - D301.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location D310a | | | | |
| III-407 - D310a.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D310a.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location D310b | | | | |
| III-407 - D310b.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D310b.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location D310c | | | | |
| III-407 - D310c.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D310c.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location D320 | | | | |
| III-407 - D320.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D320.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D320.3 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D320.4 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D320.5 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D320.6 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D320.7 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D320.8 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location D321 | | | | |
| III-407 - D321.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D321.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location D322 | | | | |
| III-407 - D322.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D322.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| Tourist attraction signs at location D323 | | | | |
| ST - D323.1 (800 x 500 mm) | pcs. | 1 | 0.40 | |
|  | | | | |
| Tourist attraction signs at location D330 | | | | |
| III-407 - D330.1 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
| III-407 - D330.2 (1000 x 200 mm) | pcs. | 1 | 0.20 | |
|  | | | | |
| **2** | **CARRIERS OF TRAFFIC SIGNS AND FOUNDATIONS** | | | | |
|  |  | | | | |
| Tourist attraction signs at location D130 | | | | |
| Tubular post | pcs. | 1 | 3.00 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location D140 | | | | |
| Tubular post | pcs. | 1 | 2.60 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location D150 | | | | |
| Tubular post | pcs. | 1 | 3.60 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location D151 | | | | |
| Tubular post | pcs. | 1 | 3.20 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location D152 | | | | |
| Tubular post | pcs. | 1 | 2.50 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location D153 | | | | |
| Tubular post | pcs. | 1 | 2.40 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location D160 | | | | |
| Tubular post | pcs. | 1 | 3.40 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location 240 | | | | |
| Tubular post | pcs. | 1 | 3.60 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location 250 | | | | |
| Tubular post | pcs. | 1 | 3.40 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location 260 | | | | |
| Tubular post | pcs. | 1 | 3.60 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location 270 | | | | |
| Tubular post | pcs. | 1 | 3.60 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location 280 | | | | |
| Tubular post | pcs. | 1 | 3.00 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location 290 | | | | |
| Tubular post | pcs. | 1 | 3.00 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location 230 | | | | |
| Tubular post | pcs. | 1 | 3.60 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location D200 | | | | |
| Tubular post | pcs. | 1 | 3.60 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location 300 | | | | |
| Tubular post | pcs. | 1 | 3.60 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location 310 | | | | |
| Tubular post | pcs. | 1 | 3.20 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location 320 | | | | |
| Tubular post | pcs. | 1 | 3.40 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location 330 | | | | |
| Tubular post | pcs. | 1 | 3.60 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location 340 | | | | |
| Tubular post | pcs. | 1 | 3.20 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location 350 | | | | |
| Tubular post | pcs. | 1 | 3.80 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location 360 | | | | |
| Tubular post | pcs. | 1 | 3.60 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location 370 | | | | |
| Tubular post | pcs. | 1 | 3.00 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location 380 | | | | |
| Tubular post | pcs. | 1 | 3.60 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location 390 | | | | |
| Tubular post | pcs. | 1 | 3.60 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location D300 | | | | |
| Tubular post | pcs. | 1 | 3.00 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location D301 | | | | |
| Tubular post | pcs. | 1 | 2.40 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location D310a | | | | |
| Tubular post | pcs. | 1 | 2.60 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location D310b | | | | |
| Tubular post | pcs. | 1 | 2.60 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location D310c | | | | |
| Tubular post | pcs. | 1 | 2.60 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location D320 | | | | |
| Tubular post | pcs. | 1 | 3.20 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location D321 | | | | |
| Tubular post | pcs. | 1 | 2.60 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location D322 | | | | |
| Tubular post | pcs. | 1 | 2.60 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location D323 | | | | |
| Tubular post | pcs. | 1 | 2.50 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  | | | | |
| Tourist attraction signs at location D330 | | | | |
| Tubular post | pcs. | 1 | 3.30 | |
| Concrete foundation for tubular posts | pcs. | 1 | 0.15 | |
|  |  | | | | |
| **3** | **WORKS ON ASSEMBLYING OF SIGNS, PLACEMENT OF PILLARS/POSTS AND INSTALLATION OF FOUNDATIONS** | | | | |
|  | Assembling of signs | | | | |
| The placement of traffic signs and panels is emphasized as a percentage of the value of their construction. The value of this position is 35% of the value of the production of traffic signs and panels, and it also includes transport of panels to the place of placement. | (%) | | | |
| Placing pillars/posts | | | | |
| Placement, i.e. installation of pillar carriers is expressed as a percentage of the value of their construction. The value of this position is 35% of the value of the construction of the support pillars/posts and foundations, and it also includes transport of the carrier to the installation site. | (%) | | | |
|  | | | | |
| **4** | **OTHER WORKS** | | | | |
|  |  | | | | |
| 4.1 Dismantling and placement of existing traffic signs | | | | |
| Dismantling and placement of existing traffic signs | pcs. | 30.00 | - | |
| 4.2 Dismantling and removal of existing carriers of traffic signs | | | | |
| Dismantling and removal of existing carriers of traffic signs | pcs. | 14.00 | - | |
| 4.3 Donor's sticker "Danube Transnational Programme" | | | | |
| Donor's sticker "Danube Transnational Programme" | pcs. | 93.00 | - | |
|  | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **4.2 BILL OF QUANTITIES OF WORKS RELATED TO REST AREA FOR CYCLISTS WITH STREET FURNITURE AND INFORMATION PANELS** | | | | |
| **No.** | **Item no.** | **TYPE OF WORKS** | **Quantity** | **Meas. Unit** |
|
| **Rest areas for cyclists О-1** | | | | |
|  | 1.1. | Preparatory works |  | |
| 1 | 1.1.1 | Facilities setting out and marking | 6.70 | m1 |
|  |  |  |  |  |
|  | 1.2. | Earth works |  | |
| 2 | 1.2.1 | Topsoil excavation | 4.90 | m3 |
| 3 | 1.2.2 | Excavation of earth material | 3.20 | m3 |
| 4 | 1.2.3 | Subgrade Compression | 16.08 | m2 |
| 5 | 1.2.4 | Topsoiling of flat and aslant surfaces | 3.80 | m3 |
| 6 | 1.2.5 | Transport of earth material | 7.35 | m3 |
| 7 | 1.2.6 | Spreading of earth material at the landfill | 7.35 | m3 |
|  |  |  |  |  |
|  | 1.3. | Concrete works |  | |
| 8 | 1.3.1 | Construction of a gravel base layer | 6.43 | m3 |
| 9 | 1.3.2 | Casting in foundation using concrete MB30 | 1.79 | m3 |
|  |  |  |  |  |
|  | 1.4. | Other works |  | |
| 10 | 1.4.1 | Canopy | 1.00 | pcs |
| 11 | 1.4.4 | Element for sitting with a table | 1.00 | pcs |
| 12 | 1.4.5 | Bicycle racks | 2.00 | pcs |
|  |  |  |  |  |
| **Rest areas for cyclists О-2** | | | | |
|  | 1.1. | Preparatory works |  | |
| 13 | 1.1.1 | Facilities setting out and marking | 6.70 | m1 |
|  |  |  |  |  |
|  | 1.2. | Earth works |  | |
| 14 | 1.2.1 | Topsoil excavation | 4.90 | m3 |
| 15 | 1.2.2 | Excavation of earth material | 3.20 | m3 |
| 16 | 1.2.3 | Subgrade Compression | 16.08 | m2 |
| 17 | 1.2.4 | Topsoiling of flat and aslant surfaces | 3.80 | m3 |
| 18 | 1.2.5 | Transport of earth material | 7.35 | m3 |
| 19 | 1.2.6 | Spreading of earth material at the landfill | 7.35 | m3 |
|  |  |  |  |  |
|  | 1.3. | Concrete works |  | |
| 20 | 1.3.1 | Construction of a gravel base layer | 6.43 | m3 |
| 21 | 1.3.2 | Casting in foundation using concrete MB30 | 1.79 | m3 |
|  |  |  |  |  |
|  | 1.4. | Other works |  | |
| 22 | 1.4.1 | Canopy | 1.00 | pcs |
| 23 | 1.4.3 | Medium bench | 1.00 | pcs |
| 24 | 1.4.5 | Bicycle racks | 2.00 | pcs |
|  |  |  |  |  |
| **Rest areas for cyclists О-3** | | | | |
|  | 1.1. | Preparatory works |  | |
| 25 | 1.1.1 | Facilities setting out and marking | 6.70 | m1 |
|  |  |  |  |  |
|  | 1.2. | Earth works |  | |
| 26 | 1.2.1 | Topsoil excavation | 4.90 | m3 |
| 27 | 1.2.2 | Excavation of earth material | 3.20 | m3 |
| 28 | 1.2.3 | Subgrade Compression | 16.08 | m2 |
| 29 | 1.2.4 | Topsoiling of flat and aslant surfaces | 3.80 | m3 |
| 30 | 1.2.5 | Transport of earth material | 7.35 | m3 |
| 31 | 1.2.6 | Spreading of earth material at the landfill | 7.35 | m3 |
|  |  |  |  |  |
|  | 1.3. | Concrete works |  | |
| 32 | 1.3.1 | Construction of a gravel base layer | 6.43 | m3 |
| 33 | 1.3.2 | Casting in foundation using concrete MB30 | 1.79 | m3 |
|  |  |  |  |  |
|  | 1.4. | Other works |  | |
| 34 | 1.4.1 | Canopy | 1.00 | pcs |
| 35 | 1.4.5 | Bicycle racks | 1.00 | pcs |
|  |  |  |  |  |
| **Rest areas for cyclists О-4** | | | | |
|  | 1.1. | Preparatory works |  | |
| 36 | 1.1.1 | Facilities setting out and marking | 6.70 | m1 |
|  |  |  |  |  |
|  | 1.2. | Earth works |  | |
| 37 | 1.2.1 | Topsoil excavation | 4.90 | m3 |
| 38 | 1.2.2 | Excavation of earth material | 3.20 | m3 |
| 39 | 1.2.3 | Subgrade Compression | 16.08 | m2 |
| 40 | 1.2.4 | Topsoiling of flat and aslant surfaces | 3.80 | m3 |
| 41 | 1.2.5 | Transport of earth material | 7.35 | m3 |
| 42 | 1.2.6 | Spreading of earth material at the landfill | 7.35 | m3 |
|  |  |  |  |  |
|  | 1.3. | Concrete works |  | |
| 43 | 1.3.1 | Construction of a gravel base layer | 6.43 | m3 |
| 44 | 1.3.2 | Casting in foundation using concrete MB30 | 1.79 | m3 |
|  |  |  |  |  |
|  | 1.4. | Other works |  | |
| 45 | 1.4.1 | Canopy | 1.00 | pcs |
| 46 | 1.4.5 | Bicycle racks | 2.00 | pcs |
|  |  |  |  |  |
| **Rest areas for cyclists О-5** | | | | |
|  | 1.1. | Preparatory works |  | |
| 47 | 1.1.1 | Facilities setting out and marking | 6.70 | m1 |
|  |  |  |  |  |
|  | 1.2. | Earth works |  | |
| 48 | 1.2.1 | Topsoil excavation | 4.90 | m3 |
| 49 | 1.2.2 | Excavation of earth material | 3.20 | m3 |
| 50 | 1.2.3 | Subgrade Compression | 16.08 | m2 |
| 51 | 1.2.4 | Topsoiling of flat and aslant surfaces | 3.80 | m3 |
| 52 | 1.2.5 | Transport of earth material | 7.35 | m3 |
| 53 | 1.2.6 | Spreading of earth material at the landfill | 7.35 | m3 |
|  |  |  |  |  |
|  | 1.3. | Concrete works |  | |
| 54 | 1.3.1 | Construction of a gravel base layer | 6.43 | m3 |
| 55 | 1.3.2 | Casting in foundation using concrete MB30 | 1.79 | m3 |
|  |  |  |  |  |
|  | 1.4. | Other works |  | |
| 56 | 1.4.1 | Canopy | 1.00 | pcs |
| 57 | 1.4.4 | Element for sitting with a table | 1.00 | pcs |
| 58 | 1.4.5 | Bicycle racks | 2.00 | pcs |
|  |  |  |  |  |
| **Rest areas for cyclists О-6** | | | | |
|  | 1.1. | Preparatory works |  | |
| 59 | 1.1.1 | Facilities setting out and marking | 6.70 | m1 |
|  |  |  |  |  |
|  | 1.2. | Earth works |  | |
| 60 | 1.2.1 | Topsoil excavation | 4.90 | m3 |
| 61 | 1.2.2 | Excavation of earth material | 3.20 | m3 |
| 62 | 1.2.3 | Subgrade Compression | 16.08 | m2 |
| 63 | 1.2.4 | Topsoiling of flat and aslant surfaces | 3.80 | m3 |
| 64 | 1.2.5 | Transport of earth material | 7.35 | m3 |
| 65 | 1.2.6 | Spreading of earth material at the landfill | 7.35 | m3 |
|  |  |  |  |  |
|  | 1.3. | Concrete works |  | |
| 66 | 1.3.1 | Construction of a gravel base layer | 6.43 | m3 |
|  | 1.3.2 | Casting in foundation using concrete MB30 | 1.79 | m3 |
|  |  |  |  |  |
|  | 1.4. | Other works |  | |
| 67 | 1.4.1 | Canopy | 1.00 | pcs |
| 68 | 1.4.2 | Small bench | 0.00 | pcs |
| 69 | 1.4.5 | Bicycle racks | 2.00 | pcs |
|  |  |  |  |  |
| **Small information panel М-1** | | | | |
|  | 1.1. | Preparatory works |  | |
| 70 | 1.1.1 | Facilities setting out and marking | 1.00 | m1 |
|  |  |  |  |  |
|  | 1.2. | Earth works |  | |
| 71 | 1.2.1 | Topsoil excavation | 0.30 | m3 |
| 72 | 1.2.2 | Excavation of earth material | 0.20 | m3 |
| 73 | 1.2.3 | Subgrade Compression | 1.00 | m2 |
| 74 | 1.2.4 | Topsoiling of flat and aslant surfaces | 0.96 | m3 |
| 75 | 1.2.5 | Transport of earth material | 0.30 | m3 |
| 76 | 1.2.6 | Spreading of earth material at the landfill | 0.30 | m3 |
|  |  |  |  |  |
|  | 1.3. | Concrete works |  | |
| 77 | 1.3.1 | Construction of a gravel base layer | 0.30 | m3 |
| 78 | 1.3.2 | Casting in foundation using concrete MB30 | 0.20 | m3 |
|  |  |  |  |  |
|  | 1.4. | Other works |  | |
| 79 | 1.4.6 | Small information panel | 1.00 | pcs |
|  |  |  |  |  |
| **Small information panel М-2** | | | | |
|  | 1.1. | Preparatory works |  | |
| 80 | 1.1.1 | Facilities setting out and marking | 1.00 | m1 |
|  |  |  |  |  |
|  | 1.2. | Earth works |  | |
| 81 | 1.2.1 | Topsoil excavation | 0.30 | m3 |
| 82 | 1.2.2 | Excavation of earth material | 0.20 | m3 |
| 83 | 1.2.3 | Subgrade Compression | 1.00 | m2 |
| 84 | 1.2.4 | Topsoiling of flat and aslant surfaces | 0.96 | m3 |
| 85 | 1.2.5 | Transport of earth material | 0.30 | m3 |
| 86 | 1.2.6 | Spreading of earth material at the landfill | 0.30 | m3 |
|  |  |  |  |  |
|  | 1.3. | Concrete works |  | |
| 87 | 1.3.1 | Construction of a gravel base layer | 0.30 | m3 |
| 88 | 1.3.2 | Casting in foundation using concrete MB30 | 0.20 | m3 |
|  |  |  |  |  |
|  | 1.4. | Other works |  | |
| 89 | 1.4.6 | Small information panel | 1.00 | pcs |
|  |  |  |  |  |
| **Small information panel М-3** | | | | |
|  | 1.1. | Preparatory works |  | |
| 90 | 1.1.1 | Facilities setting out and marking | 1.00 | m1 |
|  |  |  |  |  |
|  | 1.2. | Earth works |  | |
| 91 | 1.2.1 | Topsoil excavation | 0.30 | m3 |
| 92 | 1.2.2 | Excavation of earth material | 0.20 | m3 |
| 93 | 1.2.3 | Subgrade Compression | 1.00 | m2 |
| 94 | 1.2.4 | Topsoiling of flat and aslant surfaces | 0.96 | m3 |
| 95 | 1.2.5 | Transport of earth material | 0.30 | m3 |
| 96 | 1.2.6 | Spreading of earth material at the landfill | 0.30 | m3 |
|  |  |  |  |  |
|  | 1.3. | Concrete works |  | |
| 97 | 1.3.1 | Construction of a gravel base layer | 0.30 | m3 |
| 98 | 1.3.2 | Casting in foundation using concrete MB30 | 0.20 | m3 |
|  |  |  |  |  |
|  | 1.4. | Other works |  | |
| 99 | 1.4.6 | Small information panel | 1.00 | pcs |
|  |  |  |  |  |
| **Small information panel М-4** | | | | |
|  | 1.1. | Preparatory works |  | |
| 100 | 1.1.1 | Facilities setting out and marking | 1.00 | m1 |
|  |  |  |  |  |
|  | 1.2. | Earth works |  | |
| 101 | 1.2.1 | Topsoil excavation | 0.30 | m3 |
| 102 | 1.2.2 | Excavation of earth material | 0.20 | m3 |
| 103 | 1.2.3 | Subgrade Compression | 1.00 | m2 |
| 104 | 1.2.4 | Topsoiling of flat and aslant surfaces | 0.96 | m3 |
| 105 | 1.2.5 | Transport of earth material | 0.30 | m3 |
| 106 | 1.2.6 | Spreading of earth material at the landfill | 0.30 | m3 |
|  |  |  |  |  |
|  | 1.3. | Concrete works |  | |
| 107 | 1.3.1 | Construction of a gravel base layer | 0.30 | m3 |
| 108 | 1.3.2 | Casting in foundation using concrete MB30 | 0.20 | m3 |
|  |  |  |  |  |
|  | 1.4. | Other works |  | |
| 109 | 1.4.6 | Small information panel | 1.00 | pcs |
|  |  |  |  |  |
| **Large information panel V-1** | | | | |
|  | 1.1. | Preparatory works |  | |
| 110 | 1.1.1 | Facilities setting out and marking | 3.80 | m1 |
|  |  |  |  |  |
|  | 1.2. | Earth works |  | |
| 111 | 1.2.1 | Topsoil excavation | 2.62 | m3 |
| 112 | 1.2.2 | Excavation of earth material | 1.75 | m3 |
| 113 | 1.2.3 | Subgrade Compression | 8.74 | m2 |
| 114 | 1.2.4 | Topsoiling of flat and aslant surfaces | 2.60 | m3 |
| 115 | 1.2.5 | Transport of earth material | 3.85 | m3 |
| 116 | 1.2.6 | Spreading of earth material at the landfill | 3.85 | m3 |
|  |  |  |  |  |
|  | 1.3. | Concrete works |  | |
| 117 | 1.3.1 | Construction of a gravel base layer | 3.50 | m3 |
| 118 | 1.3.2 | Casting in foundation using concrete MB30 | 0.87 | m3 |
|  |  |  |  |  |
|  | 1.4. | Other works |  | |
| 119 | 1.4.5 | Bicycle racks | 2.00 | pcs |
| 120 | 1.4.7 | Large information panel | 1.00 | pcs |
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