

BILL OF QUANTITIES
FOR THE WORKS ON THE REMEDY OF THE LANDSLIDE
ON THE STATE ROAD OF II A CLASS NO 143, SECTION: PRIČEVIĆI -PECKA,
km: 16+920.05 - km: 17+069.26, ID-3074

No	WORKS DESCRIPTION	Unit	Quantity	Unit price USD	Total USD
I PRELIMINARY WORKS					
1	Forming of construction site, construction and installation of temporary structures, delivery and mounting of auxilliary facilities and equipment, preparation of the working plateau, construction of access roads, etc. The item includes costs of the mobilisation and demobilisation of the piling machine	lump sum	1.00		
2	Surveying - pegging of road surfaces, elementary and detailed bench marks, with marking protocol.	lump sum	1.00		
3	Felling of trees, clearing of undergrowth and small vegetation.	lump sum	1.00		
TOTAL:					
II EARTH WORKS					
4	Mechanical excavation of earth, and manually to a lesser extent, in 3rd and 4th category of soil for the purpose of constructing drainage trench to the depth of 4m, manhole and pipe culvert. The excavation is to be done 60% mechanically, with an excavator, and 40% manually. Cut the sides regularly and level the bottom. Transportation of excavated soil up to a distance of 5 km to a disposal designated by the Supervisor.	m3	703.90		
5	Supporting of the trench along the entire length on two sides, in the traditional way or with heavy metal formwork. The support is to be done double-sided in order to secure work in the trench. The price includes the delivery of formwork to the construction site, installation, disassembling, clearing and returning to the plant.	m2	877.74		
6	Supply and installation of non-woven geotextile from polypropylene fibres (PP), weighing 300gr/m2, with tensile strength of $\beta z \geq 20$ kN/m, elongation of $\epsilon \geq 55\%$.	m2	1,387.18		
7	Supply and installation of waterproof geomembrane from thermoplastic synthetic foil made of low-density polyethylene (LDPE), with a thickness of 1.5mm.	m2	664.88		

No	WORKS DESCRIPTION	Unit	Quantity	Unit price USD	Total USD
8	Supply and laying of hard plastic pipes (HDPE), with a diameter of Ø400mm. The pipes are perforated in the upper part. The pipes must be with fittings and joining material.	m1	130.00		
9	Filling of drainage trenches with crushed stone, with a grain size of 10-25cm. Filling of the trenches to be done in 50-100cm layers. Crushed stone must be firm and clean and resistant to frost, with compressive strength of >120MPa and with excellent resistance properties $\phi > 42^\circ$.	m3	567.06		
13	Making of vegetative course with a thickness of 20cm on the slopes of the new embankment. Topsoil is not separately excavated, but selected from the wet soil excavated when removing the original deformed embankment.	m2	1,608.61		
14	Narrow excavation for square manhole in 3rd and 4th category of earth with supporting. The excavation is to be done 60% mechanically, with an excavation, and 40% manually. Cut the sides regularly and level the bottom. Transportation of excavated soil up to a distance of 5 km to a disposal designated by the Supervisor.	m3	74.49		

No	WORKS DESCRIPTION	Unit	Quantity	Unit price USD	Total USD
15	Narrow excavation in 3rd and 4th category of earth with supporting. The excavation is to be done 60% mechanically, with an excavation, and 40% manually. Cut the sides regularly and level the bottom. Transportation of excavated soil up to a distance of 5 km to a disposal designated by the Supervisor.	m3	16.21		
TOTAL:					
III CONCRETE WORKS					
Concrete works on the construction of flume, canal, manhole, culvert					
-rectangular shaft at km:16+984.462					
16	Construction of concrete flume from lean MB15 concrete, with the thickness of 30cm and with a cross-fall of 4%.	m1	143.00		
17	Construction of concrete canal for receiving and draining water from the hinterland at the top of the trench. Construct the canals from MB-30 concrete, M-100, with mesh steel reinforcement Q 188 in the middle. Do the canals in tunnel liners.	m1	143.00		
18	Construction of concrete manhole, with rectangular cross-section. The manholes are to be constructed from MB-40 concrete, M-150, with steel reinforcement according to the design. The price includes the grading of the trench bottom, construction of the base from gravel or sand, formwork with the stiffening of the walls and slab, laying of reinforcement, concreting.				
	-concrete:	m3	7.73		
	-reinforcement:	kg	54.46		
19	Hydro insulation of inner walls of the manhole with cement mortar in two coats, with skimming to black gloss, coat with bitulit on the outside.	m2	25.76		
20	Installation of cast iron steps (DIN 1211a) SRPS M.J6.285. After the installation, clean the steps and coat with anticorrosive agents.	pcs	2.00		
21	Installation of cast square cover of the manhole, measuring 680x680mm, with bearing capacity of B125kN (SRPS EN 124)	pcs	2.00		

No	WORKS DESCRIPTION	Unit	Quantity	Unit price USD	Total USD
22	Construction of concrete culverts. The culverts has a diameter of 1200mm, double reinforced, and made form MB-40 concrete, M-150. At the end of the culvert, construct outlet head from MB -30 concrete, M-150. The price includes the supply, laying and splicing of the culvert and sealing of joints with cement mortar with additive-sealer, by constructing outlet head and subsoil from concrete. The pipes must come with KGF joints.	m1	31.50		
23	Construction of the hydro insulation of the culvert. Insulate the outer side with two coats of bitumen. First apply the cold coat (bitulit), and then the hot coat from bituminous tapes, with a thickness of up to 7mm .	m2	144.48		
-round manhole at km:16+939.455					
24	Supply and laying of reinforced concrete pipes for the manhole, Ø1000mm, with a height of 0.5m, with a cone of H=0.6m. The manholes are to be made from MB-40 concrete, M-150. The price includes the grading of two trenches, construction of base from gravel or sand, laying, installation and sealing of joints, construction of concrete ring on the top. The pipes must come with KGF joints.	pcs	2.00		
25	Hydro insulation of inner walls of the manhole with cement mortar in two layers, with skimming to black gloss, coat with bitulit on the outside.	m2	5.06		
26	Installation of cast round cover of the manhole, measuring 680x680mm, with a bearing capacity of B125kN (SRPS EN 124).	pcs	1.00		
27	Construction of a part of concrete culvert. The culvert is has a diameter of 600mm double reinforced, and made form MB-40 concrete, M-150. At the end of the culvert, construct outlet head from MB -30 concrete, M-150. The price includes the supply, laying, construction of water impermeable concrete ring, fitting into the eexisting and sealing of joints.	pcs	1.00		
28	Construction of the hydro insulation of the culvert. Insulate the outer side with two coats of bitumen. First apply the cold coat (bitulit), and then the hot coat from bituminous tapes, with a thickness of up to 7mm.	m2	2.32		

No	WORKS DESCRIPTION	Unit	Quantity	Unit price USD	Total USD
Concrete works on the construction of bored piles and capping beam					
29	Construction of bored piles from MB-30, with a diameter of 80 cm. The item includes mechanical excavation in 3rd and 4th category of soil, loading and transportation of material from the boreholes to the landfill and concreting. During the excavation, the excavated material needs to be plotted. The price includes the concreting of pile superelevation of 50 cm at the top of the pile and later cropping of the pile haeds.	m1	694.00		
30	Construction of bored piles from MB-30, with a diameter of 80 cm. The item includes mechanical excavation in 5th and 6th category of soil, loading and transportation of material from the boreholes to the landfill and concreting. During the excavation, the excavated material needs to be plotted. The price includes the concreting of pile superelevation of 50 cm at the top of the pile and later demolition.	m1	380.00		
31	Concreting of the capping beam, measuring b/h=120/100cm, from concrete of quality MB-30, M-150, with necessary formwork.	m3	153.00		
32	Supply, construction and laying of reinforcement RA400/500, GA240/360 and MAR500/560 for piles and capping beam fully in accordance with the design.	kg	76,587.00		
TOTAL:					
IV OTHER WORKS					
33	Supply and planting of acacia, willow or conifer trees in the front zone and preferably on the surface of the slope. Where needed, the trees are to be tied with elastic cable wire or rope of Ø8 mm. All nursery trees must have a clearly defined and streight trunk and well developed crown with a minimum of three primary branches, and root of min, 3 pieces, "cultured" nursery trees, of a minimum height of 3m. The price includes the supply, transportation of trees, care, pruning and planting.	m2	8,500.00		
34	Sealing of cracks in the narrow and wider zone of the landslide front with clay cap from inorganic clay of medium and high plasticity. (CI, CI/CH, CH). Compact the clay with compactor.	lump sum	1.00		

No	WORKS DESCRIPTION	Unit	Quantity	Unit price USD	Total USD
35	Land-scaping of the entire area affected by the remediation.	lump sum	1.00		
36	Geological mapping of excavated material during drilling for piles.	m1	1,074.00		
37	Supply and installation of equipment for geodetic and geotechnical observation of the structure. The observation is done by establishing a network of bench marks and one inclinometer.				
	- geodetic benchmarks	pcs	6.00		
	- inclinometric structure from a plastic pipe with grooves and secured with a concrete block measuring 0.5 x 0.5 x 0.2 m and protective cap.	m1	12.00		
	- observation of inclinometric structures and geodetic benchmarks	pcs	12.00		
38	Demolition of asphalt surfacing of the road in the section planned by the design for remedy of landslide. The item includes the following: demolition, loading and transportation of demolished material to a disposal determined by the Supervisor within 5km. Calculation per m ² of demolished road surface.	m ²	477.59		
39	Grading and rolling of the subgrade. Calculation per m ² of rolled subgrade.	m ²	1,363.00		
40	Supply, transportation and incorporation of lower bearing course of the pavement structure from crushed stone aggregate of 0/31mm of continuous granulometric composition, with a thickness of 20cm in compacted state. $0.20 \times 818.44 + 2 \times (0.20 \times 0.26 \times 149.37) = 163.69 + 15.53 = 179.22 \text{ m}^3$. Calculation per m ³ of incorporated material.	m ³	179.22		
41	Supply, transportation and incorporation of lower bearing course of the pavement structure from crushed stone aggregate of 0/63mm of continuous granulometric composition, with a thickness of 25cm in compacted state. $0.25 \times 818.44 + 2 \times (0.25 \times 0.74 \times 149.37) = 204.61 + 55.27 = 259.88 \text{ m}^3$ Calculation per m ³ of incorporated material.	m ³	259.88		
42	Supply, transportation and incorporation of the upper bitumenous base course from BNS22A (8cm thick). Calculation per m ² of completed course.	m ²	818.44		

No	WORKS DESCRIPTION	Unit	Quantity	Unit price USD	Total USD
43	Supply, transportation and incorporation of wearing course of the road surface from AB11 asphalt with the thickness of 4cm in the part of the road section which is being remedied and fitting into the existing road surface. Calculation per m2 of completed course.	m2	818.44		
TOTAL:					
V TRAFFIC SIGNALIZATION AND ROAD FURNITURE					
45	Vertical traffic signalization				
	Standard traffic signs foil class 2				
	Triangular a=90cm				
	I-1	pcs	1.00		
	I-1.1	pcs	1.00		
	I-2.1	pcs	2.00		
	Round f 60cm				
	II-30(40km/h)	pcs	2.00		
	Single pipe carrier				
	2.6 m	pcs	2.00		
2.9 m	pcs	4.00			
46	Horizontal signalization				
	Total under white paint	m2	42.30		
47	Road furniture				
	Guard rail N2W4	m	200.00		
	Oblique gurad rail endinngs N2W4 L=12m	pcs	2.00		
	Reflective studs (catadiopters)	pcs	8.00		
	Delineators	pcs	121.00		
48	Removal of the existing traffic signalization				
	Dismantling of existing signs	pcs	5.00		
	Dismantling of traffic sign posts	pcs	3.00		
49	Temporary traffic signalization	lump sum	1.00		
TOTAL:					

SUMMARY:

GROUP OF WORKS			TOTAL
I PRELIMINARY WORKS			
II EARTH WORKS			
III CONCRETE WORKS			
IV OTHER WORKS			
V TRAFFIC SIGNALIZATION AND ROAD FURNITURE			
TOTAL:			

BILL OF QUANTITIES
FOR THE WORKS ON THE REMEDY OF THE LANDSLIDE
ON THE STATE ROAD IIA SECTION 170: VALJEVO-DEBELO BRDO-ROGACICA-
km: 35+500

No	WORKS DESCRIPTION	Unit	Quantity	Unit price USD	Total USD
I PRELIMINARY WORKS					
1	Forming of construction site, construction and installation of temporary structures, delivery and mounting of ancilliary facilities and equipment, construction of access roads and possible deviations, etc.	lump sum	1.00		
2	Surveying - pegging of road surfaces, elementary and detailed bench marks, with marking protocol.	lump sum	1.00		
3	Felling of trees, clearing of undergrowth and small vegetation.	lump sum	1.00		
TOTAL:					
II EARTH WORKS					
1	Excavation of earth of 2nd and 4th category for the purpose of constructing pipe culvert and manhole. The excavation is to be done 80% mechanically, and 20% manually. The excavation is to be done with supporting and pumping of ground water for the foundation pit. After the excavation, grade the bottom of the pit with accuracy of $\pm 1.5\text{cm}$ and compact the subsoil to the compressibility module of $M_s=15.0\text{MPa}$. Transportation of excavated soil up to a distance of 5km to a disposal determined by the Supervisor. $20.0 \cdot (6.0+2.0)/2 \cdot 4.4 + (1.6+4.0)/2 \cdot 2.8 \cdot 2 = 367.6$ 8m3 Calculation per m3 of incorporated material.	m3	367.68		
2	Mechanical excavation of earth in cascade excavation, 2nd to 4th category, for the purpose of removing deformed and moved soil of the slope below the road in the section affected by the landslide. The excavation is done with stepped cutting from the top to the bottom. Transportation of excavated soil up to the distance of 5mk to a disposal determined by the Supervisor. Calculation per m3 of removed material.	m3	2,653.00		

No	WORKS DESCRIPTION	Unit	Quantity	Unit price USD	Total USD
3	Excavation of earth of 2nd to 4th category for the purpose of constructing drainage trench to the depth of 1.5m, with supporting as needed. Cut the sides regularly and level the bottom. Transportation of excavated soil up to the distance of 5mk to a disposal determined by the Supervisor. 115.33*1.5*0.60=103.80m3 Calculation per m3 of removed material.	m3	103.80		
4	Construction of embankment from crushed stone. The size of the incorporated stone is max=15cm. Tip the crushed stone, spread, pile as good as possible, and in the end compact the layer. Crushed stone must be firm and clean and resistant to frost, with compressive strength of >100MPa and with excellent resistance properties $\phi > 35^\circ$ and granulation of Cu >9-30. Compaction is to be done with appropriate mechanical means in layers of 50-80cm. The compaction degree of the layers must be fully in accordance with SPRS U. E1.010 and designed technical requirements. The works cover the supply of material, spreading, coarse and fine grading, wetting and compacting of embankment. Calculation per m3 of completed embankment.	m3	2,380.00		
5	Supply, transportation and incorporation of a filter layer from stone chippings (1-6cm) with the thickness of 40cm. 115.33*0.6*0.4=27.68m3 Calculation per m3 of incorporated material.	m3	27.68		
7	Supply and laying of HDPE double layer corrugated drain pipe, with a diameter of 200mm on the bottom of the drainage trench. The pipes are perforated on the upper part, and they are supplied with all fittings and material for joining. Introduce the pipe into the shaft at the place of the pipe culvert. Calculation per m of laid pipe.	m	115.33		

No	WORKS DESCRIPTION	Unit	Quantity	Unit price USD	Total USD
8	Supply of material and construction of lining of the segmentation trench from crushed stone laid in MB15 concrete, with a total thickness of 25-30cm and width of ~100cm. The price includes the supply and construction of concrete base. Calculation per m of completed lining.	m	89.50		
9	Making of vegetative course with a thickness of 20cm on the slopes of the new embankment. Topsoiling is to be done by using active topsoil material which guarantees durability of the vegetation. $128.48+35.41*(30+21)/2=1031.44m^2$ Calculation per m2 of topsoiled surface.	m2	405.00		
TOTAL:					
III CONCRETE WORKS					
1	Construction of pipe culvert, Ø1000. The item includes the supply, laying and joining of Ø1000 pipes on a layer of concrete base according to the design, fully in accordance with the SRPS U.N1.054 standard. Outlet head is constructed according to the details given in the design, and in accordance with the SRPS U.S4.032 standard. The quality of pipes must comply with the SRPS U.N1.050 standard. Calculation per m of completed culvert.	m	20.00		
2	Construction of the RC manhole with frontal inlet from MB30 concrete, resistant to frost M100, in necessary formwork with mechanical compacting and according to the regulations for this kind of works and fully in accordance with the details in the design. Calculation per m3 of manhole concrete.	m3	3.56		
3	Supply, transportation and construction of RC trapezoidal drainage canal from MB30 concrete, resistant to frost M-100. Calculation per m of completed canal.	m	46.65		
4	Supply, transportation and installation of prefabricated elements with a tooth for draining water from the gutter, from MB30 concrete, resistant to frost M-100. Calculation per m of canal.	m	2.00		
TOTAL:					

No	WORKS DESCRIPTION	Unit	Quantity	Unit price USD	Total USD
IV OTHER WORKS					
1	Demolition of asphalt surfacing of the road in the section planned by the design for the replacement of the pipe culvert, i.e. along the edge of the front of material replacement. The item includes the following: demolition, loading and transportation of demolished material to a disposal determined by the Supervisor within 5km. Calculation per m ² of demolished road surface.	m2	208.00		
2	Supply, transportation and incorporation of lower bearing course of the pavement from crushed stone aggregate of 0/63mm of continuous granulometric composition, with a thickness of 25cm in compacted state. Calculation per m3 of incorporated material.	m2	162.89		
3	Supply, transportation and incorporation of lower bearing course of the pavement from crushed stone aggregate of 0/31mm of continuous granulometric composition, with a thickness of 25cm in compacted state. Calculation per m3 of incorporated material.	m2	162.89		
4	Supply, transportation and incorporation of the upper bitumenous base course from BNS22 (10cm thick). Calculation per m2 of completed course.	m2	162.89		
5	Supply, transportation and incorporation of wearing course of the road surface from AB11 asphalt with the thickness of 4cm in the part of the road section which is being remedied and fitting into the existing road surface. Calculation per m2 of completed course.	m2	162.89		
6	Construction of shoulders from crushed stone aggregate with the size of 0 - 31.5mm. 31.37*0.295=9.25m3 Calculation per m3 of incorporated material.	m3	9.25		
7	Construction of gutter from asphalt-concrete according to the SRPS U.S4.062 standard in the length of ~130m along the left edge of the road. The gutter is made from concrete curb 18/24 with concrete quality of MB30, resistance to frost of M100 on the base from compacted concrete MB15 and asphalt-concrete layer with the thickness of 10cm to the joint with the existing road surface. Calculation per m of constructed gutter.	m	130.00		
TOTAL:					

No	WORKS DESCRIPTION	Unit	Quantity	Unit price USD	Total USD
V TRAFFIC SIGNALIZATION AND ROAD FURNITURE					
1	Horizontal signalization				
	White unbroken line with the width of 0.12m	m2	28.80		
2	Road furniture				
	Guar rail N2W5	m	100.00		
	Oblique gurad rail endinngs N2W4 L=12m	pcs	2.00		
	Reflective studs (catadiopters)	pcs	10.00		
3	Temporary traffic signalization	lump sum	1.00		
TOTAL:					
SUMMARY:					
GROUP OF WORKS					TOTAL
I PRELIMINARY WORKS					
II EARTH WORKS					
III CONCRETE WORKS					
IV OTHER WORKS					
V TRAFFIC SIGNALIZATION AND ROAD FURNITURE					
TOTAL:					

PRICED BILL OF QUANTITIES - MONTAGE OF THE SIGNBOARDS

Scetch of signboard and method statement for montage
attached

No	DESCRIPTION	UoM	Quantity	Unit Price USD	TOTAL USD
I	PREPARATORY WORKS				
1	Mounting and dismanting of the metal pipe scaffold, fully according to standing regulations and PP measures. The scaffold shall be structurally stable, and properly grounded. Working platforms made of 5cm boards shall be placed at 2.00m of height. From the exterior, 5cm boards shall be placed vertically as guards. The scaffold shall be used throughout the montage of the signboard and untill concrete foundation reaches70% of its load bearing capacity.Same scaffold is to be used for mantage of all signboards. Calculated per m2 of vertical projection of the assembled scaffold.	m2	10.00		
	TOTAL				
II	EARTH WORKS				
	Manual excavation of 3rd category soil for signboard foundations. The excavation shall be executed and levelled according to the design and provided elevation points. The sides shall be clean and vertically cut and the bottom levelled. Excavated soil shall be wheelbarrowed, poured and the terrain levelled or loaded onto a lorry and transported to the town landfill. Calculated per m3 of soil, measured in autochthonous state.	m3	0.70		
	TOTAL				
III	CONCRETE WORKS				
	Manufacture of the unreinforced concrete foundation mark MB20;Hight of fuondation is 60cm and other two dimensions 90x40cm. Concrete should be poured over the gravel layer thickness 10cm The top surface shall be floated and the concrete shall be cured according the regulations. Unit price shall consider gravel layr and all necessary formwork Calculated per m3 of foundation.	m3	0.50		
	TOTAL				
IV	MONTAGE WORKS				
	Installation of steel plates for marking of donor.Table is rectangular in shape, dimensions and materialization according to the sketch , mounted on a steel substructure consisting of steel profiles 80x80x4mm , and metal sheet d = 1mm . The total height of the table is 3m, of which 80cm is anchored into the concrete, and the lower angle of table is at a height of 1.4m above ground level. Calculated per peace of installed signboard	kom	2.00		
	TOTAL				
	TOTAL MONTAGE OF SIGNBOARDS				

**TOTAL SUMMARY
FOR REMEDY OF TWO LANDSLIDES**

ON THE STATE ROAD OF IIA 143 AND IIA 170

In Valjevo and Bajina Bašta Municipalities

USD

I	27 Pricevici - Pecka, from km 16+905 to km 17+025, ID 3074	
II	28 Valjevo - Debelo Brdo - Rogacica - Bajina Basta, km 35+500, ID 3679	
iii	MONTAGE OF THE SIGNBOARDS	
	TOTAL	