# VOLUME 3

# TECHNICAL SPECIFICATIONS

**“RECONSTRUCTION OF ROADWAY AND SEWERAGE OF THE STREETS SUTJESKA AND STRUSHKA”**

Project: “BAIR – Bitola’s joint Action for the Inclusion of Roma”

Municipality of Bitola

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| **I - BILL OF QUANTITIES – ROADWAY STRUSHKA** | | | | | |
| **1. Reconstruction of the roadway on Strushka street, Part 1 L=168,2 m** | | | | | |
| **No.** | **Description of works** | **Unit** | **Quantity** | **Unit Price** | **Total** |
| 1 | Marking and securing the route. To be paid per 1.0 m of work performed. | m | 168,20 |  |  |
| 2 | Cutting of asphalt. To be paid per 1.0 m2 of work performed. | m2 | 20,00 |  |  |
| 3 | Machine extraction of a large stone cube in 10 m campaigns. by manually storing the cube on the pavement. To be paid per 1.0 m2 of work performed. | m2 | 660,40 |  |  |
| 4 | Breaking concrete pavements with loading and transport to a landfill at 10 km. To be paid per 1.0 m2 of work performed. | m2 | 183,00 |  |  |
| 5 | Mechanical excavation of land IV category with loading and transport in a landfill at 10 km. To be paid per 1.0 m3 of work performed, mechanically. | m3 | 204,99 |  |  |
| 6 | Mechanical breaking of rock category 5, with loading and transport of 10 km. To be paid per 1.0 m3 of work performed. | m3 | 22,78 |  |  |
| 7 | Planning and rolling of bedding with accuracy +/- 2.0 cm. To be paid per 1.0 m2 of work performed. | m2 | 761,32 |  |  |
| 8 | Purchasing, transport and installation of buffer material (crushed stone) for pavement D = 25cm and sidewalks D = 15cm. To be paid per 1.0 m3 of work performed. | m3 | 223,98 |  |  |
| 9 | Purchasing, transport and installation of concrete curbs 18/24 MB40 (according to detail). To be paid per 1.0 m of work performed. | m | 336,40 |  |  |
| 10 | Stacking of an existing large stone cube on a sand base 5 cm with manual loading and horizontal transport at a distance of 10 m and pouring - filling the joints with cement mortar (dry procedure). To be paid per 1.0 m2 of work performed. | m2 | 660,40 |  |  |
| 11 | Concreting of sidewalks cm D = 7 cm MB 20. To be paid per 1.0 m2 of work performed. | m2 | 392,46 |  |  |
| 12 | Making a set of gutter with a height of 1.0 m together with a gutter, connection PVC pipe and knee of 90 0, Ф200 mm (According to detail). To be paid per piece of work performed. | piece | 6,00 |  |  |
| 13 | Asphalting with BNHS 16-a and D = 10 cm. To be paid per 1.0 m2 of work performed. | m2 | 30,00 |  |  |
| **TOTAL WITHOUT VAT** | | | | |  |
| **2. Reconstruction of the roadway on Strushka street, Part 2, L=59,77m** | | | | | |
| **No.** | **Description of works** | **Unit** | **Quantity** | **Unit Price** | **Total** |
| 1 | Marking and securing the route. To be paid per 1.0 m of work performed. | m | 59,77 |  |  |
| 2 | Breaking concrete pavements with loading and transport to a landfill at 10 km. To be paid per 1.0 m2 of work performed. | m2 | 10,00 |  |  |
| 3 | Mechanical excavation of land IV category with loading and transport in a landfill at 10 km. To be paid per 1.0 m3 of work performed. | m3 | 20,45 |  |  |
| 4 | Mechanical breaking of rock category 5, with loading and transport of 10 km. To be paid per 1.0 m3 of work performed. | m3 | 3,61 |  |  |
| 5 | Planning and rolling of bedding with accuracy +/- 2.0 cm. To be paid per 1.0 m2 of work performed. | m2 | 163,86 |  |  |
| 6 | Purchasing, transport and installation of buffer material (crushed stone) for pedestrian path D = 15cm. To be paid per 1.0 m3 of work performed. | m3 | 24,58 |  |  |
| 7 | Purchasing, transport and installation of concrete curbs 8/15 MB40 (according to detail). To be paid per 1.0 m of work performed. | m | 119,54 |  |  |
| 8 | Purchasing, transport and stacking of behaton tiles (gray) with D = 6 cm on a sand base of 4-5 cm by sprinkling a small fraction-filler and compaction - leveling with compactor (frog). To be paid per 1.0 m2 of work performed. | m2 | 128,00 |  |  |
| 9 | Concreting of the sidewalk to existing buildings D = 7cm MB 20. To be paid per 1.0 m2 of work performed. | m2 | 9,00 |  |  |
| 10 | Making a set of gutter with a height of 1.0 m together with a gutter, connection PVC pipe and knee of 90 0, Ф200 mm (According to detail). To be paid per piece of work performed. | парче | 1,00 |  |  |
| 11 | Construction of an embankment from the ground to the required compaction (the ground is from the excavation). To be paid per 1.0 m3 of work performed. | m3 | 1,23 |  |  |
| **TOTAL WITHOUT VAT** | | | | |  |
| **3. Reconstruction of the roadway on Strushka street, Part 3, L=65,28 m** | | | | | |
| **No.** | **Description of works** | **Unit** | **Quantity** | **Unit Price** | **Total** |
| 1 | Marking and securing the route. To be paid per 1.0 m of work performed. | m | 65,28 |  |  |
| 2 | Breaking concrete pavements with loading and transport to a landfill at 10 km. To be paid per 1.0 m2 of work performed. | m2 | 0,00 |  |  |
| 3 | Mechanical excavation of land IV category with loading and transport in a landfill at 10 km. To be paid per 1.0 m3 of work performed. | m3 | 31,03 |  |  |
| 4 | Mechanical breaking of rock category 5, with loading and transport of 10 km. To be paid per 1.0 m3 of work performed. | m3 | 5,48 |  |  |
| 5 | Mechanical breaking of pieces of ordinary asphalt with loading and transport for 10 km. To be paid per 1.0 m2 of work performed. | m2 | 32,00 |  |  |
| 6 | Planning and rolling of bedding with accuracy +/- 2.0 cm. To be paid per 1.0 m2 of work performed. | m2 | 196,97 |  |  |
| 7 | Purchasing, transport and installation of buffer material (crushed stone) for pedestrian path D = 15cm. To be paid per 1.0 m3 of work performed. | m3 | 29,55 |  |  |
| 8 | Purchasing, transport and installation of concrete curbs 8/15 MB40 (according to detail). To be paid per 1.0 m of work performed. | m | 130,56 |  |  |
| 9 | Purchasing, transport and stacking of behaton tiles (gray) with D = 6 cm on a sand base of 4-5 cm by sprinkling a small fraction-filler and compaction - leveling with compactor (frog). To be paid per 1.0 m2 of work performed. | m2 | 157,80 |  |  |
| 10 | Concreting of the sidewalk to existing buildings D = 7cm MB 20. To be paid per 1.0 m2 of work performed. | m2 | 7,00 |  |  |
| 11 | Construction of an embankment from the ground to the required compaction (the ground is from the excavation). To be paid per 1.0 m3 of work performed. | m3 | 3,77 |  |  |
| **TOTAL WITHOUT VAT:** | | | | |  |
| **RECAPITULATIN** | | | | | |
| **Reconstruction of the roadway on Strushka street - Bitola** | | | | | |
| **No.** | **Description** | **Length** | | **Value** | |
| 1 | Part 1 | 168,20 | |  | |
| 2 | Part 2 | 59,77 | |  | |
| 3 | Part 3 | 65,28 | |  | |
|  | **TOTAL:** | **293,25** | |  | |

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| **II - BILL OF QUANTITIES – SEWERAGE STRUSHKA** | | | | | |
| **1. Reconstruction of the mixed sewerage on Struga Street, Part 1 L=179 m** | | | | | |
| **No.** | **Description of works** | **Unit** | **Quantity** | **Unit Price** | **Total** |
| 1 | Marking and securing the route. To be paid per 1.0 m of work performed. | m | 179,00 |  |  |
| 2 | Cutting of asphalt. To be paid per 1.0 m2 of work performed. | m2 | 20,00 |  |  |
| 3 | Breaking of asphalt with loading and transport in a landfill at 10 km. To be paid per 1.0 m2 of work performed. | m2 | 30,00 |  |  |
| 4 | Category III excavation for a channel trench up to 2.0 m deep including shaft extensions and trench securing. To be paid per 1.0 m3 of work performed, a total of 180.83 m3 |  |  |  |  |
| Mechanical | m3 | 144,66 |  |  |
| Manually | m3 | 36,17 |  |  |
| 5 | Category IV excavation for canal trench up to 2.0 m deep including shaft extensions and trench securing. To be paid per 1.0 m3 of work performed, a total of 51.02 m3 |  |  |  |  |
| Mechanical | m3 | 40,81 |  |  |
| Manually | m3 | 10,20 |  |  |
| 6 | Mechanical rock breaking 5th category. To be paid per 1.0 m3 of work performed. | m3 | 28,64 |  |  |
| 7 | Mechanical breaking of concrete (existing manholes), with excavation, loading and transport to the landfill at 10 km. To be paid per 1.0 m3 of work performed. | m3 | 6,32 |  |  |
| 8 | Fine planning of the bottom of the trench with a level accuracy of +/- 2.0 cm. To be paid per 1.0 m2 of work performed. | m2 | 143,20 |  |  |
| 9 | Purchasing, transport and spreading of fine sand in a layer of 10 cm along the bottom of the trench. To be paid per 1.0 m3 of work performed. | m3 | 14,32 |  |  |
| 10 | Procurement, transport and installation of high quality polypropylene sewer pipes resistant to abrasion (pipe profile is specified with outer diameter), type PPHM - SN 8, OD 315 / SN 8 | m | 179,00 |  |  |
| 11 | Manual soil filling with machine and manual compaction in layers of 20-30 cm (especially around the hose to ensure complete fitting on the circumference). To be paid per 1.0 m3 of work performed. | m3 | 29,18 |  |  |
| 12 | Mechanical filling of the trench with planning and compaction in layers of 20-30 cm complete with geomechanical compaction control. To be paid per 1.0 m3 of work performed. | m3 | 116,74 |  |  |
| 13 | Machine loading and transport of surplus land at a distance of 10.0 km. To be paid per 1.0 m3 of work performed. | m3 | 114,56 |  |  |
| 14 | Making a wedge for stabilization from crushed stone with a height of 40 cm. To be paid per 1.0 m3 of work performed. | m3 | 71,60 |  |  |
| 15 | Asphalting with BNHS 16 and d = 10 cm. To be paid per 1.0 m2 of work performed. | m2 | 30,00 |  |  |
| 16 | Construction of sewer monolithic / mounting shafts with F = 1000mm, set with climbers of 15 / 30cm and F18mm, kinetas, pipe inserts, AB additional plate D = 20 cm as well as AB walls with D = 20cm (with variable height), base from buffer D = 20 cm (according to detail).To be paid per 1.0 m of work performed. (together with the bottom plate). | m | 12,81 |  |  |
| Inlets f = 300 mm | piece | 14,00 |  |  |
| 17 | Procurement, transport and installation of sewer manhole covers with load class of D 400 and light opening DN 610. It is paid from a made piece. | piece | 7,00 |  |  |
| **TOTAL WITHOUT VAT** | | | | |  |
| **2. Reconstruction of the connections of the mixed sewerage on Struga Street L=150 m** | | | | | |
| **No.** | **Description of works** | **Unit** | **Quantity** | **Unit Price** | **Total** |
| 1 | Marking and securing the route. To be paid per 1.0 m of work performed. | m | 150,00 |  |  |
| 2 | Category III excavation for a channel trench up to 2.0 m deep including shaft extensions and trench securing. To be paid per 1.0 m3 of work performed, a total of 92,40 m3 |  |  |  |  |
| Mechanical | m3 | 73,92 |  |  |
| Manually | m3 | 18,48 |  |  |
| 3 | Category IV excavation for canal trench up to 2.0 m deep including shaft extensions and trench securing. To be paid per 1.0 m3 of work performed, a total of 26,40 m3 |  |  |  |  |
| Mechanical | m3 | 21,12 |  |  |
| Manually | m3 | 5,28 |  |  |
| 4 | Mechanical rock breaking 5th category. To be paid per 1.0 m3 of work performed. | m3 | 13,20 |  |  |
| 5 | Fine planning of the bottom of the trench with a level accuracy of +/- 2.0 cm. To be paid per 1.0 m2 of work performed. | m2 | 90,00 |  |  |
| 6 | Purchasing, transport and spreading of fine sand in a layer of 10 cm along the bottom of the trench. To be paid per 1.0 m3 of work performed. | m3 | 9,00 |  |  |
| 7 | Piercing an opening in a pipe. It is paid from a made piece. | piece | 35,00 |  |  |
| 8 | Procurement, transport and installation of polyethylene corrugated pipes (Profile of the pipe is specified with inner diameter), SN 8, ID 150 / SN 8. To be paid per 1.0 m of work performed. | m | 150,00 |  |  |
| 9 | Manual earth filling with machine and manual compaction in layers of 20-30 cm (especially around the hose to ensure complete fitting along the circumference). To be paid per 1.0 m3 of work performed. | m3 | 14,04 |  |  |
| 10 | Mechanical trench filling with planning and compaction in layers of 20-30 cm complete with geomechanical compaction control. To be paid per 1.0 m3 of work performed. | m3 | 56,16 |  |  |
| 11 | Machine loading and transport of surplus land at a distance of 2.0 km. To be paid per 1.0 m3 of work performed. | m3 | 61,80 |  |  |
| 12 | Making a wedge for stabilization from crushed stone. To be paid per 1.0 m3 of work performed. | m3 | 39,60 |  |  |
| 13 | Purchasing, transport and installation of PE knee 90 0. It is paid from a made piece | piece | 35,00 |  |  |
| 14 | Purchasing, transport and installation of a connection element with the main sewer pipe. It is made of a made piece. | piece | 35,00 |  |  |
| **TOTAL WITHOUT VAT** | | | | |  |
| **RECAPITULATIN** | | | | | |
| **Reconstruction of the mixed sewerage on Struga Street - Bitola** | | | | | |
| **No.** | **Description** | **Length** | | **Value** | |
| 1 | Part 1 | 179,00 | |  | |
| 2 | Connections to the part 1 | 150,00 | |  | |
|  | **TOTAL:** | **329,00** | |  | |

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| **III - BILL OF QUANTITIES – ROADWAY SUTJESKA** | | | | | |
| **Street Sutjeska km 0+000,00 to km 0+090,17** | | | | | |
| **No.** | **Description of works** | **Unit** | **Quantity** | **Unit Price** | **Total** |
| **1** | **PREPARATORY WORKS** | | | | |
| 1.1 | Marking and securing the route. | m | 90,17 |  |  |
| 1.2 | Transverse and longitudinal cutting of existing asphalt with thickness up to d = 10 cm. | m | 2,79 |  |  |
| **TOTAL 1 without VAT:** | | | | |  |
| **2** | **LOWER LAYER** | | | | |
| 2.1 | Machine excavation to the required elevation, on land category III, loading and transport to the landfill at a distance of up to 8 km. | m3 | 96,47 |  |  |
| 2.2 | Making - planning and rolling of bedding - planum on lower line (measured by situation). | m2 | 280,95 |  |  |
| 2.3 | Making soil embankments by machine compaction in layers of 20-30 cm with imported soil. | m3 | 3,06 |  |  |
| **TOTAL 2 without VAT:** | | | | |  |
| **3** | **UPPER LAYER** | | | | |
| 3.1 | Purchasing, transport and installation (spreading, planning and rolling to the required compaction) of a buffer layer of crusher d = 25 cm. | m3 | 76,24 |  |  |
| 3.2 | Production of bituminized load-bearing layer BNHS 16 d = 7cm with previous machine spraying of bituminous unstable emulsion of the buffer layer, with necessary compaction and rolling of the layer. | m2 | 243,95 |  |  |
| 3.3 | Purchasing, transport and installation of concrete pavement curb, with dimensions 20/24 MB30 together with concrete base MB20. | m | 185,00 |  |  |
| 3.4 | Raising or lowering the steel covers of existing sewer manholes to the level of the road construction. | piece | 1,00 |  |  |
| **TOTAL 3 without VAT:** | | | | |  |
| **4** | **DRAINAGE** | | | | |
| 4.1 | Purchasing, transport and installation of a set of street drawer F400. | piece | 3,00 |  |  |
| **TOTAL 4 without VAT:** | | | | |  |
| **RECAPITULATION** | | | | | |
|  | **CONSTRUCTION WORKS** | | | **Value** | |
| 1 | PREPARATORY WORKS | | |  | |
| 2 | LOWER LAYER | | |  | |
| 3 | UPPER LAYER | | |  | |
| 4 | DRAINAGE | | |  | |
|  | **TOTAL WITHOUT VAT:** | | |  | |

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| **IV - BILL OF QUANTITIES – SEWERAGE SUTJESKA** | | | | | |
| **Sewerage of Sutjeska street** | | | | | |
| **No.** | **Description of works** | **Unit** | **Quantity** | **Unit Price** | **Total** |
| **1** | **PREVIOUS WORKS** | | | | |
| 1.1 | Стаке мarking of the route of the canal trenches. | m | 112,00 |  |  |
| **TOAL 1 without VAT:** | | | | |  |
| **2** | **EARTHWORKS** | | | | |
| 2.1 | Excavation of earth category III and IV in a narrow volume for a trench for laying pipes with securing the trench - per table 0-2 m |  |  |  |  |
| Mechanical 80% | m3 | 161,78 |  |  |
| Manually 20% | m3 | 40,45 |  |  |
| 2.2 | Excavation of earth category III and IV in a narrow volume for a trench for laying pipes with securing the trench - per table 2-4 m |  |  |  |  |
| Mechanical 80% | m3 | 4,57 |  |  |
| Manually 20% | m3 | 1,14 |  |  |
| 2.3 | Plan the bottom of the trench with an accuracy of +/- 2 cm. | m2 | 119,20 |  |  |
| 2.4 | Purchasing, transport and laying of sand under, around the pipe and 30 cm above the upper edge above the pipe. |  |  |  |  |
| DN 300 mm | m3 | 77,76 |  |  |
| DN 200 mm | m3 | 0,80 |  |  |
| 2.5 | Making a buffer layer from a crushed stone. | m3 | 111,78 |  |  |
| 2.6 | Transport of materials by trucks, with machine loading and unloading at a distance of up to 10 km. | m3 | 207,94 |  |  |
| **TOTAL 2 without VAT:** | | | | |  |
| **3** | **CARPENTRY WORKS** | | | | |
| 3.1 | Submerging a trench under low and strong pressure in soil up to 2 m wide and 0-4 m deep. |  |  |  |  |
| 50% low pressure: 112,0\*2/2\*1.8\*0.4 | m2 | 80,64 |  |  |
| 50% strong pressure: 112,0\*2/2\*1.8\*0.4 | m2 | 80,64 |  |  |
| **TOTAL 3 without VAT:** | | | | |  |
| **4** | **INSTALLATION WORKS** | | | | |
| 4.1 | Purchasing, transport and installation of double-layer ribbed polypropylene pipe, type B, PPHM. Pipes to be made according to standard EN 134763. Material: PP-B copolymer. Color: black exterior, turquoise interior. The marking should be with permanently visible markings on the product itself, in accordance with the above standard. Pipes with rigidity SN8 according to EN 9969. Double-layer ribbed polypropylene pipe PPHM with inner diameter |  |  |  |  |
| DN/ID200 SN8 | m | 9,00 |  |  |
| DN/ID300 SN8 | m | 112,00 |  |  |
| 4.2 | Purchasing and installation of AB vibro-pressed audit shafts type DN 1000 with climbers |  |  |  |  |
| Е1 - Base -H 150mm | piece | 7,00 |  |  |
| Е2 - Straight part H 1000mm | piece | 9,00 |  |  |
| Е3 - Straight part H 500mm | piece | 5,00 |  |  |
| Е4 - cone H 600mm | piece | 7,00 |  |  |
| 4.3 | Purchasing, transport and installation of cast iron covers for audit shaft Ф600mm, with load capacity D400 in accordance with EN 124-2. | piece | 7,00 |  |  |
| 4.4 | Purchasing, transport and installation of street vertical gutters DN400mm. | piece | 3,00 |  |  |
| 4.5 | Purchasing, transport and installation of cast iron rectangular gutters 400 / 400mm, EN 124-2 D400 | piece | 3,00 |  |  |
| 4.6 | Hydraulic testing of the sewerage network, in accordance with МКС EN 1610: 2010 | m | 112,00 |  |  |
| 4.7 | Installation of signal strip - warning strip over the constructed sewer lines (Sewerage). | m | 112,00 |  |  |
| **TOTAL 4 without VAT:** | | | | |  |
| **RECAPITULATION** | | | | | |
|  | **SEWERAGE WORKS** | | | **Value** | |
| 1 | PREVIOUS WORKS | | |  | |
| 2 | EARTHWORKS | | |  | |
| 3 | CARPENTRY WORKS | | |  | |
| 4 | INSTALLATION WORKS | | |  | |
|  | **TOTAL WITHOUT VAT:** | | |  | |

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| **OVERAL RECAPITULATION** | | |
| **NO.** | **DESCRIPTION** | **VALUE** |
| **I** | **ROADWAY STRUSHKA** |  |
| **II** | **SEWERAGE STRUSHKA** |  |
| **III** | **ROADWAY SUTJESKA** |  |
| **IV** | **SEWERAGE SUTJESKA** |  |
|  | **TOTAL WITHOUT VAT:** |  |

**NOTE: PRICES SHOULD NOT INCLUDE VAT !**