

# MUNICIPALITY BITOLA

## INTERNATIONAL COMPETITIVE BIDDING

### Municipal Services Improvement Project

**“Construction of seven streets with sidewalks, water supply system, storm water system and street lightening in the former military area ARM1 and ARM2 in Municipality Bitola”**

**MSIP-ICB-018-15**

**Loan Agreement No. 8158 – MK**

**Municipality of Bitola**

**October 2015**



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## Standard Bidding Document

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**PART 1 – Bidding Procedures**



## Section 1 - Instructions to Bidders

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## Section I - Instructions to Bidders

### General

- 1. Scope of Bid**
- 1.1 In connection with the Invitation for Bids **specified in the Bid Data Sheet (BDS)**, the Employer, as **specified in the BDS**, issues these Bidding Documents for the procurement of the Works as specified in Section VII, Works Requirements. The name, identification, and number of lots (contracts) of this bidding are **specified in the BDS**.
- 1.2 Throughout this Bidding Document:
- (a) the term “in writing” means communicated in written form and delivered against receipt;
- (b) except where the context requires otherwise, words indicating the singular also include the plural and words indicating the plural also include the singular; and
- (c) “day” means calendar day.
- 2. Source of Funds**
- 2.1 The Borrower or Recipient (hereinafter called “Borrower”) **specified in the BDS** has received or has applied for financing (hereinafter called “funds”) from the International Bank for Reconstruction and Development or the International Development Association (hereinafter called “the Bank”) in an amount **specified in the BDS**, toward the project named **in the BDS**. The Borrower intends to apply a portion of the funds to eligible payments under the contract(s) for which these Bidding Documents are issued.
- 2.2 Payment by the Bank will be made only at the request of the Borrower and upon approval by the Bank, and will be subject, in all respects, to the terms and conditions of the Loan (or other financing) Agreement. The Loan (or other financing) Agreement prohibits a withdrawal from the Loan (or other financing) account for the purpose of any payment to persons or entities, or for any import of goods, if such payment or import, to the knowledge of the Bank, is prohibited by a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations. No party other than the Borrower shall derive any rights from the Loan (or other financing) Agreement or have any claim to the proceeds of the Loan (or other

financing).

**3. Corrupt and Fraudulent Practices**

3.1 The Bank requires compliance with its policy in regard to corrupt and fraudulent practices as set forth in Section VI.

3.2 In further pursuance of this policy, Bidders shall permit and shall cause its agents (whether declared or not), sub-contractors, sub-consultants, service providers, or suppliers and any personnel thereof, to permit the Bank to inspect all accounts, records and other documents relating to any prequalification process, bid submission, and contract performance (in the case of award), and to have them audited by auditors appointed by the Bank.

**4. Eligible Bidders**

4.1 A Bidder may be a firm that is a private entity, or a government-owned entity—subject to ITB 4.5—or any combination of them in the form of a joint venture (JV), under an existing agreement, or with the intent to enter into such an agreement supported by a letter of intent. In the case of a joint venture, all members shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms. The JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the members of the JV during the bidding process and, in the event the JV is awarded the Contract, during contract execution. **Unless specified in the BDS**, there is no limit on the number of members in a JV.

4.2 A Bidder shall not have a conflict of interest. All Bidders found to have a conflict of interest shall be disqualified. A Bidder may be considered to have a conflict of interest for the purpose of this bidding process, if the Bidder:

(a) directly or indirectly controls, is controlled by or is under common control with another Bidder; or

(b) receives or has received any direct or indirect subsidy from another Bidder; or

(c) has the same legal representative as another Bidder; or

(d) has a relationship with another Bidder, directly or through common third parties, that puts it in a position to influence the bid of another Bidder, or influence the decisions of the Employer regarding this bidding process; or

(e) participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all Bids in which such Bidder is involved. However, this does not limit the inclusion of the

- same subcontractor in more than one bid; or
- (f) or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the works that are the subject of the bid; or
  - (g) or any of its affiliates has been hired (or is proposed to be hired) by the Employer or Borrower as Engineer for the Contract implementation;
  - (h) would be providing goods, works, or non-consulting services resulting from or directly related to consulting services for the preparation or implementation of the project specified in the BDS ITB 2.1 that it provided or were provided by any affiliate that directly or indirectly controls, is controlled by, or is under common control with that firm;
  - (i) has a close business or family relationship with a professional staff of the Borrower (or of the project implementing agency, or of a recipient of a part of the loan) who: (i) are directly or indirectly involved in the preparation of the bidding documents or specifications of the contract, and/or the bid evaluation process of such contract; or (ii) would be involved in the implementation or supervision of such contract unless the conflict stemming from such relationship has been resolved in a manner acceptable to the Bank throughout the procurement process and execution of the contract.
- 4.3 A Bidder may have the nationality of any country, subject to the restrictions pursuant to ITB 4.7. A Bidder shall be deemed to have the nationality of a country if the Bidder is constituted, incorporated or registered in and operates in conformity with the provisions of the laws of that country, as evidenced by its articles of incorporation (or equivalent documents of constitution or association) and its registration documents, as the case may be. This criterion also shall apply to the determination of the nationality of proposed sub-contractors or sub-consultants for any part of the Contract including related Services.
- 4.4 A Bidder that has been sanctioned by the Bank in accordance with the above ITB 3.1, including in accordance with the Bank's Guidelines on Preventing and Combating Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants ("Anti-Corruption Guidelines"), shall be ineligible to be prequalified for, bid for, or be awarded a Bank-financed contract or benefit from a Bank-financed contract, financially or otherwise, during such period of time as the Bank shall have determined. The list of debarred firms and individuals is available at the electronic

address **specified in the BDS**.

- 4.5 Bidders that are Government-owned enterprises or institutions in the Employer's Country may participate only if they can establish that they (i) are legally and financially autonomous (ii) operate under commercial law, and (iii) are not dependent agencies of the Employer. To be eligible, a government-owned enterprise or institution shall establish to the Bank's satisfaction, through all relevant documents, including its Charter and other information the Bank may request, that it: (i) is a legal entity separate from the government (ii) does not currently receive substantial subsidies or budget support; (iii) operates like any commercial enterprise, and, inter alia, is not obliged to pass on its surplus to the government, can acquire rights and liabilities, borrow funds and be liable for repayment of its debts, and can be declared bankrupt; and (iv) is not bidding for a contract to be awarded by the department or agency of the government which under their applicable laws or regulations is the reporting or supervisory authority of the enterprise or has the ability to exercise influence or control over the enterprise or institution.
- 4.6 A Bidder shall not be under suspension from bidding by the Employer as the result of the operation of a Bid-Securing Declaration.
- 4.7 Firms and individuals may be ineligible if so indicated in Section V and (a) as a matter of law or official regulations, the Borrower's country prohibits commercial relations with that country, provided that the Bank is satisfied that such exclusion does not preclude effective competition for the supply of goods or the contracting of works or services required; or (b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Borrower's country prohibits any import of goods or contracting of works or services from that country, or any payments to any country, person, or entity in that country.
- 4.8 A Bidder shall provide such evidence of eligibility satisfactory to the Employer, as the Employer shall reasonably request.

- 5. Eligible Materials, Equipment and Services**
- 5.1 The materials, equipment and services to be supplied under the Contract and financed by the Bank may have their origin in any country subject to the restrictions specified in Section V, Eligible Countries, and all expenditures under the Contract will not contravene such restrictions. At the Employer's request, Bidders may be required to provide evidence of the origin of materials, equipment and services.

### **Contents of Bidding Document**

- 6. Sections of Bidding Document**
- 6.1 The Bidding Document consist of Parts 1, 2, and 3, which include all the Sections specified below, and which should be read in conjunction with any Addenda issued in accordance with ITB 8.

#### **PART 1 Bidding Procedures**

- Section I - Instructions to Bidders (ITB)
- Section II - Bid Data Sheet (BDS)
- Section III - Evaluation and Qualification Criteria
- Section IV - Bidding Forms
- Section V - Eligible Countries
- Section VI – Bank Policy-Corrupt and Fraudulent Practices

#### **PART 2 Works Requirements**

- Section VII - Works Requirements

#### **PART 3 Conditions of Contract and Contract Forms**

- Section VIII - General Conditions of Contract (GCC)
- Section IX - Particular Conditions of Contract (PCC)
- Section X - Contract Forms

- 6.2 The Invitation for Bids issued by the Employer is not part of the Bidding Document.
- 6.3 Unless obtained directly from the Employer, the Employer is not responsible for the completeness of the Bidding Documents, responses to requests for clarification, the minutes of the pre-Bid meeting (if any), or Addenda to the Bidding Documents in accordance with ITB 8. In case of any contradiction, documents obtained directly from the Employer shall prevail.
- 6.4 The Bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Documents and to furnish with its bid all information and documentation as is required by the Bidding Documents.

**7. Clarification of Bidding Document, Site Visit, Pre-Bid Meeting**

- 7.1 A Bidder requiring any clarification of the Bidding Document shall contact the Employer in writing at the Employer's address **specified in the BDS** or raise its inquiries during the pre-bid meeting if provided for in accordance with ITB 7.4. The Employer will respond in writing to any request for clarification, provided that such request is received prior to the deadline for submission of bids within a period **specified in the BDS**. The Employer shall forward copies of its response to all Bidders who have acquired the Bidding Documents in accordance with ITB 6.3, including a description of the inquiry but without identifying its source. **If so specified in the BDS**, the Employer shall also promptly publish its response at the web page identified in the BDS. Should the clarification result in changes to the essential elements of the Bidding Documents, the Employer shall amend the Bidding Documents following the procedure under ITB 8 and ITB 22.2.
- 7.2 The Bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense.
- 7.3 The Bidder and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and lands for the purpose of such visit, but only upon the express condition that the Bidder, its personnel, and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.
- 7.4 **If so specified in the BDS**, the Bidder's designated representative is invited to attend a pre-bid meeting. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.
- 7.5 The Bidder is requested, to submit any questions in writing, to reach the Employer not later than one week before the meeting.
- 7.6 Minutes of the pre-bid meeting, if applicable, including the text of the questions asked by Bidders, without identifying the source, and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the Bidding Documents in accordance with ITB 6.3. Any modification to the Bidding Documents that may become necessary as a result of the pre-bid meeting shall be

made by the Employer exclusively through the issue of an addendum pursuant to ITB 8 and not through the minutes of the pre-bid meeting. Nonattendance at the pre-bid meeting will not be a cause for disqualification of a Bidder.

**8. Amendment of Bidding Document**

- 8.1 At any time prior to the deadline for submission of bids, the Employer may amend the Bidding Documents by issuing addenda.
- 8.2 Any addendum issued shall be part of the Bidding Documents and shall be communicated in writing to all who have obtained the Bidding Document from the Employer in accordance with ITB 6.3. The Employer shall also promptly publish the addendum on the Employer's web page in accordance with ITB 7.1.
- 8.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may, at its discretion, extend the deadline for the submission of bids, pursuant to ITB 22.2.

**Preparation of Bids**

**9. Cost of Bidding**

- 9.1 The Bidder shall bear all costs associated with the preparation and submission of its Bid, and the Employer shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

**10. Language of Bid**

- 10.1 The Bid, as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Employer, shall be written in the language **specified in the BDS**. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language **specified in the BDS**, in which case, for purposes of interpretation of the Bid, such translation shall govern.

**11. Documents Comprising the Bid**

- 11.1 The Bid shall comprise the following:
- (a) Letter of Bid in accordance with ITB 12;
  - (b) completed Schedules, in accordance with ITB 12 and 14: **as specified in the BDS**;
  - (c) Bid Security or Bid Securing Declaration, in accordance with ITB 19.1;
  - (d) alternative bids, if permissible, in accordance with ITB 13;

- (e) written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 20.2;
- (f) documentary evidence in accordance with ITB 17 establishing the Bidder's qualifications to perform the contract if its Bid is accepted;
- (g) Technical Proposal in accordance with ITB 16; and
- (h) any other document **required in the BDS**.

11.2 In addition to the requirements under ITB 11.1, bids submitted by a JV shall include a copy of the Joint Venture Agreement entered into by all members. Alternatively, a letter of intent to execute a Joint Venture Agreement in the event of a successful bid shall be signed by all members and submitted with the bid, together with a copy of the proposed Agreement.

11.3 The Bidder shall furnish in the Letter of Bid information on commissions and gratuities, if any, paid or to be paid to agents or any other party relating to this Bid.

## 12. Letter of Bid and Schedules

12.1 The Letter of Bid and Schedules shall be prepared using the relevant forms furnished in Section IV, Bidding Forms. The forms must be completed without any alterations to the text, and no substitutes shall be accepted except as provided under ITB 20.2. All blank spaces shall be filled in with the information requested.

## 13. Alternative Bids

13.1 Unless otherwise **specified in the BDS**, alternative bids shall not be considered.

13.2 When alternative times for completion are explicitly invited, a statement to that effect will be **included in the BDS**, as will the method of evaluating different times for completion.

13.3 Except as provided under ITB 13.4 below, Bidders wishing to offer technical alternatives to the requirements of the Bidding Document must first price the Employer's design as described in the Bidding Document and shall further provide all information necessary for a complete evaluation of the alternative by the Employer, including drawings, design calculations, technical specifications, breakdown of prices, and proposed construction methodology and other relevant details. Only the technical alternatives, if any, of the lowest evaluated Bidder conforming to the basic technical requirements shall be considered by the Employer.



13.4 When **specified in the BDS**, Bidders are permitted to submit alternative technical solutions for specified parts of the Works. Such parts will be **identified in the BDS** and described in Section VII. Works Requirements. The method for their evaluation will be stipulated in Section III. Evaluation and Qualification Criteria.

#### **14. Bid Prices and Discounts**

14.1 The prices and discounts (including any price reduction) quoted by the Bidder in the Letter of Bid and in the Schedules shall conform to the requirements specified below.

14.2 The Bidder shall submit a bid for the whole of the works described in ITB 1.1 by filling in prices for all items of the Works, as identified in Section IV. Bidding Forms. In case of admeasurement contracts, the Bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by the Bidder will not be paid for by the Employer when executed and shall be deemed covered by the rates for other items and prices in the Bill of Quantities.

14.3 The price to be quoted in the Letter of Bid, in accordance with ITB 12.1, shall be the total price of the bid, excluding any discounts offered.

14.4 The Bidder shall quote any discounts and the methodology for their application in the Letter of Bid, in accordance with ITB 12.1.

14.5 **Unless otherwise provided in the BDS** and the Conditions of Contract, the prices quoted by the Bidder shall be fixed. If the prices quoted by the Bidder are subject to adjustment during the performance of the Contract in accordance with the provisions of the Conditions of Contract, the Bidder shall furnish the indices and weightings for the price adjustment formulae in the Schedule of Adjustment Data in Section IV- Bidding Forms and the Employer may require the Bidder to justify its proposed indices and weightings.

14.6 If so specified in ITB 1.1, bids are invited for individual lots (contracts) or for any combination of lots (packages). Bidders wishing to offer discounts for the award of more than one Contract shall specify in their bid the price reductions applicable to each package, or alternatively, to individual Contracts within the package. Discounts shall be submitted in accordance with ITB 14.4, provided the bids for all lots (contracts) are opened at the same time.

- 14.7 All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date 28 days prior to the deadline for submission of bids, shall be included in the rates and prices<sup>1</sup> and the total bid price submitted by the Bidder.
- 15. Currencies of Bid and Payment**
- 15.1 The currency(ies) of the bid and the currency(ies) of payments shall be as **specified in the BDS**.
- 15.2 Bidders may be required by the Employer to justify, to the Employer's satisfaction, their local and foreign currency requirements, and to substantiate that the amounts included in the unit rates and prices and shown in the Schedule of Adjustment Data are reasonable<sup>2</sup>, in which case a detailed breakdown of the foreign currency requirements shall be provided by Bidders.
- 16. Documents Comprising the Technical Proposal**
- 16.1 The Bidder shall furnish a Technical Proposal including a statement of work methods, equipment, personnel, schedule and any other information as stipulated in Section IV, Bidding Forms, in sufficient detail to demonstrate the adequacy of the Bidders' proposal to meet the work requirements and the completion time.
- 17. Documents Establishing the Qualifications of the Bidder**
- 17.1 In accordance with Section III, Evaluation and Qualification Criteria, to establish its qualifications to perform the Contract, the Bidder shall provide the information requested in the corresponding information sheets included in Section IV, Bidding Forms.
- 17.2 If a margin of preference applies as specified in accordance with ITB 33.1, domestic Bidders, individually or in joint ventures, applying for eligibility for domestic preference shall supply all information required to satisfy the criteria for eligibility specified in accordance with ITB 33.1.
- 18. Period of Validity of Bids**
- 18.1 Bids shall remain valid for the period **specified in the BDS** after the bid submission deadline date prescribed by the Employer in accordance with ITB 22.1. A bid valid for a shorter period shall be rejected by the Employer as nonresponsive.

<sup>1</sup> In lump sum contracts, delete "rates and prices and the."

<sup>2</sup> For lump sum contracts, delete "unit rates and prices and shown in the Schedule of Adjustment Data are reasonable" and replace with "Lump Sum."

- 18.2 In exceptional circumstances, prior to the expiration of the bid validity period, the Employer may request Bidders to extend the period of validity of their bids. The request and the responses shall be made in writing. If a bid security is requested in accordance with ITB 19, it shall also be extended for twenty-eight (28) days beyond the deadline of the extended validity period. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request shall not be required or permitted to modify its bid, except as provided in ITB 18.3.
- 18.3 If the award is delayed by a period exceeding fifty-six (56) days beyond the expiry of the initial bid validity, the Contract price shall be determined as follows:
- (a) In the case of fixed price contracts, the Contract price shall be the bid price adjusted by the factor **specified in the BDS**.
  - (b) In the case of adjustable price contracts, no adjustment shall be made.
  - (c) In any case, bid evaluation shall be based on the bid price without taking into consideration the applicable correction from those indicated above.

## 19. Bid Security

- 19.1 The Bidder shall furnish as part of its bid, either a Bid-Securing Declaration or a bid security **as specified in the BDS**, in original form and, in the case of a bid security, in the amount and currency **specified in the BDS**.
- 19.2 A Bid Securing Declaration shall use the form included in Section IV, Bidding Forms.
- 19.3 If a bid security is specified pursuant to ITB 19.1, the bid security shall be a demand guarantee in any of the following forms at the Bidder's option:
- (a) an unconditional guarantee issued by a bank or financial institution (such as an insurance, bonding or surety company);
  - (b) an irrevocable letter of credit;
  - (c) a cashier's or certified check; or
  - (d) another security **specified in the BDS**.

from a reputable source from an eligible country. If the unconditional guarantee is issued by a financial institution located outside the Employer's Country, the issuing financial

institution shall have a correspondent financial institution located in the Employer's Country to make it enforceable. In the case of a bank guarantee, the bid security shall be submitted either using the Bid Security Form included in Section IV, Bidding Forms, or in another substantially similar format approved by the Employer prior to bid submission. The bid security shall be valid for twenty-eight (28) days beyond the original validity period of the bid, or beyond any period of extension if requested under ITB 18.2.

19.4 If a bid security or Bid Securing Declaration is specified pursuant to ITB 19.1, any bid not accompanied by a substantially responsive bid security or Bid-Securing Declaration shall be rejected by the Employer as non responsive.

19.5 If a bid security is specified pursuant to ITB 19.1, the bid security of unsuccessful Bidders shall be returned as promptly as possible upon the successful Bidder's signing the Contract and furnishing the performance security pursuant to ITB 42.

19.6 The bid security of the successful Bidder shall be returned as promptly as possible once the successful Bidder has signed the Contract and furnished the required performance security.

19.7 The bid security may be forfeited or the Bid Securing Declaration executed:

(a) if a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Letter of Bid, , or any extension thereto provided by the Bidder; or

(b) if the successful Bidder fails to:

(i) sign the Contract in accordance with ITB 41; or

(ii) furnish a performance security in accordance with ITB 42.

19.8 The bid security or the Bid Securing Declaration of a JV shall be in the name of the JV that submits the bid. If the JV has not been constituted into a legally-enforceable JV, at the time of bidding, the Bid Security or the Bid Securing Declaration shall be in the names of all future members as named in the letter of intent mentioned in ITB 4.1 and ITB 11.2.

19.9 If a bid security is **not required in the BDS**, and

(a) if a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Letter of Bid, or

- (b) if the successful Bidder fails to: sign the Contract in accordance with ITB 41; or furnish a performance security in accordance with ITB 42;

the Borrower may, **if provided for in the BDS**, declare the Bidder ineligible to be awarded a contract by the Employer for a period of time **as stated in the BDS**.

## 20. Format and Signing of Bid

- 20.1 The Bidder shall prepare one original of the documents comprising the bid as described in ITB 11 and clearly mark it "ORIGINAL". Alternative bids, if permitted in accordance with ITB 13, shall be clearly marked "ALTERNATIVE". In addition, the Bidder shall submit copies of the bid in the number **specified in the BDS**, and clearly mark each of them "COPY." In the event of any discrepancy between the original and the copies, the original shall prevail.
- 20.2 The original and all copies of the bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as **specified in the BDS** and shall be attached to the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the bid where entries or amendments have been made shall be signed or initialed by the person signing the bid.
- 20.3 In case the Bidder is a JV, the Bid shall be signed by an authorized representative of the JV on behalf of the JV, and so as to be legally binding on all the members as evidenced by a power of attorney signed by their legally authorized representatives.
- 20.4 Any interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the bid.

### Submission and Opening of Bids

## 21. Sealing and Marking of Bids

- 21.1 The Bidder shall enclose the original and all copies of the bid, including alternative bids, if permitted in accordance with ITB 13, in separate sealed envelopes, duly marking the envelopes as "ORIGINAL", "ALTERNATIVE" and "COPY." These envelopes containing the original and the copies shall then be enclosed in one single envelope.
- 21.2 The inner and outer envelopes shall:
- (a) bear the name and address of the Bidder;

- (b) be addressed to the Employer as **provided in the BDS** pursuant to ITB 22.1;
  - (c) bear the specific identification of this bidding process specified in accordance with BDS 1.1; and
  - (d) bear a warning not to open before the time and date for bid opening.
- 21.3 If all envelopes are not sealed and marked as required, the Employer will assume no responsibility for the misplacement or premature opening of the bid.
- 22. Deadline for Submission of Bids**
- 22.1 Bids must be received by the Employer at the address and no later than the date and time **specified in the BDS**. When so **specified in the BDS**, bidders shall have the option of submitting their bids electronically. Bidders submitting bids electronically shall follow the electronic bid submission procedures **specified in the BDS**.
- 22.2 The Employer may, at its discretion, extend the deadline for the submission of bids by amending the Bidding Document in accordance with ITB 8, in which case all rights and obligations of the Employer and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.
- 23. Late Bids**
- 23.1 The Employer shall not consider any bid that arrives after the deadline for submission of bids, in accordance with ITB 22. Any bid received by the Employer after the deadline for submission of bids shall be declared late, rejected, and returned unopened to the Bidder.
- 24. Withdrawal, Substitution, and Modification of Bids**
- 24.1 A Bidder may withdraw, substitute, or modify its bid after it has been submitted by sending a written notice, duly signed by an authorized representative, and shall include a copy of the authorization in accordance with ITB 20.2, (except that withdrawal notices do not require copies). The corresponding substitution or modification of the bid must accompany the respective written notice. All notices must be:
- (a) prepared and submitted in accordance with ITB 20 and ITB 21 (except that withdrawal notices do not require copies), and in addition, the respective envelopes shall be clearly marked "WITHDRAWAL," "SUBSTITUTION," "MODIFICATION;" and
  - (b) received by the Employer prior to the deadline prescribed for submission of bids, in accordance with ITB 22.

24.2 Bids requested to be withdrawn in accordance with ITB 24.1 shall be returned unopened to the Bidders.

24.3 No bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Letter of Bid or any extension thereof.

## 25. Bid Opening

25.1 Except in the cases specified in ITB 23 and 24, the Employer shall publicly open and read out in accordance with ITB 25.3 all bids received by the deadline, at the date, time and place **specified in the BDS**, in the presence of Bidders' designated representatives and anyone who choose to attend. Any specific electronic bid opening procedures required if electronic bidding is permitted in accordance with ITB 22.1, shall be **as specified in the BDS**.

25.2 First, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelope with the corresponding bid shall not be opened, but returned to the Bidder. No bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at bid opening. Next, envelopes marked "SUBSTITUTION" shall be opened and read out and exchanged with the corresponding bid being substituted, and the substituted bid shall not be opened, but returned to the Bidder. No bid substitution shall be permitted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out at bid opening. Envelopes marked "MODIFICATION" shall be opened and read out with the corresponding bid. No bid modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out at bid opening. Only envelopes that are opened and read out at bid opening shall be considered further.

25.3 All other envelopes shall be opened one at a time, reading out: the name of the Bidder and whether there is a modification; the total Bid Price, per lot (contract) if applicable, including any discounts and alternative bids; the presence or absence of a bid security, or Bid Securing Declaration, if required; and any other details as the Employer may consider appropriate. Only discounts and alternative bids read out at bid opening shall be considered for evaluation. The Letter of Bid and the Bill of Quantities are to be initialed by representatives of the Employer attending bid opening in the manner **specified in the BDS**. The Employer shall neither discuss the merits of any bid nor reject any bid (except for late bids, in accordance with ITB 23.1).

25.4 The Employer shall prepare a record of the bid opening that shall include, as a minimum: the name of the Bidder and whether there is a withdrawal, substitution, or modification; the Bid Price, per lot (contract) if applicable, including any discounts and alternative bids; and the presence or absence of a bid security, if one was required. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders.

### **Evaluation and Comparison of Bids**

#### **26. Confidentiality**

26.1 Information relating to the evaluation of bids and recommendation of contract award, shall not be disclosed to Bidders or any other persons not officially concerned with the bidding process until information on Contract award is communicated to all Bidders in accordance with ITB 40.

26.2 Any attempt by a Bidder to influence the Employer in the evaluation of the bids or Contract award decisions may result in the rejection of its bid.

26.3 Notwithstanding ITB 26.2, from the time of bid opening to the time of Contract award, if a Bidder wishes to contact the Employer on any matter related to the bidding process, it shall do so in writing.

#### **27. Clarification of Bids**

27.1 To assist in the examination, evaluation, and comparison of the bids, and qualification of the Bidders, the Employer may, at its discretion, ask any Bidder for a clarification of its bid given a reasonable time for a response. Any clarification submitted by a Bidder that is not in response to a request by the Employer shall not be considered. The Employer's request for clarification and the response shall be in writing. No change, including any voluntary increase or decrease in the prices or substance of the bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the bids, in accordance with ITB 31.

27.2 If a Bidder does not provide clarifications of its bid by the date and time set in the Employer's request for clarification, its bid may be rejected.



- 28. Deviations, Reservations, and Omissions**
- 28.1 During the evaluation of bids, the following definitions apply:
- (a) “Deviation” is a departure from the requirements specified in the Bidding Document;
  - (b) “Reservation” is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Document; and
  - (c) “Omission” is the failure to submit part or all of the information or documentation required in the Bidding Document.
- 29. Determination of Responsiveness**
- 29.1 The Employer’s determination of a bid’s responsiveness is to be based on the contents of the bid itself, as defined in ITB11.
- 29.2 A substantially responsive bid is one that meets the requirements of the Bidding Document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that,
- (a) if accepted, would:
    - (i) affect in any substantial way the scope, quality, or performance of the Works specified in the Contract; or
    - (ii) limit in any substantial way, inconsistent with the Bidding Document, the Employer’s rights or the Bidder’s obligations under the proposed Contract; or
  - (b) if rectified, would unfairly affect the competitive position of other Bidders presenting substantially responsive bids.
- 29.3 The Employer shall examine the technical aspects of the bid submitted in accordance with ITB 16, Technical Proposal, in particular, to confirm that all requirements of Section VII (Works Requirements) have been met without any material deviation, reservation or omission.
- 29.4 If a bid is not substantially responsive to the requirements of the Bidding Document, it shall be rejected by the Employer and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.
- 30. Nonconformities, Errors, and Omissions**
- 30.1 Provided that a bid is substantially responsive, the Employer may waive any nonconformities in the bid.
- 30.2 Provided that a bid is substantially responsive, the Employer may request that the Bidder submit the necessary information or

documentation, within a reasonable period of time, to rectify nonmaterial nonconformities in the bid related to documentation requirements. Requesting information or documentation on such nonconformities shall not be related to any aspect of the price of the Bid. Failure of the Bidder to comply with the request may result in the rejection of its Bid.

30.3 Provided that a bid is substantially responsive, the Employer shall rectify quantifiable nonmaterial nonconformities related to the Bid Price. To this effect, the Bid Price may be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component. The adjustment shall be made using the methods specified in Section III (Evaluation and Qualification Criteria).

**31. Correction of  
Arithmetical  
Errors**

31.1 Provided that the bid is substantially responsive, the Employer shall correct arithmetical errors on the following basis:

- (a) only for admeasurement contracts, if there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected, unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected;
- (b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and
- (c) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a) and (b) above.

31.2 Bidders shall be requested to accept correction of arithmetical errors. Failure to accept the correction in accordance with ITB 31.1, shall result in the rejection of the Bid.

**32. Conversion to  
Single Currency**

32.1 For evaluation and comparison purposes, the currency(ies) of the Bid shall be converted into a single currency as **specified in the BDS**.

- 33. Margin of Preference** 33.1 **Unless otherwise specified in the BDS,** a margin of preference for domestic bidders<sup>3</sup> shall not apply.
- 34. Subcontractors** 34.1 Unless otherwise stated in the BDS, the Employer does not intend to execute any specific elements of the Works by sub-contractors selected in advance by the Employer.
- 34.2 The Employer may permit subcontracting for certain specialized works as indicated in Section III. When subcontracting is permitted by the Employer, the specialized sub-contractor's experience shall be considered for evaluation. Section III describes the qualification criteria for sub-contractors.
- 34.3 Bidders may propose subcontracting up to the percentage of total value of contracts or the volume of works as **specified in the BDS.**
- 35. Evaluation of Bids** 35.1 The Employer shall use the criteria and methodologies listed in this Clause. No other evaluation criteria or methodologies shall be permitted.
- 35.2 To evaluate a bid, the Employer shall consider the following:
- (a) the bid price, excluding Provisional Sums and the provision, if any, for contingencies in the Summary Bill of Quantities<sup>4</sup> for admeasurement contracts, but including Daywork<sup>5</sup> items, where priced competitively;
  - (b) price adjustment for correction of arithmetic errors in accordance with ITB 31.1;
  - (c) price adjustment due to discounts offered in accordance with ITB 14.4;
  - (d) converting the amount resulting from applying (a) to (c) above, if relevant, to a single currency in accordance with ITB 32;

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<sup>3</sup> An individual firm is considered a domestic bidder for purposes of the margin of preference if it is registered in the country of the Employer, has more than 50 percent ownership by nationals of the country of the Employer, and if it does not subcontract more than 10 percent of the contract price, excluding provisional sums, to foreign contractors. JVs are considered as domestic bidders and eligible for domestic preference only if the individual member firms are registered in the country of the Employer or have more than 50 percent ownership by nationals of the country of the Employer, and the JV shall be registered in the country of the Borrower. The JV shall not subcontract more than 10 percent of the contract price, excluding provisional sums, to foreign firms. JVs between foreign and national firms will not be eligible for domestic preference.

<sup>4</sup> In lump sum contracts, delete "Bill of Quantities" and replace with "Activity Schedule."

<sup>5</sup> Daywork is work carried out following instructions of the Project Manager and paid for on the basis of time spent by workers, and the use of materials and the Contractor's equipment, at the rates quoted in the Bid. For Daywork to be priced competitively for Bid evaluation purposes, the Employer must list tentative quantities for individual items to be costed against Daywork (e.g., a specific number of tractor driver staff-days, or a specific tonnage of Portland cement), to be multiplied by the bidders' quoted rates and included in the total Bid price.

- (e) price adjustment for nonconformities in accordance with ITB 30.3;
  - (f) the additional evaluation factors are specified in Section III (Evaluation and Qualification Criteria);
- 35.3 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in bid evaluation.
- 35.4 If this Bidding Document allows Bidders to quote separate prices for different lots (contracts), the methodology to determine the lowest evaluated price of the contract combinations, including any discounts offered in the Letter of Bid, is specified in Section III. Evaluation and Qualification Criteria.
- 35.5 If the bid for an admeasurement contract, which results in the lowest Evaluated Bid Price, is seriously unbalanced or, front loaded in the opinion of the Employer, the Employer may require the Bidder to produce detailed price analyses for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, taking into consideration the schedule of estimated Contract payments, the Employer may require that the amount of the performance security be increased at the expense of the Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract.
- 36. Comparison of Bids**
- 36.1 The Employer shall compare the evaluated prices of all substantially responsive bids established in accordance with ITB 35.2 to determine the lowest evaluated bid.
- 37. Qualification of the Bidder**
- 37.1 The Employer shall determine to its satisfaction whether the Bidder that is selected as having submitted the lowest evaluated and substantially responsive bid meets the qualifying criteria specified in Section III. Evaluation and Qualification Criteria.
- 37.2 The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to ITB 17.1.
- 37.3 An affirmative determination of qualification shall be a prerequisite for award of the Contract to the Bidder. A negative determination shall result in disqualification of the bid, in which event the Employer shall proceed to the next lowest evaluated bid to make a similar determination of that Bidder's qualifications to perform satisfactorily.

- 38. Employer's Right to Accept Any Bid, and to Reject Any or All Bids** 38.1 The Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to contract award, without thereby incurring any liability to Bidders. In case of annulment, all bids submitted and specifically, bid securities, shall be promptly returned to the Bidders.

### **Award of Contract**

- 39. Award Criteria** 39.1 Subject to ITB 37.1, the Employer shall award the Contract to the Bidder whose bid has been determined to be the lowest evaluated bid and is substantially responsive to the Bidding Document, provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily.

- 40. Notification of Award** 40.1 Prior to the expiration of the period of bid validity, the Employer shall notify the successful Bidder, in writing, via the Letter of Acceptance included in the Contract Forms, that its bid has been accepted. At the same time, the Employer shall also notify all other Bidders of the results of the bidding, and shall publish in UNDB online the results identifying the bid and lot (contract) numbers and the following information:

- (i) name of each Bidder who submitted a Bid;
- (ii) bid prices as read out at Bid Opening;
- (iii) name and evaluated prices of each Bid that was evaluated;
- (iv) name of bidders whose bids were rejected and the reasons for their rejection; and
- (v) name of the winning Bidder, and the Price it offered, as well as the duration and summary scope of the contract awarded.

40.2 Until a formal contract is prepared and executed, the notification of award shall constitute a binding Contract.

40.3 The Employer shall promptly respond in writing to any unsuccessful Bidder who, after notification of award in accordance with ITB 40.1, requests in writing the grounds on which its bid was not selected.

- 41. Signing of Contract**
- 41.1 Promptly upon notification, the Employer shall send the successful Bidder the Contract Agreement.
- 41.2 Within twenty-eight (28) days of receipt of the Contract Agreement, the successful Bidder shall sign, date, and return it to the Employer.
- 42. Performance Security**
- 42.1 Within twenty-eight (28) days of the receipt of notification of award from the Employer, the successful Bidder shall furnish the performance security in accordance with the conditions of contract, subject to ITB 35.5, using for that purpose the Performance Security Form included in Section X. Contract Forms, or another form acceptable to the Employer. If the performance security furnished by the successful Bidder is in the form of a bond, it shall be issued by a bonding or insurance company that has been determined by the successful Bidder to be acceptable to the Employer. A foreign institution providing a bond shall have a correspondent financial institution located in the Employer's Country.
- 42.2 Failure of the successful Bidder to submit the above-mentioned Performance Security or to sign the Contract Agreement shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security. In that event the Employer may award the Contract to the next lowest evaluated Bidder whose offer is substantially responsive and is determined by the Employer to be qualified to perform the Contract satisfactorily.
- 43. Adjudicator**
- 43.1 The Employer proposes the person **named in the BDS** to be appointed as Adjudicator under the Contract, at the hourly fee **specified in the BDS**, plus reimbursable expenses. If the Bidder disagrees with this proposal, the Bidder should so state in his Bid. If, in the Letter of Acceptance, the Employer does not agree on the appointment of the Adjudicator, the Employer will request the Appointing Authority designated in the Particular Conditions of Contract (PCC) pursuant to Clause 23.1 of the General Conditions of Contract (GCC), to appoint the Adjudicator.

## Section II - Bid Data Sheet (BDS)

### A. Introduction

<b>ITB 1.1</b>	The number of the Invitation for Bids is : MSIP-ICB-018-15 The Employer is Municipality of Bitola.
<b>ITB 1.1</b>	The name of the bidding process is: Construction of seven streets with sidewalks, water supply system, storm water system and street lightening in the former military area ARM1 and ARM2 in Municipality Bitola”. The identification number of the bidding process is: MSIP-ICB-018-15
<b>ITB 2.1</b>	The Borrower is: Republic of Macedonia-Ministry of Finance
<b>ITB 2.1</b>	The name of the Project is: Municipal Services Improvement Project (MSIP).
<b>ITB 2.1</b>	Loan or Financing Agreement amount: 50,000,000.00 US Dollars
<b>ITB 4.1</b>	Maximum number of members in the JV shall be: 3 The individuals or firms in a JV shall be jointly and severally liable.
<b>ITB 4.4</b>	A list of debarred firms and individuals is available on the Bank’s external website: <a href="http://www.worldbank.org/debarr">http://www.worldbank.org/debarr</a> .

### B. Bidding Documents

<b>ITB 7.1</b>	<p>For <b><u>clarification purposes</u></b> only, the Employer’s address is:</p> <p>Attn: Aleksandar Najdovski  Ministry of Finance of the Republic of Macedonia,  MSIP PMU  Dame Gruev 12, bb  City: Skopje  ZIP code: 1000  Country: Republic of Macedonia  Telephone: +389 2 3255 730 / +389 75 317 670</p> <p>e-mail address: <a href="mailto:aleksandar.najdovski@finance.gov.mk">aleksandar.najdovski@finance.gov.mk</a></p> <p>Requests for clarification should be received by the Employer no later than: <b><i>14 days before bid opening date.</i></b></p>
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<b>ITB 7.1</b>	Web page: <a href="http://finance.gov.mk/mk/node/1056">http://finance.gov.mk/mk/node/1056</a>
<b>ITB 7.4</b>	A Pre-Bid meeting shall not take place.

### C. Preparation of Bids

<b>ITB 10.1</b>	The language of the bid is: English.
<b>ITB 11.1 (b)</b>	The following schedules shall be submitted with the bid:  Bidder must complete all Bill of Quantities and Price schedules attached to the letter of bid for Construction of seven streets with sidewalks, water supply system, storm water system and street lightening in the former military area ARM1 and ARM2 in Municipality Bitola” including details of local and foreign currency requirement as provided from pages 55 to 154.
<b>ITB 11.1 (h)</b>	The Bidder shall submit with its bid the following additional documents: N/A
<b>ITB 13.1</b>	Alternative bids shall not be permitted.
<b>ITB 13.2</b>	Alternative times for completion shall not be permitted.
<b>ITB 13.4</b>	Alternative technical solutions shall be permitted for the following parts of the Works: N/A  If alternative technical solutions are permitted, the evaluation method will be as specified in Section III (Evaluation and Qualification Criteria).
<b>ITB 14.5</b>	The prices quoted by the Bidder shall not be subject to adjustment during the performance of the Contract.
<b>ITB 15.1</b>	The prices shall be quoted by the bidder in: Macedonian Denars. A Bidder expecting to incur expenditures in other currencies for inputs to the Works supplied from outside the Employer’s country (referred to as the “foreign currency requirements”) and wishing to be paid accordingly, shall indicate up to three foreign currencies of their choice expressed as a percentage of the bid price, together with the exchange rates used in the calculations in the appropriate form(s) included in Section IV (Bidding Forms).



<b>ITB 18.1</b>	The bid validity period shall be: 120 days.
<b>ITB 18.3(a)</b>	N/A
<b>ITB 19.1</b>	<p>Bid shall include a Bid Security issued by a bank included in Section X Security Forms. The Bid Security shall be a Bank Guarantee.</p> <p>A Bid Security shall be required, the amount and currency of the bid security shall be: 50,000.00 EUR.</p>
<b>ITB 20.1</b>	In addition to the original of the bid, the number of copies is: 3
<b>ITB 20.2</b>	<p>The written confirmation of authorization to sign on behalf of the Bidder shall indicate</p> <p style="padding-left: 40px;">The name and description of the documentation required to demonstrate the authority of the signatory to sign the Bid such as a Power of Attorney; and</p> <p style="padding-left: 40px;">In the case of Bids submitted by an existing or intended JV an undertaking signed by all parties (i) stating that all parties shall be jointly and severally liable, if so required in accordance with ITB 4.1(a), and (ii) nominating a Representative who shall have the authority to conduct all business for and on behalf of any and all the parties of the JV during the bidding process and, in the event the JV is awarded the Contract, during contract execution.”</p>

### D. Submission and Opening of Bids

<b>ITB 22.1</b>	Bidders shall not have the option of submitting their bids electronically.
<b>ITB 22.1 (b)</b>	If bidders shall have the option of submitting their bids electronically, the electronic bidding submission procedures shall be: N/A
<b>ITB 22.1</b>	For <b><u>bid submission purposes</u></b> only, the Employer's address is: Municipality of Bitola, Department for Public Procurement Address: Boulevard 1 <sup>st</sup> of May No.61 Bitola Floor-Room number: 319 and 320 City, ZIP Code: 7 000 Country: Republic of Macedonia The deadline for bid submission is: <b>The deadline for bid submission is:</b> Date: 15.12.2015 Time: 12:00 pm
<b>ITB 25.1</b>	The bid opening shall take place at: Municipality of Bitola Address: Boulevard 1 <sup>st</sup> of May No.61 Bitola Floor-Room 3st floor / Conference Hall City, ZIP Code: 7 000 Country: Republic of Macedonia Date: 15.12.2015 Time: 12:00 pm
<b>ITB 25.3</b>	The Letter of Bid and Priced Bill of Quantities shall be initialed by 3 representatives of the Employer conducting Bid opening.

### E. Evaluation and Comparison of Bids

<b>ITB 32.1</b>	The currency that shall be used for bid evaluation and comparison purposes to convert all bid prices expressed in various currencies into a single currency is: Macedonian Denar.  The source of exchange rate shall be: National Bank of Republic of Macedonia  The date for the exchange rate shall be: 28 days prior to the deadline for submission of bids
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ITB 33.1	A margin of preference shall not apply.
ITB 34.1	N/A
ITB 34.3	<p>Contractor's proposed subcontracting: Maximum percentage of subcontracting permitted is: 50% of the total contract amount or 50% of the volume of work.</p> <p>b) Bidders planning to subcontract more than 10% of total volume of work shall specify, in the Letter of Bid, the activity(ies) or parts of the works to be subcontracted along with complete details of the sub-contractors and their qualification and experience. The qualification and experience of the sub-contractors must meet the minimum criteria for the relevant work to be sub-contracted failing which such sub-contractors will not be permitted to participate.</p> <p>c) Sub-contractors' qualification and experience will not be considered for evaluation of the Bidder. The Bidder on its own (without taking into account the qualification and experience of the sub-contractor) should meet the qualification criteria.</p>

#### F. Award of Contract

ITB 43.1	<p>The Adjudicator proposed by the Employer is <b>Ljubiša auševski</b> .</p> <p>The hourly fee for this proposed Adjudicator shall be: 1,500.00 MKD per hour.</p> <p>The biographical data of the proposed Adjudicator is as follows:</p> <p>Professional experience record (projects):</p> <p style="text-align: center;"><b>Curriculum vitae</b></p> <p><b>Proposed role in the project:</b></p> <ol style="list-style-type: none"> <li>1. <b>Family name:</b> auševski</li> <li>2. <b>First names:</b> Ljubiša</li> <li>3. <b>Date of birth:</b> 01.10.1965</li> <li>4. <b>Nationality:</b> Macedonian</li> <li>5. <b>Civil status:</b> married, 2 child</li> <li>6. <b>Education:</b></li> </ol>
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Institution [ Date from - Date to ]	Degree(s) or Diploma(s) obtained:	Copy attached (Yes/No)
Faculty of Civil Engineering– ST CYRIL AND METHODIUS University – Skopje 1984 - 1991	B.Sc.-Diploma 1991	Yes

7. **Language skills:** Indicate competence on a scale of 1 to 5 (**5 - excellent; 1 - basic**)

Language	Reading	Speaking	Writing
Macedonian	5	5	5
English	5	5	5
Serbian/Croatian	5	5	5
Ukrainian	4	4	4
Bulgarian	3	3	3
German	3	3	3
Italian	3	3	3

8. **Membership of professional bodies:** Macedonian Association of Construction Engineers

9. **Other skills:** (e.g. Computer literacy, etc.) Experienced user of MS Office, Acad, Internet and Databases

10. **Present position:** Manager, Monting Engineering Bitola in Macedonia

11. **Years within the firm:** 20

12. **Key qualifications:**(Relevant to the project)

13. **Specific experience in the region**

Country	Date from - Date to
Germany	1992-1995
Macedonia	1995 - 1999
Albania	1999-2000
Macedonia	2000-2005
Ukraina	2005-2007
Macedonia	2007 - 2008
Qatar	2008 - 2009
Macedonia	2009 – 2010
Albania	2010-2012
Macedonia	2012-2015

14. **Professional experience**

Date from - Date to	Location	Company	Position	Description
March 1995 - May 1996	Bitola, Macedonia	GD Granit AD Skopje 01 Bitola	Head of construction, Assistant to Project Manager	Construction of Border Terminal, Bitola, Macedonia
May 1996 - May 1997	Resen, Macedonia	GD Granit AD Skopje 01 Bitola	Head of construction	Total Reconstruction of the Post Office in Resen
May 1997- September 1997	Resen, Macedonia	GD Granit AD Skopje 01 Bitola	Head of construction	Construction of swimming pool in Krani
September 1997- - May 1999	Bitola, Macedonia	GD Granit AD Skopje 01 Bitola	Project Manager	Construction of Centre Mlin Stojcev Bitola
September 1999- September 2000	Korcha, Albania	GD Granit AD Skopje Albania	Head of technical department	Reconstruction of highway Korcha - Kapchtica, Albania
2001- 2003	Resen, Macedonia	GD Granit AD Skopje 01 Bitola DE Resen	Project Manager	Construction of the roads and buildings, Resen, Macedonia
March 2003 - August 2005	Bitola, Macedonia	GD Granit AD Skopje 01 Bitola	Project Manager	Construction of factory for milk production - Mlekara Bitola
October 2005 - July 2007	Lviv, Ukraine	DP Granit Ukraina	Head of technical department	Reconstruction of highway Kiev-Chop Contract 2, km 533+000 - km 621+500, Ukraine
July 2007 - May 2008	Macedonia	GD Granit AD Skopje 01 Bitola	Project Manager	Construction of the roads and buildings, Bitola, Macedonia
May 2008- May 2009	Doha, Qatar	Konstruktor Engineering Split	Deputy Project Manager	Construction of Industrial Interchange Doha , Qatar
May 2009- September 2009	Macedonia	Konstruktor Macedonia	Project Manager	Construction of regional roads , Construction of memorial house Tose Proeski - Krusevo, Reconstruction of House ARM Ohrid ,

September 2009 – March 2014	Macedonia	Meteorit Bitola	Technical Director	<p>Construction and production of steel construction Bitola, Macedonia</p> <p>Major projects</p> <ul style="list-style-type: none"> <li>• Steel structure, tanks and working platforms Oil Refinery Mlin Stojchev – Bitola</li> <li>• Steel construction for solar panels</li> <li>• Steel construction for production facility SOCOTAB – Bitola</li> <li>• Steel containers and metal racks for tobacco storing SOCOTAB – Bitola</li> <li>• Bridges Ferassi and Vjosa in R.Albanija</li> </ul> <p>Bridge FERASSI length 385m and quantity (3.100t)</p> <p>Bridge VJOSA length 130m and quantity (1.100t)</p> <ul style="list-style-type: none"> <li>• Construction of Steel Bridges in uprija - R.Srbija (2.500 t)</li> <li>• Rehabilitation of units nos. 1-3 at Thermal Power Plant Bitola,Macedonia; Babcock Borsig Steinmuller GmbH,Oberhausen</li> </ul>
March 2014-now	Macedonia	MONTING Engineering Bitola	Manager	<p>Construction and production of steel construction Bitola, Macedonia</p> <p>Major projects</p> <ul style="list-style-type: none"> <li>• Construction of Replacement Roads and Bridges - Banja - Section 3A in R.Albania (3.500t)</li> <li>• Steel construction for production facility - Milk factory IMB Bitola</li> <li>• Steel construction for production facility - Milk factory IMV-Velkovski Bitola</li> <li>• Rehabilitation of units nos. 1-3 at Thermal Power Plant Bitola,Macedonia; Babcock Borsig Steinmuller GmbH,Oberhausen</li> <li>• Factory Agroinvest Prilep</li> </ul>

### **Section III - Evaluation and Qualification Criteria**

This section contains all the criteria that the Employer shall use to evaluate bids and qualify Bidders if the bidding was not preceded by a prequalification exercise and postqualification is applied. In accordance with ITB 35 and ITB 37, no other methods, criteria and factors shall be used. The Bidder shall provide all the information requested in the forms included in Section 4 (Bidding Forms).

Wherever a Bidder is required to state a monetary amount, Bidders should indicate the EUR equivalent using the rate of exchange determined as follows:

- -For construction turnover or financial data required for each year - Exchange rate prevailing on the last day of the respective calendar year (in which the amounts for that year is to be converted) was originally established.
- -Value of single contract - Exchange rate prevailing on the date of the contract.

Exchange rates shall be taken from the publicly available source identified in the ITB 32.1. Any error in determining the exchange rates in the Bid may be corrected by the Employer

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**1. Margin of Preference: N/A**

**2. Evaluation**

In addition to the criteria listed in ITB 35.2 (a) – (e) the following criteria shall apply:

**2.1 Adequacy of Technical Proposal**

Evaluation of the Bidder's Technical Proposal will include an assessment of the Bidder's technical capacity to mobilize key equipment and personnel for the contract consistent with its proposal regarding work methods, scheduling, and material sourcing in sufficient detail and fully in accordance with the requirements stipulated in Section VII (Works Requirements).

**2.2 Multiple Contracts**

Pursuant to Sub-Clause 35.4 of the Instructions to Bidders, if Works are grouped in multiple contracts, evaluation will be as follows: N/A

**2.3 Alternative Completion Times**

An alternative Completion Time, if permitted under ITB 13.2, will be evaluated as follows: N/A

**2.4 Technical Alternatives**

Technical alternatives, if permitted under ITB 13.4, will be evaluated as follows: N/A

**2.5 Specialized Subcontractors**

Only the specific experience of sub-contractors for specialized works permitted by the Employer will be considered. The general experience and financial resources of the specialized sub-contractors shall not be added to those of the Bidder for purposes of qualification of the Bidder.

The specialized sub-contractors proposed shall be fully qualified for their work proposed, and meet the following criteria: N/A

### 3. Qualification

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All Parties Combined	Each Member	One Member	
<b>1. Eligibility</b>							
1.1	<b>Nationality</b>	Nationality in accordance with ITB 4.3	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Forms ELI – 1.1 and 1.2, with attachments
1.2	<b>Conflict of Interest</b>	No conflicts of interest in accordance with ITB 4.2	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Letter of Bid
1.3	<b>Bank Eligibility</b>	Not having been declared ineligible by the Bank, as described in ITB 4.4, 4.5, 4.6 and 4.7	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Letter of Bid
1.4	<b>Government Owned Entity of the Borrower country</b>	Meets conditions of ITB 4.5	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Forms ELI – 1.1 and 1.2, with attachments
1.5	<b>United Nations resolution or Borrower's country law</b>	Not having been excluded as a result of prohibition in the Borrower's country laws or official regulations against commercial relations with the Bidder's	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Forms ELI – 1.1 and 1.2, with attachments

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All Parties Combined	Each Member	One Member	
		country, or by an act of compliance with UN Security Council resolution, both in accordance with ITB 4.7 and Section V.					
<b>2. Historical Contract Non-Performance</b>							
2.1	<b>History of Non-Performing Contracts</b>	Non-performance of a contract <sup>6</sup> did not occur as a result of contractor default since 1 <sup>st</sup> January 2010	Must meet requirement <sup>12</sup>	Must meet requirements	Must meet requirement <sup>8</sup>	N/A	Form CON-2
2.2	<b>Suspension Based on Execution of Bid Securing Declaration by the Employer or withdrawal of the Bid within Bid validity</b>	Not under suspension based on execution of a Bid Securing Declaration pursuant to ITB 4.6 or withdrawal of the Bid pursuant ITB 19.9.	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Bid Submission Form
2.3	<b>Pending Litigation</b>	Bidder's financial	Must meet	N/A	Must meet	N/A	Form CON – 2

<sup>6</sup> Non performance, as decided by the Employer, shall include all contracts where (a) non performance was not challenged by the contractor, including through referral to the dispute resolution mechanism under the respective contract, and (b) contracts that were so challenged but fully settled against the contractor. Non performance shall not include contracts where Employers decision was overruled by the dispute resolution mechanism. Non performance must be based on all information on fully settled disputes or litigation, i.e. dispute or litigation that has been resolved in accordance with the dispute resolution mechanism under the respective contract and where all appeal instances available to the Bidder have been exhausted.

<sup>8</sup> This requirement also applies to contracts executed by the Bidder as JV member.

<b>Eligibility and Qualification Criteria</b>			<b>Compliance Requirements</b>			<b>Documentation</b>	
<b>No.</b>	<b>Subject</b>	<b>Requirement</b>	<b>Single Entity</b>	<b>Joint Venture (existing or intended)</b>			<b>Submission Requirements</b>
				<b>All Parties Combined</b>	<b>Each Member</b>	<b>One Member</b>	
		position and prospective long term profitability sound according to criteria established in 3.1 below and assuming that all pending litigation will be resolved against the Bidder	requirement		requirement		

<b>Eligibility and Qualification Criteria</b>			<b>Compliance Requirements</b>			<b>Documentation</b>	
<b>No.</b>	<b>Subject</b>	<b>Requirement</b>	<b>Single Entity</b>	<b>Joint Venture (existing or intended)</b>			<b>Submission Requirements</b>
				<b>All Parties Combined</b>	<b>Each Member</b>	<b>One Member</b>	
2.4	<b>Litigation History</b>	No consistent history of court/arbitral award decisions against the Bidder <sup>7</sup> since 1 <sup>st</sup> January 2010	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Form CON – 2

<sup>7</sup> The Bidder shall provide accurate information on the letter of Bid about any litigation or arbitration resulting from contracts completed or ongoing under its execution over the last five years. A consistent history of court/arbitral awards against the Bidder or any member of a joint venture may result in disqualifying the Bidder.

<b>Eligibility and Qualification Criteria</b>			<b>Compliance Requirements</b>			<b>Documentation</b>	
<b>No.</b>	<b>Subject</b>	<b>Requirement</b>	<b>Single Entity</b>	<b>Joint Venture (existing or intended)</b>			<b>Submission Requirements</b>
				<b>All Parties Combined</b>	<b>Each Member</b>	<b>One Member</b>	
<b>3. Financial Situation and Performance</b>							
3.1	<b>Financial Capabilities</b>	(i) The Bidder shall demonstrate that it has access to, or has available, liquid assets, unencumbered real assets, lines of credit, and other financial means (independent of any contractual advance payment) sufficient to meet the construction cash flow requirements estimated as 850,000,00 UR for the subject contract(s) net of the Bidders other commitments (ii) The Bidders shall also demonstrate, to the satisfaction of the Employer, that it has adequate sources of finance to meet the	Must meet requirement	Must meet Requirement	N/A	N/A	Form FIN – 3.1, with attachments
			Must meet requirement	Must meet requirement	N/A	N/A	

Eligibility and Qualification Criteria			Compliance Requirements				Documentation
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All Parties Combined	Each Member	One Member	
		cash flow requirements on works currently in progress and for future contract commitments. (iii) The audited balance sheets or, if not required by the laws of the Bidder's country, other financial statements acceptable to the Employer, for the last <b>(3)years</b> shall be submitted and must demonstrate the current soundness of the Bidder's financial position and indicate its prospective long-term profitability.	Must meet requirement	N/A	Must meet requirement	N/A	
3.2	<b>Average Annual Construction Turnover</b>	Minimum average annual construction turnover of 7,500,000.00 EUR calculated as total certified payments received for	Must meet requirement	Must meet requirement	Must meet <b>35%</b> , _____ of the requirement	Must meet <b>100%</b> , _____ of the requirement	Form FIN – 3.2

<b>Eligibility and Qualification Criteria</b>			<b>Compliance Requirements</b>			<b>Documentation</b>	
<b>No.</b>	<b>Subject</b>	<b>Requirement</b>	<b>Single Entity</b>	<b>Joint Venture (existing or intended)</b>			<b>Submission Requirements</b>
				<b>All Parties Combined</b>	<b>Each Member</b>	<b>One Member</b>	
		contracts in progress and/or completed within the last 3 years starting January 2012.					



Eligibility and Qualification Criteria			Compliance Requirements			Documentation	
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All Parties Combined	Each Member	One Member	
<b>4. Experience</b>							
4.1 (a)	<b>General Construction Experience</b>	Experience under construction contracts in the role of prime contractor, JV member, sub-contractor, or management contractor for at least the last 5 years, starting 1 <sup>st</sup> January 2010.	Must meet requirement	N/A	Must meet requirement	N/A	Form EXP – 4.1
4.2 (a)	<b>Specific Construction &amp; Contract Management Experience</b>	i) A minimum number of similar <sup>8</sup> contracts specified below that have been satisfactorily and substantially <sup>9</sup> completed as a prime contractor,	Must meet requirement	Must meet requirement <sup>13</sup>	N/A	N/A	Form EXP 4.2(a)

<sup>8</sup> The similarity shall be based on the physical size, complexity, methods/technology and/or other characteristics described in Section VII, Work's Requirements.

Summation of number of small value contracts (less than the value specified under requirement) to meet the overall requirement will not be accepted.

<sup>9</sup> Substantial completion shall be based on 80% or more works completed under the contract.

Eligibility and Qualification Criteria			Compliance Requirements			Documentation	
No.	Subject	Requirement	Single Entity	Joint Venture (existing or intended)			Submission Requirements
				All Parties Combined	Each Member	One Member	
		joint venture member <sup>10</sup> , management contractor or sub-contractor <sup>10</sup> between 1st January 2012 and application submission deadline: 3 contracts, each of minimum value 2,000,000.00 Euro;					

<sup>13</sup> In the case of JV, the value of contracts completed by its members shall not be aggregated to determine whether the requirement of the minimum value of a single contract has been met. Instead, each contract performed by each member shall satisfy the minimum value of a single contract as required for single entity. In determining whether the JV meets the requirement of total number of contracts, only the number of contracts completed by all members each of value equal or more than the minimum value required shall be aggregated.

<sup>10</sup> For contracts under which the Bidder participated as a joint venture member or sub-contractor, only the Bidder's share, by value, shall be considered to meet this requirement.

## 2.5 Personnel

The Bidder must demonstrate that it will have the personnel for the key positions that meet the following requirements:

No.	Position	Total Work Similar Experience (years)	In Similar Works Experience (years)
1	Site Manager (Civil Engineer with a minimum of 5 [five] years of working experience, as well as working experience on a minimum of 5[five] similar assignments);	5	5
2	Assistant Site Manager Engineer with a minimum of 5[five] years of working experience and working experience on a minimum of 4[four] similar assignments);	5	4
3	Health and safety engineer (Health and Safety Engineer with a minimum of 5(five) years working experience at minimum of 3(three) similar assignments)	5	3
4	Geodetic Technician (Geodetic technician with a minimum of 5[five] years of working experience and working experience on a minimum of 4[four] similar assignments);	5	4
5	Geodetic Technician (Geodetic technician with a minimum of 5[five] years of working experience and working experience on a minimum of 4[four] similar assignments);	5	4
6	At least 200 (two hundred) full time employees with adequate professional qualifications certified by relevant state confirmed by the relevant government authorities.	2	1

The Bidder shall provide details of the proposed personnel and their experience records in the relevant Forms included in Section IV, Bidding Forms.

## 2.6 Equipment

The Bidder must demonstrate that it will have access to the key Contractor's equipment listed hereafter:

No.	Equipment Type and Characteristics	Minimum Number required
	Finishers	2
	-Metal roller	5
	-Rubber roller	2
	-Emulsion sprayers	1
	-Graders	2
	-Loaders	2
	-Excavators	3
	-Trucks with min loading capacity of 15 t	5
	-Water tank truck with min 10t tank	2
	-Asphalt scraper	1
	-Asphalt cutter	1
	-Air compressor	1
	-Asphalt cleaner ( broom)	1
	- Trench excavator for traffic streets and roads, 3 meters wide	2
	- Vibratory rammers for compacting of soil in the trench	1
	-Asphalt production plant with a production of minimum 100t per hour	1
	- Internal laboratory for quality testing or signed outsourcing contract with an entity that posses such laboratory	1

The Bidder shall provide further details of proposed items of equipment using the relevant Form in Section IV.

**Section IV - Bidding Forms**

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### Letter of Bid

*The Bidder must prepare the Letter of Bid on stationery with its letterhead clearly showing the Bidder's complete name and address.*

*Note: All italicized text is for use in preparing these form and shall be deleted from the final products.*

Date: \_\_\_\_\_  
Bidding No.: \_\_\_\_\_  
Invitation for Bid No.: \_\_\_\_\_

To: *[insert complete name of Employer]*

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB 8)\_\_\_\_;
- (b) We meet the eligibility requirements and have no conflict of interest in accordance with ITB 4;
- (c) We have not been suspended nor declared ineligible by the Employer based on execution of a Bid Securing Declaration in the Employer's country in accordance with ITB 4.6
- (d) We offer to execute in conformity with the Bidding Documents the following Works: \_\_\_\_\_;
- (e) The total price of our Bid, excluding any discounts offered in item (f) below is:  
In case of only one lot, total price of the Bid:  
In case of multiple lots, total price of each lot *[insert the total price of each lot in words and figures, indicating the various amounts and the respective currencies]*;  
In case of multiple lots, total price of all lots (sum of all lots) *[insert the total price of all lots in words and figures, indicating the various amounts and the respective currencies]*;
- (f) The discounts offered and the methodology for their application are:
- (i) The discounts offered are: *[Specify in detail each discount offered.]*

- (ii) The exact method of calculations to determine the net price after application of discounts is shown below: *[Specify in detail the method that shall be used to apply the discounts]*:
- (g) Our bid shall be valid for a period of *[specify the number of calendar days]* days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (h) If our bid is accepted, we commit to obtain a performance security in accordance with the Bidding Documents;
- (i) We are not participating, as a Bidder or as a subcontractor, in more than one bid in this bidding process in accordance with ITB 4.2(e), other than alternative bids submitted in accordance with ITB 13;
- (j) We, including any of our subcontractors or suppliers for any part of the contract, have not been declared ineligible by the Bank, under the Employer’s country laws or official regulations or by an act of compliance with a decision of the United Nations Security Council;
- (k) We are not a government owned entity/ We are a government owned entity but meet the requirements of ITB 4.5;<sup>18</sup>
- (l) We have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract: *[insert complete name of each Recipient, its full address, the reason for which each commission or gratuity was paid and the amount and currency of each such commission or gratuity]*

Name of Recipient	Address	Reason	Amount
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

(If none has been paid or is to be paid, indicate “none.”)

- (m) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed; and
- (n) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.
- (o) We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in any type of fraud and corruption

Name of the Bidder\* *[insert complete name of person signing the Bid]*

Name of the person duly authorized to sign the Bid on behalf of the Bidder\*\* *[insert complete name of person duly authorized to sign the Bid]*

Title of the person signing the Bid *[insert complete title of the person signing the Bid]*

Signature of the person named above *[insert signature of person whose name and capacity are shown above]*

Date signed *[insert date of signing]* day of *[insert month]*, *[insert year]*

\*: In the case of the Bid submitted by joint venture specify the name of the Joint Venture as Bidder

\*\* : Person signing the Bid shall have the power of attorney given by the Bidder to be attached with the Bid Schedules.



## Bill of Quantities

### I.1 Storm water drainage in ARM 1

SRU2 - Prof 9 and Prof 10 -Storm water drainage

B/Q with calculation

<b>I.1.1 Bill of quantity with calculation for construction of storm water drainage at str. SRU 2 in ARM 1 - Bitola L = 540,40 m</b>					
<b>Item</b>	<b>Description of works</b>	<b>Measure</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
<b>1</b>	Marking and securing of the route Payment is done for 1m' of executed work				
	<i>m'</i> 540.40	<i>m'</i>	540.40		
	Excavation of soil III category for channel trenches with depth up to 2.00 m. with included widening for the manholes and securing the trench. Payment is done by 1m <sup>3</sup> of executed work				
	<i>m<sup>3</sup></i> 752.31				
	<i>m<sup>3</sup> -mechanical</i> 601.85	<i>m<sup>3</sup></i>	601.85		
	<i>m<sup>3</sup> - manual</i> 150.46	<i>m<sup>3</sup></i>	150.46		
<b>3</b>	Purchase and installation of corrugated PE sewer pipes.(The profile of the pipes is expressed with inner diameter) Payment is done for 1m' of executed work				
	<i>m' ID 300/SN 8</i> 439.80	<i>m'</i>	439.80		
	<i>m' ID 400/SN 8</i> 100.60	<i>m'</i>	100.60		
<b>4</b>	Manual backfilling with mechanical compaction of the trench in layers of 20-30 cm. Payment is done by 1m <sup>3</sup> of executed work				
	<i>m<sup>3</sup></i> 677.28	<i>m<sup>3</sup></i>	677.28		
<b>5</b>	Mechanical loading and removal of the remaining land of the landfill at a distance of 3,00 km Payment is done by 1m <sup>3</sup> of executed work				
	<i>m<sup>3</sup></i> 75.03	<i>m<sup>3</sup></i>	75.03		
<b>6</b>	Complete construction of reinforced concrete prefabricated inspection manholes - type 1, Ø 1000 mm, together with sockets and gaskets Payment is done for 1m' of executed work				
	<i>m'</i> 21.02	<i>m'</i>	21.02		
	sockets Ø 300 mm                      18	<i>pcs.</i>	18		
	sockets Ø 400 mm                      8	<i>pcs.</i>	8		

7	Purchase and installation of cast iron cover for manholes class D 400 Payment is done per installed piece				
	D400	13	pcs	13	
<b>Total Storm water drainage in SRU2:</b>					

SRU 2–Prof 9 and Prof 10 storm water connections

<b>I.1.2 Bill of quantity for excavations and connections for the storm water drainage of "SRU 2" str. in ARM 1 - Bitola L = 69,50m</b>					
Pos.	Description	Measure	Quantity	Unit price	Total
1	Marking and securing of the route Payment is done for 1m' of executed work				
	m'	69.50	m'	69.50	
2	Making document of the connection site with absolute coordinates (x,y,z) and marking the field area with metal spike Ø 14 mm (L = 50 cm). Payment - executed work - unit price				
	pcs	11	pcs	11	
953	Excavation of soil III category for canal trenches 2.00 m. max. depth incl. trenches' shoring. Payment is done by 1m3 of executed work				
	m <sup>3</sup>	109,09			
	<b>m<sup>3</sup> – mechanical</b>	87,27	m <sup>3</sup>	87,27	
	<b>m<sup>3</sup> - manual work</b>	21,82	m <sup>3</sup>	21,82	
4	Purchase and installation of corrugated PE sewer pipes. (The pipes' profile is presented in inner diameter) Payment is done for 1m' of executed work				
	m' ID 300/SN 8	69.50	m'	69.50	
5	Manual and mechanical backfilling with mechanical compaction of the trench in layers of 20-30 cm. Payment is done by 1m3 of executed work				
	m <sup>3</sup>	100.36	m <sup>3</sup>	100.36	
6	Mechanical loading and removal of the remaining land at the landfill at a distance of 8,00 km Payment is done by 1m3 of executed work				
	m <sup>3</sup>	8.73	m <sup>3</sup>	8.73	

7	Making the connection to a reinforced concrete manhole with safety gaskets 300mm - sockets for pipes and protection on the other end of the pipe with welded end cap. Payment - executed work - unit price				
	Pcs	11	pcs	11	
<b>Total Storm water drainage connections in SRU2:</b>					

SRU 3 – Prof 13, Prof 14 and Prof18 Storm water drainage

B/Q with calculation

**I.1.3 Bill of quantity for construction of storm water drainage of  
SRU 3 in ARM 1 - Bitola L = 256,00 m**

Item	Description of works	Measure	Quantity	Unit price	Total
1	Marking and securing of the route Paid by 1 m'of executed work				
	m'	256.00	m'	256.00	
2	Excavation of soil III category for channel trenches with depth up to 2.00 m. with included widening for the manholes and securing the trench Payment is done by 1 m <sup>3</sup> of executed work				
	m <sup>3</sup>	374.96			
	<b>m<sup>3</sup> mechanical</b>	299.97	m <sup>3</sup>	299.97	
	<b>m<sup>3</sup> - manual</b>	74.99	m <sup>3</sup>	74.99	
3	Purchase and installation of corrugated PE sewer pipes.(The profile of the pipes is expressed with inner diameter) Payment is done by 1m' of executed work				
	<b>m' ID 300/SN 8</b>	219.00	m'	219	
	<b>m' ID 400/SN 8</b>	37.00	m'	37	
4	Manual backfilling with mechanical compaction of the trench in layers of 20-30 cm. Paid by 1m3 of executed work				
	m <sup>3</sup>	340.17	m <sup>3</sup>	340.17	
5	Mechanical loading and removal of the remaining land to the landfill at a distance of 3,00 km Payment is done by 1m3 of executed work				
	m <sup>3</sup>	34.79	m <sup>3</sup>	34.79	
6	Complete construction of reinforced concrete prefabricated inspection manholes - type 1, Ø 1000 mm, together with sockets and gaskets				

	Payment is done by 1m' of executed work				
	m' 11.75	m'	11.75		
	bushing Ø 300 mm 12	pcs.	12		
	bushing Ø 400 mm 2	pcs.	2		
<b>7</b>	Purchase and installation of cast iron cover for manholes class D 400 Payment is done per installed piece				
	D400 7	pcs.	7		
<b>Total Storm water drainage in SRU3:</b>					

SRU 3- Prof 13, Prof 14 and Prof 18 storm water drainage connections

<b>I.1.4 Bill of quantity for excavations and connections for storm water drainage of "SRU 3" str. in ARM 1 - Bitola L = 157,30m</b>					
<b>Pos.</b>	<b>Description</b>	<b>Measur e</b>	<b>Quantit y</b>	<b>Unit price</b>	<b>Total</b>
<b>1</b>	Marking and securing of the route Paid by 1m' of executed work				
	m' 157.30	m'	157.30		
<b>2</b>	Making document of the connection site with absolute coordinates (x,y,z) and marking the field area with metal spike Ø 14 mm (L = 50 cm). Payment - executed work - unit price				
	Pcs 17	pcs	17		
<b>3</b>	Excavation of soil III category for canal trenches with average depth of 1.52mincl. trenches' shoring. Paid by 1m <sup>3</sup> of executed work				
	m <sup>3</sup> 263.00				
	m <sup>3</sup> - mechanical 210.40	m <sup>3</sup>	210.40		
	m <sup>3</sup> - manual work 52.60	m <sup>3</sup>	52.60		
<b>4</b>	Supply and installation of corrugated PE sewer pipes. (The pipes' profile is presented in inner diameter) Paid by 1m' of executed work				
	m' ID 300/SN 8 157.30	m'	157.30		
<b>5</b>	Manual and mechanical backfilling with mechanical compaction of the trench in layers of 20-30 cm. Payment is done by 1m <sup>3</sup> of executed work				
	m <sup>3</sup> 243.23	m <sup>3</sup>	243.23		
<b>6</b>	Mechanical loading and removal of the remaining land to the landfill at a distance of 8 km				

	Payed by 1m <sup>3</sup> of executed work				
	m <sup>3</sup> 19.77	m <sup>3</sup>	19.77		
<b>7</b>	Making the connection to a reinforced concrete manhole with safety gaskets 300mm - sockets for pipes and protection on the other end of the pipe with welded end cap. Payment - executed work - unit price				
	Pcs 17	pcs	17		
<b>Total Storm water drainage connections in SRU3:</b>					

SRU4 -Prof 22, Prof 23 and Prof 28 - storm water drainage

B/Q with calculation

<b>I.1.5 Bill of quantity for construction of storm water drainage at str. SRU 4 in ARM 1 - Bitola L= 377,7m</b>					
<b>Item</b>	<b>Description of works</b>	<b>Measure</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
<b>1</b>	Marking and securing of the route Payed by 1m <sup>3</sup> of executed work				
	m' 377.70	m'	377.70		
<b>2</b>	Excavation of soil III category for channel trenches with depth up to 2 m. with included widening for the manholes and securing the trench Payed by 1m <sup>3</sup> of executed work				
	m <sup>3</sup> 556.34				
	m <sup>3</sup> -mechanical 445.07	m <sup>3</sup>	445.07		
	m <sup>3</sup> -manual 111.27	m <sup>3</sup>	111.27		
<b>3</b>	Purchase and installation of corrugated PE sewer pipes.(The profile of the pipes is expressed with inner diameter) Payed by 1m'of executed work				
	m' ID 300/SN 8 377.70	m'	377.70		
<b>4</b>	Manual backfilling with mechanical compaction of the trench in layers of 20-30 cm. Payed by 1m <sup>3</sup> of executed work				
	m <sup>3</sup> 508.87	m <sup>3</sup>	508.87		
<b>5</b>	Mechanical loading and removal of the remaining land at the landfill at a distance of 3,00 km Payed by 1m <sup>3</sup> of executed work				
	m <sup>3</sup> 47.47	m <sup>3</sup>	47.47		

6	Complete construction of reinforced concrete prefabricated inspection manholes - type 1, Ø 1000 mm, together with sockets and gaskets Paid by 1m'of executed work				
	m' 16.60	m'	16.60		
	sockets Ø 300mm 18	pcs	18		
7	Purchase and installation of cast iron cover for manholes class D 400 Payment is done per installed piece				
	D400 9	pcs	9		
<b>Total Storm water drainage in SRU4:</b>					

SRU4–Prof 22, Prof 23 and Prof 28 storm water drainage connections

<b>I.1.6 Bil of quantity for excavations and connections for storm water drainage of "SRU 4" str. in ARM 1 - Bitola L = 155,10m</b>					
Pos.	Description	Measure	Quantity	Unit price	Total
1	Marking and securing of the route Payment is done by 1m' of executed work				
	m' 155.10	m'	155.10		
2	Making document of the connection site with absolute coordinates (x,y,z) and marking the field area with metal spike Ø 14 mm (L = 50 cm). Payment - executed work - unit price				
	pcs 16	pcs	16		
3	Excavation of soil III category for canal trenches 1.39 m. max. depth incl. trenches' shoring. Payment is done by 1 m <sup>3</sup> of executed work				
	m <sup>3</sup> 232.84				
	m <sup>3</sup> - mechanical 186.27	m <sup>3</sup>	186.27		
	m <sup>3</sup> - manual work 46.57	m <sup>3</sup>	46.57		
4	Purchase and installation of corrugated PE sewer pipes. (The pipes' profile is presented in inner diameter) Payment is done by 1m' of executed work				
	m' ID 300/SN 8 155.10	m'	155.10		
5	Manual and mechanical backfilling with mechanical compaction of the trench in layers of 20-30 cm. Payment is done by 1 m <sup>3</sup> of executed work				
	m <sup>3</sup> 213.35	m <sup>3</sup>	213.35		

<b>6</b>	Mechanical loading and removal of the remaining land to the landfill at a distance of 8 km Payment is done by 1m <sup>3</sup> of executed work				
	m <sup>3</sup> 19.49	m <sup>3</sup>	19.49		
<b>7</b>	Making the connection to a reinforced-concrete manhole with safety gaskets 300mm - sockets for pipes and protection on the other end of the pipe with welded end cap. Payment - executed work - unit price				
	Pcs 17	pcs	16		
<b>Total Storm water drainage connections in SRU4:</b>					

STU 5b - Prof 29 and Prof 32(part) - storm water drainage

B/Q with calculation

**I.1.7 Bill of quantity for construction of storm water drainage at str. STU 5b  
in ARM 1 - Bitola L = 171.22 m**

Item	Description of works	Measure	Quantity	Unit price	Total
<b>1</b>	Marking and securing of the route Payment is done by 1m'of executed work				
	m' 171.22	m'	171.22		
<b>2</b>	Excavation of soil III category for channel trenches with depth up to 2 m. with included widening for the manholes and securing the trench. Payment is done by 1m <sup>3</sup> of executed work				
	m <sup>3</sup> 331.9				
	m <sup>3</sup> mechanical 265.52	m <sup>3</sup>	265.52		
	m <sup>3</sup> - manual 66.38	m <sup>3</sup>	66.38		
<b>3</b>	Purchase and installation of corrugated PE sewer pipes.(The profile of the pipes is expressed with inner diameter) Payment is done by 1m' of executed work				
	m' ID 300/SN 8 171.22	m'	171.22		
<b>4</b>	Manual backfilling with mechanical compaction of the trench in layers of 20-30 cm. Payment is done by 1m <sup>3</sup> of executed work				
	m <sup>3</sup> 298.90	m <sup>3</sup>	298.90		
<b>5</b>	Mechanical loading and removal of the remaining land of the landfill at a distance of 3km Payment is done by 1m <sup>3</sup> executed work				
	m <sup>3</sup> 33.00	m <sup>3</sup>	33.00		

<b>6</b>	Complete construction of reinforced-concrete prefabricated inspection manholes - type 1, Ø 1000 mm, together with sockets and gaskets Payment is done by 1m' of executed work				
	m' 10.27	m'	10.27		
	sockets Ø 300 m 9	Pcs	9		
<b>7</b>	Purchase and installation of cast iron cover for manholes class D 400 Payment is done per installed piece				
	D400 5	Pcs	5		
<b>Total Storm water drainage in STU 5b:</b>					

STU 5b – Prof 29 storm water connections

<b>I.1.8 Bil of quantity for excavations and connections for the storm water drainage of "STU 5b" str. in ARM 1 - Bitola L = 32,30m</b>					
<b>Pos.</b>	<b>Description</b>	<b>Measure</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
<b>1</b>	Marking and securing of the route Payment is done by 1m' of executed work				
	m' 32.30	m'	32.30		
<b>2</b>	Records of the connection site with absolute coordinates (x,y,z) and marking the field area with metal spike Ø 14 mm (L = 50 cm). Payment - executed work - unit price				
	Pcs 5	pcs	5		
<b>3</b>	Excavation of soil III category for canal trenches average depth of 1.49 m. including trenches' shoring. Payment - executed work of min. 1m <sup>3</sup>				
	m <sup>3</sup> 52.94				
	m <sup>3</sup> – mechanical 42.35	m <sup>3</sup>	42.35		
	m <sup>3</sup> - manual work 10.59	m <sup>3</sup>	10.59		
<b>4</b>	Purchase and installation of corrugated PE sewer pipes. (The pipes' profile is presented in inner diameter) Payment – by 1m' of executed work				
	m' ID 300/SN 8 32.30	m'	32.30		
<b>5</b>	Manual and mechanical backfilling with mechanical compaction of the trench in layers of 20-30 cm. Payment is done by 1m' of executed work.				
	m <sup>3</sup> 48.88	m <sup>3</sup>	48.88		



6	Mechanical loading and removal of the remaining land at the landfill at a distance of 8,00 km Payment is done by 1m3 of executed work				
	m <sup>3</sup> 4.06	m <sup>3</sup>	4.06		
7	Making the connection to a reinforced-concrete manhole with safety gaskets 300mm - sockets for pipes and protection on the other end of the pipe with PVC lid and foil. Payment - executed work - unit price				
	Pcs 5	pcs	5		
<b>Total Storm water drainage connections in STU 5b :</b>					
<b>TOTAL STORM WATER DRAINAGE NETWORK IN ARM1</b>					

### *I.2 Storm water drainage in ARM 2*

#### **I.2.1 Bill of quantity of the works for storm water drainage and excavations and connections for the storm water drainage of the Str. SRU4 in ARM-2 in Bitola**

		Unit measure	Quantity	Unit price	Total price
<b>I</b>	<b><i>EARTH WORKS</i></b>				
<b>1</b>	Marking and securing of the route	m'	805		
<b>2</b>	Crushing concrete and rock with a compressor, loading and transport to the landfill at a distance of 10 km	m3	10		
<b>3</b>	Mechanical cutting of asphalt concrete D=10sm	m'	14		
<b>4</b>	Mechanical excavation of asphalt and concrete, loading and transport to the landfill at a distance of 10 km	m3	6		
<b>5</b>	Mechanical excavation of earth in category four and five in narrow scope with depth of the trench of 0-2 m	m3	1,750		
<b>6</b>	Manual excavation of earth in category 4 and 5 in narrow scope with depth of the trench from 0-2m	m3	250		
<b>7</b>	Mechanical excavation of earth in 4 and 5 category in narrow scope with depth of the trench from 2-5m	m3	700		

<b>8</b>	Manual excavation of the earth in 4 and 5 category in narrow scope with depth of the trench from 2-5m	m3	60		
<b>9</b>	Fine planning of the bottom of the trench with accuracy of the finish level + /- 2cm	m2	800		
<b>10</b>	Backfilling the trench with earth manually in layers t=20-30cm with selected and tested material from the excavation, with planning and necessary compaction which will not allow additional delayed sliding	m3	700		
<b>11</b>	Backfilling the trench with earth mechanically in layers t=20-30 cm , with selected and tested material from the excavation, planning and compaction; that will not allow additional delayed sliding, complete with geomechanical control of the compaction	m3	1,400		
<b>12</b>	Loading and transport of the surplus earth to the landfill at a distance of 10km	m3	650		
<b>13</b>	Purchase, transport and spreading of fine sand in layer of 10cm.at the bottom of the trench	m3	80		
<b>14</b>	Purchase, transport and embedding crushed stone, planning and compaction, complete with geomechanical control of the compaction	m3	300		
<b>15</b>	Trench shoring	m2	150		
<b>16</b>	Pumping the water from the trench with a pump	hour	16		
<b>17</b>	Purchase, transport, and concreting with Concrete Class 30 without formwork	m3	12		
<b>18</b>	Purchase, transport and concreting of base t=10cm, with Concrete Class 30, complete with wire-mesh reinforcement Q131	m2	23		
<b>19</b>	Patching the asphalt layer above the trench with BNHS (Bitumen road surface) 16 t=10cm, complete removal of dirt and coating with bitulit (bitumen).	m2	9		
<b>II</b>	<b>INSTALLATION WORKS</b>				

<b>1</b>	Construction of sewer manholes with reinforced concrete pipes F1000 complete with ladders F18, reinforced concrete slab t=15cm. and concrete half-round gutter, with average H= 3.00m	m'	58.05		
<b>2</b>	Construction of complete typical street gully with pipe F 400 and metal grid for heavy type 400KN, with offlet PE f200 and connection (according detail)	Nr.	26		
<b>3</b>	Purchase, transport and installation of PE corrugated sewer pipes SN8				
	ID 150	m'	300		
	ID 300	m'	170		
	ID 350	m'	120		
	ID 400	m'	420		
	ID 600	m'	80		
<b>4</b>	Purchase and installation of PE single branch of 45°				
	ID 300/150	Nr.	15		
	ID 400/150	Nr.	5		
<b>5</b>	Purchase and installation of PE elbow ID 150	Nr.	40		
<b>6</b>	Purchase and installation of manhole lid with round frame all according to EN 124, with load-bearing class D 400. The lid and frame must be made of ductile iron and with adequate anti-corrosion protection. The lid must be connected with the frame from one side with a hinge, and from the other side through a wedge to lock with a key and a keyhole integrated with the construction. The dynamic stability to be secured at least with three contact points. On the contact surface between the lid and the frame there must be a ring of composite material for vertical stabilization. The construction must provide opening of the lid of at least 130° degrees, and blockage of the lid at 90° for protection of the workers of sudden closure. To hold a certificate for environmental protection ISO14001. Possibility to install a dirt collector				

	opening DN 610	Nr.	21		
<b>Total Storm water drainage in SRU4:</b>					

Str. StU7

<b>I.2.2 Bill of quantity of the works for storm water drainage and excavations and connections for storm water drainage on the Str. STU7 in ARM-2 in BITOLA</b>					
		Unit measure	Quantity	Unit price	Total price
<b>I</b>	<b><i>EARTH WORKS</i></b>				
<b>1</b>	Marking and securing of the route	m'	615		
<b>2</b>	Crushing concrete and rock with a compressor, loading and transport to the landfill at a distance of 10 km	m <sup>3</sup>	5		
<b>3</b>	Mechanical cutting of the asphalt and concrete t=10cm	m'	10		
<b>4</b>	Mechanical excavation of earth in 4 and 5 category in narrow scope with depth of the trench of 0-2m	m <sup>3</sup>	1,330		
<b>5</b>	Manual excavation of earth in 4 and 5 category in narrow scope with depth of the trench from 0-2m	m <sup>3</sup>	170		
<b>6</b>	Mechanical excavation of earth in 4 and 5 category in narrow scope with depth of the trench from 2-5m	m <sup>3</sup>	550		
<b>7</b>	Manual excavation of the earth in 4 and 5 category in narrow scope with depth of the trench from 2-5m	m <sup>3</sup>	50		
<b>8</b>	Fine planning of the bottom of the trench with accuracy of the finish level +-2 cm	m <sup>2</sup>	600		
<b>9</b>	Backfilling the trench with earth manually in layers t=20-30cm with selected and tested material from the excavation, with planning and necessary compaction which will not allow additional delayed sliding	m <sup>3</sup>	550		
<b>10</b>	Backfilling the trench with earth mechanically in layers t=20-30 cm , with selected and tested material from the excavation, planning and compaction; that will not allow additional delayed sliding, complete with geomechanical control of	m <sup>3</sup>	1,050		

	the compaction				
<b>11</b>	Loading and transport of surplus earth to the landfill at a distance up to 10 km.	m3	500		
<b>12</b>	Purchase, transport and spreading of fine sand in layer of 10 cm. at the bottom of the trench	m3	60		
<b>13</b>	Purchase, transport and embedding of crushed stone, planning and compaction, complete with geomechanical control of compaction	m3	220		
<b>14</b>	Trench shoring	m2	100		
<b>15</b>	Pumping the water from the trench with pumps	hour	10		
<b>16</b>	Purchase, transport, and concreting with Concrete Class 30 without formwork	m3	5		
<b>17</b>	Purchase, transport and concreting of base t=10cm, with Concrete Class 30, complete with wire-mesh reinforcement Q131	m2	15		
<b>II</b>	<b><i>INSTALLATION WORKS</i></b>				
<b>1</b>	Construction of sewer manholes of reinforced concrete pipes F1000 complete with ladders F18, reinforced concrete slab t=15cm. and concrete half-round gutter, with average H= 3.00m	m'	52.83		
<b>2</b>	Construction of complete typical street gully with pipe F 400 and metal grid for heavy type 400KN, with offlet PE f200 and connection (according detail)	Nr.	14		
<b>3</b>	Purchase, transport and installation of PE corrugated sewer pipes SN8				
	ID 150	m'	220		
	ID 300	m'	140		
	ID 350	m'	260		
	ID 450	m'	195		
<b>4</b>	Purchase and installation of PE single branch of				

	45°				
	ID 300/150	Nr.	5		
<b>5</b>	Purchase and installation of PE elbow ID 150	Nr.	10		
<b>6</b>	Purchase and installation of manhole lid with round form frame all according to EN 124, with load-bearing class D 400. The lid and frame must be made of ductile iron and with adequate anti-corrosion protection. The lid must be connected with the frame from one side with a hinge, and from the other side through a wedge to lock with a key and a keyhole integrated with the construction. The dynamic stability to be secured at least with three contact points. On the contact surface between the lid and the frame there must be a ring of composite material for vertical stabilization. The construction must provide opening of the lid of at least 130° degrees, and blockage of the lid at 90° for protection of the workers of sudden closure. To hold a certificate for environmental protection ISO14001. Possibility to install a dirt collector				
	- opening DN 610	Nr.	20		
	<b>Total Storm water drainage in STU7:</b>				

Str. StU12

<b>I.2.3 Bill of quantity of the works for storm water drainage and excavations and connections for storm water drainage of the Str. STU 12 in ARM-2</b>					
Item		Unit measure	Quantity	Unit price	Total price
<b>I</b>	<b><i>EARTH WORKS</i></b>				
<b>1</b>	Marking and securing of the route	m'	270		
<b>2</b>	Crushing concrete and rock with a compressor, loading and transport to the landfill at a distance of 10 km	m3	10		
<b>3</b>	Mechanical excavation of earth in category four and five in narrow scope with depth of the trench of 0-2 m	m3	650		
<b>4</b>	Manual excavation of earth in category 4 and 5 in narrow scope with depth of the trench from 0-2m	m3	100		

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<b>5</b>	Mechanical excavation of earth in category 4 and 5 in narrow scope with depth of the trench from 2-5m	m3	280		
<b>6</b>	Manual excavation of earth in category 4 and 5 in narrow scope with depth of the trench from 2-5m	m3	30		
<b>7</b>	Fine planning of the bottom of the trench with accuracy of the finish level + - 2cm	m2	270		
<b>8</b>	Backfilling the trench with earth manually in layers t=20-30cm with selected and tested material from the excavation, with planning and necessary compaction which will not allow additional delayed sliding	m3	280		
<b>9</b>	Backfilling the trench with earth mechanically in layers t=20-30 cm , with selected and tested material from the excavation, planning and compaction; that will not allow additional delayed sliding, complete with geomechanical control of the compaction	m3	530		
<b>10</b>	Loading and transport of the surplus earth to the landfill at a distance up to 10 km	m3	250		
<b>11</b>	Purchase, transport and spreading of fine sand in layer of 10 cm. At the bottom of the trench	m3	27		
<b>12</b>	Purchase, transport and embedding of crushed stone with planning and compaction, complete with geomechanical control of the compaction	m3	100		
<b>13</b>	Trench shoring	m2	80		
<b>14</b>	Pumping water from the trench with a pump	hour	10		
<b>15</b>	Purchase, transport, and concreting with Concrete Class 30 without formwork	m3	5		
<b>16</b>	Purchase, transport and concreting of base t=10cm, with Concrete Class 30, complete with wire-mesh reinforcement Q131	m2	10		
<b>II</b>	<b><i>INSTALLATION WORKS</i></b>				

1	Construciton of sewer manholes of reinforced concrete pipes F1000 complete with ladders F18, reinforced concrete slab t=15cm. and concrete half-round gutter, with average H= 3,00m	m'	40.7		
2	Construction of complete typical street gully with pipe F 400 and metal grid for heavy type 400KN, with offlet PE f200 and connection (according detail).	Nr.	8		
3	Purchase, transport and installation of PE corrugated sewer pipes SN8				
	ID 150	m'	120		
	ID 350	m'	170		
	ID 400	m'	100		
4	Purchase and installation of PE single branch of 45°				
	ID 400/150	Nr.	5		
5	Purchase and installation of PE elbow ID 150	Nr.	10		
6	Purchase and installation of manhole lid with round frame all according to EN 124, with load-bearing class D 400. The lid and frame must be made of ductile iron and with adequate anti-corrosion protection. The lid must be connected with the frame from one side with a hinge, and from the other side through a wedge to lock with a key and a keyhole integrated with the construction. The dynamic stability to be secured at least with three contact points. On the contact surface between the lid and the frame there must be a ring of composite material for vertical stabilization. The construction must provide opening of the lid of at least 130° degrees, and blockage of the lid at 90° for protection of the workers of sudden closure. To hold a certificate for environmental protection ISO14001. Possibility to install a dirt collector				
	- opening DN 610	Nr.	14		
<b>Total Storm water drainage in STU12:</b>					



	<b>TOTAL STORM WATER DRAINAGE NETWORK IN ARM 2</b>	
	<b>TOTAL STORM WATER DRAINAGE NETWORK IN ARM1 AND ARM2</b>	

### **II.1 Water supplying in ARM 1**

*SrU 2 Water supply (small boulevard) in ARM1*

#### **II.1.1 Bill of quantities for construction of a water supplying network of profile Number 26 (str. SrU 2) in ARM 1 - Bitola L = 271,04m**

<b>Item</b>	<b>Description works</b>	<b>Measures</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
<b>1</b>	Marking and securing of the route Payment is done by 1.00 m' executed work				
	m' 271.04	m'	271.04		
<b>2</b>	Excavation of earth III soil category for channel trenches with width of 70 cm. Payment is done by 1.00 m <sup>3</sup> excavated earth				
	m <sup>3</sup> 165.84				
	80 % mechanical excavation	m <sup>3</sup>	132.67		
	20 % manual excavation	m <sup>3</sup>	33.17		
<b>3</b>	Purchase and installation of polyethylene HDPE 100 water supplying pipes Payment is done by 1,00 m' executed work				
	ND 110/10 bars 271.04	m'	271.04		
<b>4</b>	Manual backfilling with mechanical compaction of the trench in layers of 20-30 cm. Payment is done by 1.00 m <sup>3</sup> executed work				
	m <sup>3</sup> 160.39	m <sup>3</sup>	160.39		
<b>5</b>	Loading and removal of the residual earth at the landfill at a distance of 8,00 km Payment is done by 1.00 m <sup>3</sup> executed work				
	m <sup>3</sup> 5.45	m <sup>3</sup>	5.45		
<b>6</b>	Purchase and installation of fittings for node 51				
	OP F 100/100 1	pcs	1		
	oval valve F 100 3	pcs	3		
	ADAPTER FLANGE ND 110 3	pcs	3		
	FLANGE ND 110 / PN 10 3	pcs	3		
	built-in set F100 mm 3	pcs	3		
cap of 7 kg 3	pcs	3			

	<i>Anchor block 30/30/25</i>	<i>1</i>	<i>pcs</i>	<i>1</i>	
	<b>Total water supply in SRU2 Prof. nmb. 26 :</b>				

*SrU 2 Water supply (small boulevard) in ARM1***II.1.2 Bill of quantities for construction of a water supplying network of profile Number 9 (str. SrU 2) in ARM 1 - Bitola L = 271,74m**

<b>Item</b>	<b>Description works</b>	<b>Measures</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
<b>1</b>	Marking and securing of the route Payment is done by 1.00 m' executed work				
	<i>m' 271.74</i>	<i>m'</i>	<i>271.74</i>		
<b>2</b>	Excavation of earth III soil category for channel trenches with width of 70 cm. Payment is done by 1.00 m <sup>3</sup> excavated earth				
	<i>m<sup>3</sup> 162.79</i>				
	<i>80 % mechanical excavation</i>	<i>m<sup>3</sup></i>	<i>130.23</i>		
	<i>20 % manual excavation</i>	<i>m<sup>3</sup></i>	<i>32.56</i>		
<b>3</b>	Purchase and installation of polyethylene HDPE 100 water supplying pipes Payment is done by 1,00 m' executed work				
	<i>ND 110/10 bars 271.74</i>	<i>m'</i>	<i>271.74</i>		
<b>4</b>	Manual backfilling with mechanical compaction of the trench in layers of 20-30 cm. Payment is done by 1.00 m <sup>3</sup> executed work				
	<i>m<sup>3</sup> 157.33</i>	<i>m<sup>3</sup></i>	<i>157.33</i>		
<b>5</b>	Loading and removal of the residual earth at the landfill at a distance of 8,00 km Payment is done by 1.00 m <sup>3</sup> executed work				
	<i>m<sup>3</sup> 5.46</i>	<i>m<sup>3</sup></i>	<i>5.46</i>		
<b>6</b>	Purchase and installation of fittings for node : 15,16				
	<i>OP F 150/100 2</i>	<i>pcs</i>	<i>2</i>		
	<i>oval valve F 150 4</i>	<i>pcs</i>	<i>4</i>		
	<i>oval valve F 100 2</i>	<i>pcs</i>	<i>2</i>		
	<i>ADAPTER FLANGE ND 160 4</i>	<i>pcs</i>	<i>4</i>		
	<i>ADAPTER FLANGE ND 100 2</i>	<i>pcs</i>	<i>2</i>		
	<i>FLANGE ND 160 / PN 10 4</i>	<i>pcs</i>	<i>4</i>		
	<i>FLANGE ND 110 / PN 10 2</i>	<i>pcs</i>	<i>2</i>		
	<i>built-in set F150 mm 4</i>	<i>pcs</i>	<i>4</i>		
<i>built-in set F100 mm 2</i>	<i>pcs</i>	<i>2</i>			

	<i>cap of 7 kg</i>	6	<i>pcs</i>	6		
	<i>Anchor block 30/30/25</i>	2	<i>pcs</i>	2		
<b>7</b>	<i>Purchase and installation of PPH F80mm with additional welded material (fitting) for polyethylene pipe ND160. (Node 60,61)</i>					
	<i>PPH F 80 mm</i>	2	<i>pcs</i>	2		
	<i>LS F 80mm</i>	2	<i>pcs</i>	2		
	<i>PTR 160/90 PE 100</i>	2	<i>pcs</i>	2		
	<i>oval valve F80mm</i>	2	<i>pcs</i>	2		
	<i>FLAING ADAPTER FLANGE ND 90</i>	2	<i>pcs</i>	2		
	<i>built-in set F80mm</i>	2	<i>pcs</i>	2		
	<i>cap of 7 kg</i>	2	<i>pcs</i>	2		
	<i>cap of 30 kg</i>	2	<i>pcs</i>	2		
	<i>Anchor block 30/30/25</i>	2	<i>pcs</i>	2		
	<b>Total water supply in SRU2 Prof. nmb. 9 :</b>					

## SRU 2 - water supply connections

<b>II.1.3 Bill of quantities for excavations and connections for the water supply network of "SRU 2" str. in ARM 1 - Bitola L = 78,00m</b>					
<b>Pos.</b>	<b>Description</b>	<b>Measu rement</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
<b>1</b>	Marking and securing of the route Payment is done by 1.00 m' executed work				
	<i>m' 78.00</i>	<i>m'</i>	78		
<b>2</b>	Excavation of earth III soil category for channel trenches with average depth 0.66m. Payment is done by 1.00 m <sup>3</sup> excavated earth				
	<i>m<sup>3</sup> 212.58</i>				
	<i>80 % mechanical excavation</i>	<i>m<sup>3</sup></i>	170.06		
	<i>20 % manual excavation</i>	<i>m<sup>3</sup></i>	42.52		
<b>3</b>	Purchase and installation of HDPE 100 polyethylene water supplying pipes. Payment is done by 1,00 m' executed work				
	<i>ND 110/10 bar 78.00</i>	<i>m'</i>	78		
<b>4</b>	Manual and mechanical backfilling with mechanical compaction of the trench in layers of 20-30 cm. Payment is done by 1.00 m <sup>3</sup> executed work				

	<i>m<sup>3</sup></i>	211.97	<i>m<sup>3</sup></i>	211.97		
<b>5</b>	<i>Loading and transport of the residue soil into landfill site up to 8,00 km distance Payment –by 1.00 m3 executed work</i>					
	<i>m<sup>3</sup></i>	0.61	<i>m<sup>3</sup></i>	0.61		
<b>6</b>	<i>Purchase and installation of connecting material (fitting) for ND110 polyethylene pipe.</i>					
	<i>OP F 150/100</i>	3	<i>pcs</i>	3		
	<i>oval valve F 100</i>	3	<i>pcs</i>	3		
	<i>ADAP. FLAN. WITH RING ND 160</i>	6	<i>pcs</i>	6		
	<i>ADAP. FLAN. WITH RING ND 110</i>	3	<i>pcs</i>	3		
	<i>built-in set F100 mm</i>	3	<i>pcs</i>	3		
	<i>cap 7 kg</i>	3	<i>pcs</i>	3		
	<i>anchor block 30/30/25</i>	3	<i>pcs</i>	3		
<b>Total Water supply connections SRU2:</b>						

*SrU 3 Water supply*

<b>II.1.4 Bill of quantities for construction of a water supplying network of profile Number 12 (str. SrU 3) in ARM 1 - Bitola L = 296,30 m</b>					
<b>Item</b>	<b>Description of works</b>	<b>Measures</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
<b>1</b>	<i>Marking and securing of the route Payment is done by 1.00 m' executed work</i>				
	<i>m' 296.30</i>	<i>m'</i>	296.30		
<b>2</b>	<i>Excavation of earth III soil category for channel trenches with width of 70 cm. Payment is done by 1.00 m3 excavated earth</i>				
	<i>m<sup>3</sup> 204.94</i>				
	<i>80 % mechanical excavation</i>	<i>m<sup>3</sup></i>	163.95		
	<i>20 % manual excavation</i>	<i>m<sup>3</sup></i>	40.99		
<b>3</b>	<i>Purchase and installation of polyethylene HDPE 100 water supplying pipes Payment is done by 1 m'of executed work</i>				

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	<i>ND 160/10 bars</i>	296.30	<i>m'</i>	296.30		
<b>4</b>	<i>Manual backfilling with mechanical compaction of the trench in layers of 20-30 cm. Payment is done by 1 m3 of executed work</i>					
	<i>m<sup>3</sup></i>	198.98	<i>m<sup>3</sup></i>	198.98		
<b>5</b>	<i>Loading and removal of the residual earth at the landfill at a distance of 8,00 km Payment is done by 1 m3 of executed work</i>					
	<i>m<sup>3</sup></i>	5.96	<i>m<sup>3</sup></i>	5.96		
<b>6</b>	<i>Purchase and installation of fittings for node : 18,22,24 and 25</i>					
	<i>OP F 150/100</i>	4	<i>pcs</i>	4		
	<i>oval valve F 150</i>	8	<i>pcs</i>	8		
	<i>oval valve F 100</i>	4	<i>pcs</i>	4		
	<i>ADAPTER FLANGE ND 160</i>	8	<i>pcs</i>	8		
	<i>ADAPTER FLANGE ND 110</i>	4	<i>pcs</i>	4		
	<i>FLANGE ND 160 / PN 10</i>	8	<i>pcs</i>	8		
	<i>FLANGE ND 110 / PN 10</i>	4	<i>pcs</i>	4		
	<i>built-in set F150 mm</i>	8	<i>pcs</i>	8		
	<i>built-in set F100 mm</i>	4	<i>pcs</i>	4		
	<i>cap of 7 kg</i>	12	<i>pcs</i>	12		
	<i>anchor block 30/30/25</i>	4	<i>pcs</i>	4		
<b>7</b>	<i>Purchase and installation of PPH F 80 and additional fitting for polyethylene pipe ND160. Node 65</i>					
	<i>PPH F 80</i>	1	<i>pcs</i>	1		
	<i>LS F 80</i>	1	<i>pcs</i>	1		
	<i>PTR 160/90 PE 100</i>	1	<i>pcs</i>	1		
	<i>oval valve F 80</i>	1	<i>pcs</i>	1		
	<i>Flaing Adapter Flange ND 90</i>	1	<i>pcs</i>	1		
	<i>built-in set F80 mm</i>	1	<i>pcs</i>	1		
	<i>cap of 7 kg</i>	1	<i>pcs</i>	1		
	<i>cap of 30 kg</i>	1	<i>pcs</i>	1		
	<i>anchor block 30/30/25</i>	1	<i>pcs</i>	1		
<b>Total Water supply SRU3:</b>						

*SRU 3 - water supply connections*

<b>II.1.5 Bill of quantities for excavations and connections forthe water supply network of "SRU 3" str. in ARM 1 - Bitola L = 22.00m</b>					
<b>Poz.</b>	<b>Description</b>	<b>Measure</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>

<b>1</b>	Marking and securing of the route Payment is done by 1 m' of executed work				
	m' 22.00	m'	22		
<b>2</b>	Excavation of earth III soil category for channel trenches with average depth 1.07m. Payment is done by 1.00 m3 excavated earth				
	m <sup>3</sup> 16.48				
	80 % mechanical excavation	m <sup>3</sup>	13.18		
	20 % manual excavation	m <sup>3</sup>	3.30		
<b>3</b>	Purchase and installation of HDPE 100 polyethylene water supply pipes. Payment by 1,00m'executed work				
	ND 110/10 bar 22.00	m'	22		
<b>4</b>	Manual and mechanical backfilling with mechanical compaction of the trench in layers of 20-30 cm. Payment is done by 1.00 m <sup>3</sup> executed work				
	m <sup>3</sup> 16.31	m <sup>3</sup>	16.31		
<b>5</b>	Loading and transport of the residue soil into landfill site up to 8,00 km distance Payment – by 1.00 m3 executed work				
	m <sup>3</sup> 0.17	m <sup>3</sup>	0.17		
<b>6</b>	Purchase and installation of connecting material (fitting) for ND110 polyethylene pipe.				
	OP F 150/100 2	pcs	2		
	oval valve F 100 2	pcs	2		
	ADAP. FLAN. WITH RING ND 160 4	pcs	4		
	ADAP. FLAN. WITH RING ND 110 2	pcs	2		
	built-in set F100 mm 2	pcs	2		
	cap 7 kg 2	pcs	2		
	anchor block 30/30/25 2	pcs	2		
<b>Total Water supply connections SRU3:</b>					

<b>II.1.6 Bill of quantities for construction of a water supplying network of profile Number 16 (str. SrU 4) in ARM 1 - Bitola L = 408,12m</b>					
<b>Item</b>	<b>Description of works</b>	<b>Measurement</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
<b>1</b>	Marking and securing of the route Payment is done by 1.00 m' executed work				
	m' 408.12	m'	408.12		
<b>2</b>	Excavation of earth III soil category for channel trenches with width of 70 cm. Payment is done by 1.00 m <sup>3</sup> excavated earth				
	m <sup>3</sup> 274.01				
	80 % mechanical excavation	m <sup>3</sup>	219.21		
	20 % manual excavation	m <sup>3</sup>	54.80		
<b>3</b>	Purchase and installation of polyethylene HDPE 100 water supplying pipes Payment is done by 1,00 m' executed work				
	ND 160/10 bars 408.12	m'	408.12		
<b>4</b>	Manual backfilling with mechanical compaction of the trench in layers of 20-30`cm. Payment is done by 1.00 m <sup>3</sup> executed work				
	m <sup>3</sup> 265.80	m <sup>3</sup>	265.80		
<b>5</b>	Loading and removal of the residual earth at the landfill at a distance of 8,00 km Payment is done by 1.00 m <sup>3</sup> executed work				
	m <sup>3</sup> 8.21	m <sup>3</sup>	8.21		
<b>6</b>	Purchase and installation of fittings for node: 27 and 31				
	KP F 150 2	piece	2		
	RP F 150/100 4	piece	4		
	oval valve F 150 4	piece	4		
	oval valve F 100 4	piece	4		
	ADAPTER FLANGE ND 160 4	piece	4		
	ADAPTER FLANGE ND 110 4	piece	4		
	FLANGE ND 160 / PN 10 4	piece	4		
FLANGE ND 110 / PN 10 4	piece	4			

	<i>built-in set F150 mm</i>	4	<i>piece</i>	4		
	<i>built-in set F100 mm</i>	4	<i>piece</i>	4		
	<i>cap of 7 kg</i>	8	<i>piece</i>	8		
	<i>anchor block 30/30/25</i>	2	<i>piece</i>	2		
<b>7</b>	<i>Purchase and installation of fittings for node: 36, 38, 39</i>					
	<i>OP F 150/100</i>	3	<i>piece</i>	3		
	<i>oval valve F 150</i>	6	<i>piece</i>	6		
	<i>oval valve F 100</i>	3	<i>piece</i>	3		
	<i>ADAPTER FLANGE ND 160</i>	6	<i>piece</i>	6		
	<i>ADAPTER FLANGE ND 110</i>	3	<i>piece</i>	3		
	<i>FLANGE ND 160 / PN 10</i>	6	<i>piece</i>	6		
	<i>FLANGE ND 110 / PN 10</i>	3	<i>piece</i>	3		
	<i>built-in set F150 mm</i>	6	<i>piece</i>	6		
	<i>built-in set F100 mm</i>	3	<i>piece</i>	3		
	<i>cap od 7 kg</i>	9	<i>piece</i>	9		
	<i>anchor block 30/30/25</i>	3	<i>piece</i>	3		
<b>8</b>	<i>Purchase and installation of PPH F 80 and additional fitting for polyethylene pipe ND160. Node 65</i>					
	<i>PPH F 80</i>	1	<i>piece</i>	1		
	<i>LS F 80</i>	1	<i>piece</i>	1		
	<i>PTR 160/90 PE 100</i>	1	<i>piece</i>	1		
	<i>oval valve F 80</i>	1	<i>piece</i>	1		
	<i>Flaing Adapter Flange ND 90</i>	1	<i>piece</i>	1		
	<i>built-in set F80 mm</i>	1	<i>piece</i>	1		
	<i>cap of 7 kg</i>	1	<i>piece</i>	1		
	<i>cap of 30 kg</i>	1	<i>piece</i>	1		
	<i>anchor block 30/30/25</i>	1	<i>piece</i>	1		
<b>Total Water supply SRU 4:</b>						

*SRU 4 - water supply connections*

<b>II.1.7 Bill of quantities for excavations and connections for the water supply networkof "SRU 4" str. in ARM 1 - Bitola L = 8,40m</b>					
<b>Pos.</b>	<b>Description</b>	<b>Measur ement</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>



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<b>1</b>	Marking and securing of the route Payment is done by 1.00 m' executed work				
	m' 8.40	m'	8.40		
<b>2</b>	Excavation of earth III soil category for channel trenches with average depth 0,88m. Payment is done by 1.00 m <sup>3</sup> excavated earth				
	m <sup>3</sup> 5.17				
	80 % mechanical excavation	m <sup>3</sup>	4.14		
	20 % manual excavation	m <sup>3</sup>	1.03		
<b>3</b>	Purchase and installation of HDPE 100 polyethylene water supply pipes. Payment by 1,00m' executed work				
	ND 110/10 bar 8.40	m'	8.40		
<b>4</b>	Manual and mechanical backfilling with mechanical compaction of the trench in layers of 20-30 cm. Payment is done by 1.00 m <sup>3</sup> executed work				
	m <sup>3</sup> 5.10	m <sup>3</sup>	5.10		
<b>5</b>	Loading and transport of the residue soil into landfill site up to 8,00 km distance Payment – by 1.00 m <sup>3</sup> executed work				
	m <sup>3</sup> 0.07	m <sup>3</sup>	0.07		
<b>6</b>	Purchase and installation of connecting material (fitting) for ND110 polyethylene pipe.				
	OP F 150/100 1	pcs	1		
	oval valve F 100 1	pcs	1		
	ADAP. FLAN. WITH RING ND 160 2	pcs	2		
	ADAP. FLAN. WITH RING ND 110 1	pcs	1		
	built-in set F100 mm 1	pcs	1		
	cap 7 kg 1	pcs	1		
	anchor block 30/30/25 1	pcs	1		
<b>Total Water supply connections SRU4:</b>					

*StU 5b Water supply*

**II.1.8 Bill of quantities for construction of a water supplying network of profile Number 17 (str. StU 5b )  
in ARM 1 - Bitola L = 137,80 m**

<i>Item</i>	<i>Description of works</i>	<i>Measures</i>	<i>Quantity</i>	<i>Unit price</i>	<i>Total</i>
<b>1</b>	Marking and securing of the route Payment is done by 1.00 m' executed work				
	m' 137.80	m'	137.80		
<b>2</b>	Excavation of earth III soil category for channel trenches with width of 70 cm. Payment is done by 1.00 m <sup>3</sup> excavated earth				
	m <sup>3</sup> 102.49				
	80 % mechanical excavation	m <sup>3</sup>	81.99		
	20 % manual excavation	m <sup>3</sup>	20.50		
<b>3</b>	Purchase and installation of polyethylene HDPE 100 water supplying pipes Payment is done by 1,00 m' executed work				
	ND 160/10 bars 137.80	m'	137.80		
<b>4</b>	Manual backfilling with mechanical compaction of the trench in layers of 20-30 cm. Payment is done by 1.00 m <sup>3</sup> executed work				
	m <sup>3</sup> 99.72	m <sup>3</sup>	99.72		
<b>5</b>	Loading and removal of the residual earth at the landfill at a distance of 8,00 km Payment is done by 1.00 m <sup>3</sup> executed work				
	m <sup>3</sup> 2.77	m <sup>3</sup>	2.77		
<b>6</b>	Purchase and installation of fittings for node: 41				
	OP F 100/100 1	piece	1		
	oval valve F 100 3	piece	3		
	ADAPTER FLANGE ND 110 3	piece	3		
	FLANGE ND 110 / PN 10 3	piece	3		
	built-in set F100 mm 3	piece	3		
	cap of 7 kg 3	piece	3		
anchor block 30/30/25 1	piece	1			

<b>Total Water supply STU5b:</b>				

## *II.2 Water supplying in ARM 2*

str. SRU4

<b>II.2.1 Bill of quantities for water supplying (sanitary and technological), hydrant network and water supply connections of the street SRU 4 in ARM-2 in BITOLA</b>					
		<b>unit measure</b>	<b>quantity</b>	<b>unit price</b>	<b>Total price</b>
<b>I</b>	<b><i>EARTH WORKS</i></b>				
<b>1</b>	Marking and securing of the route	m'	1,650		
<b>2</b>	Crushing concrete and rock with a compressor, loading and transport to the landfill at a distance of 10 km.	m3	14		
<b>3</b>	Mechanical cutting of the asphalt and concrete t=10cm	m'	46		
<b>4</b>	Mechanical excavation of the asphalt and concrete, loading and transport to the landfill at a distance of 10 km	m3	7		
<b>5</b>	Mechanical excavation of earth of fourth and fifth category in narrow scope with depth of the trench of 0-2m	m3	1,760		
<b>6</b>	Manual excavation of earth in fourth and fifth category in narrow scope with depth of the trench of 0-2m	m3	240		
<b>7</b>	Fine planning of the trench bottom with accuracy of the finish level + - 2cm	m2	1,320		
<b>8</b>	Manual backfilling of the trench in layers t=20-30cm with planning and compaction	m3	450		
<b>9</b>	Mechanical backfilling of a trench with planning and compaction in layers t= 20-30cm, complete with geomechanical control of the compaction	m3	1,130		
<b>10</b>	Loading and transport of the surplus earth to the landfill at a distance up to 10 km	m3	420		
<b>11</b>	Purchase, and transport and spreading of fine sand in layer of 10 cm on the bottom of the trench	m3	140		
<b>12</b>	Purchase, transport, and embedding of crushed stones with planning and	m3	390		

	compaction, complete with geomechanical control of compaction.				
<b>13</b>	Purchase, transport and concreting with Concrete class 30 without formwork	m3	7		
<b>14</b>	Purchase, transport and concreting of base t=10cm, with Concrete Cass 30, complete with wire-mesh reinforcement Q131	m2	23		
<b>15</b>	Repairing the trench from above with BNHS (Bitumen road surface) 16 t=10cm, complete with dusting and spreading of bitulit.(Bitumen)	m2	33		
<b>16</b>	Testing and disinfection of the pipeline	m'	1,650		
<b>II</b>	<b><i>INSTALLATION WORKS</i></b>				
<b>1</b>	Construction of reinforced concrete manholes 120/150cm, by detail, with walls and slab t=15cm and floor with t=15cm, with Concrete class 30, reinforced structurally on two sides with Q188	Nr.	8		
<b>2</b>	Purchase and installation of HDPE pipes and hoses				
	OD 160/10	m'	1,650		
	OD 90	m'	380		
	OD 32	m'	700		
<b>3</b>	Purchase, transport and installation with testing of fitting pieces and fixtures				
	T DN 150/150	Nr.	4		
	T DN 150/100	Nr.	4		
	FF DN 150/600	Nr.	20		
	FF DN 100/600	Nr.	4		
	assemble-dismantle piece DN 150	Nr.	8		
	ASF OD 160	Nr.	20		
	ASF OD 110	Nr.	4		
	ASF OD 90	Nr.	5		
	Q 90° DN 150	Nr.	1		
	Q 90° DN 100	Nr.	1		

	Q 90° DN 80	Nr.	5		
	flat valve DN 150	Nr.	12		
	flat valve DN 100	Nr.	4		
	oval valve ND 80	Nr.	1		
	oval valve ND 80 with built-in set	Nr.	5		
	DVV DN 80	Nr.	1		
	PTR OD 160/90	Nr.	5		
	PPH DN 80	Nr.	5		
	collars f160/1"	Nr.	70		
	double nipples 1"	Nr.	70		
	elbows 1"	Nr.	70		
	adapter socket f32	Nr.	140		
4	<p>Purchase and installation of a lid for a manhole with round frame all according to EN 124, with load-bearing class D 400. The lid and the frame must be made of ductile iron with an adequate anti-corrosion protection. The lid must be connected with the frame from one side with a hinge, and from the other side through a wedge to lock with a key and a keyhole integrated with the construction. The dynamic stability to be secured at least with three contact points. On the contact surface between the lid and the frame there must be a ring of composite material for vertical stabilization. The construction must provide opening of the lid of at least 130° degrees, and blockage of the lid at 90° for protection of the workers of sudden closure. To hold a certificate for environmental protection ISO14001. Possibility to install a dirt collector.</p>				
	- opening DN 610	Nr.	8		
<b><i>Total Water supply and hydrant network with connections SRU4:</i></b>					

Str. STU 7

<b>II.2.2 Bill of quantities for water supplying (sanitary and tehnological), hydrant network and water supply connections of the street STU 7 in ARM-2 in BITOLA</b>					
		<b>Unit measure</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total price</b>
<b>I</b>	<b><i>EARTH WORKS</i></b>				
<b>1</b>	Marking and securing of the route	m'	1,240		
<b>2</b>	Crushing concrete and rock with a compressor, loading and transport to the landfill at a distance of 10 km.	m3	10		
<b>3</b>	Mechanical excavation of earth of fourth and fifth category in narrow scope with depth of the trench of 0-2m	m3	1,409		
<b>4</b>	Manual excavation of earth in fourth and fifth category in narrow scope with depth of the trench of 0-2m	m3	191		
<b>5</b>	Fine planning of the trench bottom with accuracy of the finish level + - 2cm	m2	990		
<b>6</b>	Manual filling of the trench in layers t=20-30cm with planning and compaction	m3	390		
<b>7</b>	Mechanical filling of a trench with planning and compaction in layers t=20-30cm, complete with geomechanical control of the compaction	m3	860		
<b>8</b>	Loading and transport of the surplus earth to the landfill at a distance up to 10 km	m3	350		
<b>9</b>	Purchase, and transport and spreading of fine sand in layer of 10 cm along the bottom of the trench	m3	99		
<b>10</b>	Purchase, transport, and embedding of crushed stones with planning and compaction, complete with geomechanical control of compaction.	m3	320		
<b>11</b>	Purchase, transport and concreting with Concrete class MB 30 without formwork	m3	3		
<b>12</b>	Purchase, transport and concreting of base t=10cm, with Concrete class 30, complete with wire-mesh reinforcement Q131	m2	10		
<b>13</b>	Testing and disinfection of the pipeline	m'	1,240		

<b>II</b>	<b>INSTALLATION WORKS</b>				
1	Construction of reinforced concrete manholes 120/150cm, by detail, with walls and slab t=15cm and floor with t=15cm, with Concrete class 30, reinforced structurally on two sides with Q188	Nr.	3		
2	Purchase and installation of HDPE pipes and hoses				
	OD 160/10	m'	620		
	OD 110/10	m'	620		
	OD 32	m'	600		
3	Purchase, transport and installation with testing of fitting pieces and fixtures				
	T DN 150/150	Nr.	2		
	T DN 100/100	Nr.	1		
	FF DN 150/600	Nr.	6		
	FF DN 100/600	Nr.	3		
	FF DN 80/600	Nr.	7		
	assemble-dismantle piece DN 150	Nr.	2		
	assemble-dismantle piece DN 100	Nr.	1		
	ASF OD 160	Nr.	6		
	ASF OD 110	Nr.	3		
	Q 90° DN 150	Nr.	1		
	Q 90° DN 100	Nr.	1		
	flat valve DN 150	Nr.	4		
	flat valve DN 100	Nr.	2		
	oval valve ND 80 with built-in set	Nr.	7		
	PTR OD 160/90	Nr.	3		
	PTR OD 110/90	Nr.	4		
	PPH DN 80	Nr.	7		
	collar f160/1"	Nr.	30		
	collar f110/1"	Nr.	30		
	double nipples 1"	Nr.	60		

	elbows 1"	Nr.	60		
	adapter socket f32	Nr.	120		
4	Purchase and installation of a lid for a manhole with round frame all according to EN 124, with load-bearing class D 400. The lid and the frame must be made of ductile iron with an adequate anti-corrosion protection. The lid must be connected with the frame from one side with a hinge, and from the other side through a wedge to lock with a key and a keyhole integrated with the construction. The dynamic stability to be secured at least with three contact points. On the contact surface between the lid and the frame there must be a ring of composite material for vertical stabilization. The construction must provide opening of the lid of at least 130° degrees, and blockage of the lid at 90° for protection of the workers of sudden closure. To hold a certificate for environmental protection ISO14001. Possibility to install a dirt collector.				
	- opening DN 610	Nr.	3		
<b>TOTAL Water supply and hidrant network with connections STU7:</b>					

STU12

<b>II.2.3 Bill of quantities for water supplying (sanitary and technological), hydrant network and water supply connections of the street STU12 in ARM-2 in BITOLA</b>					
		Unit measure	Quantity	Unit price	Total price
<b>Item</b>	<b><i>EARTH WORKS</i></b>				
<b>1</b>	Marking and securing of the route	m'	590		
<b>2</b>	Crushing concrete and rock with a compressor, loading and transport to the landfill at a distance of 10km	m3	5		
<b>3</b>	Mechanical excavation of earth in category 4 and 5 in narrow scope with depth of the trench from 0-2 m	m3	622		
<b>4</b>	Manual excavation of earth in in category 4 and 5 in narrow scope with depth of the trench from 0-2 m	m3	78		



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5	Fine planning of the trench bottom with accuracy of the finish level + - 2cm	m2	480		
6	Manual backfilling of the trench in layers t=20-30cm with planning and compaction	m3	180		
7	Mechanical backfilling of the trench with planning and compaction in layers t=20-30 cm, complete with geomechanical control of compaction	m3	350		
8	Loading and transport of surplus earth to the landfill at a distance of 10km	m3	170		
9	Purchase, transport and spreading of fine sand in layer of 10cm. on the bottom of the trench.	m3	48		
10	Purchase, transport and embedding of crushed stone with planning and compaction, complete with geomechanical control of compaction	m3	150		
11	Purchase, transport and concreting with Concrete class 30 without formwork	m3	3		
12	Purchase, transport and concreting of the base t=10cm, with Concrete class 30, complete with wire mesh reinforcement Q131	m2	10		
14	Testing and disinfection of the pipelines	m'	590		
<b>II</b>	<b><i>Installation works</i></b>				
1	Construction of reinforced concrete manholes 120/150cm, by detail, with walls and slab t=15cm and floor with t=15cm, with Concrete class 30, reinforced structurally on two sides with Q188	Nr.	4		
2	Purchase and installation of HDPE pipes and hoses				
	OD 160/10	m'	290		
	OD 110/10	m'	300		
	OD 32	m'	200		
3	Purchase, transport and installation with testing of the fitting pieces and fixtures				
	T DN 150/150	Nr.	2		
	T DN 100/100	Nr.	2		
	FF DN 150/600	Nr.	6		

	FF DN 100/600	Nr.	6		
	FF DN 80/600	Nr.	2		
	assemble-dismantle piece DN 150	Nr.	2		
	assemble-dismantle piece DN 100	Nr.	2		
	ASF OD 160	Nr.	6		
	ASF OD 110	Nr.	6		
	Q 90° DN 150	Nr.	1		
	Q 90° DN 100	Nr.	1		
	flat valve DN 150	Nr.	4		
	flat valve DN 100	Nr.	4		
	oval valve ND 80 withbuilt-in set	Nr.	2		
	PTR OD 160/90	Nr.	1		
	PTR OD 110/90	Nr.	1		
	PPH DN 80	Nr.	2		
	collars f160/1"	Nr.	10		
	collars f110/1"	Nr.	10		
	double nipples 1"	Nr.	20		
	elbows 1"	Nr.	20		
	adapter socket f32	Nr.	40		
4	<p>Purchase and installation of a lid for a manhole with round frame all according to EN 124, with load-bearing class D 400. The lid and the frame must be made of ductile iron with an adequate anti-corrosion protection. The lid must be connected with the frame from one side with a hinge, and from the other side through a wedge to lock with a key and a keyhole integrated with the construction. The dynamic stability to be secured at least with three contact points. On the contact surface between the lid and the frame there must be a ring of composite material for vertical stabilization. The construction must provide opening of the lid of at least 130° degrees, and blockage of the lid at 90° for protection of the workers of sudden closure. To hold a certificate for environmental protection ISO14001. Possibility to install a dirt collector.</p>				

	- opening	DN 610	Nr.	4	
<b>TOTAL Water supply and hydrant network with connections STU12:</b>					

### III.1 Roadway and excavations in ARM 1

<b>III.1.1 Bill of quantities for construction of roadway of SrU 2 in ARM 1 - Bitola L = 283,44m</b>					
<b>Item</b>	<b>Description of works</b>	<b>Measures</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
<b>1. Preparatory and Earth works</b>					
<b>1.1</b>	<i>Geodetic staking out and securing the alignment according to the situation.</i>				
	<i>m' 283.44</i>	<i>m'</i>	<i>283.44</i>		
<b>1.2</b>	<i>Mechanical and manual clearing of the terrain from above-ground and underground structures and installations with transport to permanent landfill. A lump sum is paid.</i>				
	<i>lump sum 1</i>	<i>lump sum.</i>	<i>1</i>		
<b>1.3</b>	<i>Mechanical excavation of humus with loading and transport to permanent landfill at a distance to 8 km. Payment is done by 1 m<sup>3</sup> of executed work</i>				
	<i>from tabular overview m<sup>3</sup> 1,160.00</i>	<i>m<sup>3</sup></i>	<i>1,160</i>		
<b>1.4</b>	<i>Mechanical excavation of earth III category with wide excavation according to the cross-sectional profile up to elevation of placement of replacement material. In the price are included the excavation of earth, loading and transport to the permanent landfill at a distance of 8km. Payment is done by 1 m<sup>3</sup> of executed work</i>				
	<i>from tabular overview m<sup>3</sup> 2,668.40</i>	<i>m<sup>3</sup></i>	<i>2,668.40</i>		
<b>Total 1. :</b>					
<b>2. SUBSTRUCTURE</b>					

2.1	<p><i>Mechanical compaction and rolling of the earth where the humus is excavated (subsoil) and planning with accuracy up to 3 cm. as base for placing the replacement material</i>  <i>Payment is done by 1 m<sup>2</sup> of executed work</i></p>				
	<p><i>m<sup>2</sup> 5,372.60</i></p>	<p><i>m<sup>2</sup></i></p>	<p><i>5,372.60</i></p>		
2.2	<p><i>Construction of drainage for drying up the sub-base. The work includes completion of the excavation of earth (0,10 x 0,30), concreting the base with Concrete class 20 (0,10x0,30) , placing a perforated PVC pipe ND 110mm. at 80 cm below the road surface, connected to the storm water manholes with16 fittings with PVC elbow 45° with ND 110mm. and installation of 6 non-return valves Ø100 mm in the pipes at the connection point</i>  <i>Payment is done by 1 m' of executed work</i></p>				
	<p><i>m' 540.00</i></p>	<p><i>m'</i></p>	<p><i>540</i></p>		
2.3	<p><i>Construction of improved sub-base and filling of drainage with improved material by mechanical spreading and compaction in layers of 25 cm . To use material with maximum presence of small particles up to 5% and fraction d50 from 0-63mm or equivalent material according to regulations</i>  <i>To use material according to the standards (MKS B.B0, MKS B. B8, MKS U. B1, MKS U. C4, MKS U. E4, MKS U. E8 and MKS U. E4 with there subgroups)</i>  <i>The bidder procurement material</i>  <i>Payment is done by 1 m<sup>3</sup> of executed work</i></p>				
	<p><i>m<sup>3</sup> 2,025.00</i></p>	<p><i>m<sup>3</sup></i></p>	<p><i>2,025</i></p>		
2.4	<p><i>Purchase and installation of complete street gullies constructed of reinforced concrete pipe F 400 mm with cast iron grating RP 511 heavy type 400KN and connectionPVC pipe ND 200 with L = 1 m' (according to detail)</i>  <i>It is charged by installed pieces</i></p>	<p><i>pcs</i></p>	<p><i>18</i></p>		

2.5	Construction of earth embankments with mechanical spreading and compaction in layers of 25 cm. with imported earth. Payment is done by 1 m <sup>3</sup> of executed work				
	from tabular overview m <sup>3</sup> 373.60	m <sup>3</sup>	373.60		
2.6	Compaction and rolling of sub-basee. Payment is done by 1 m <sup>2</sup> of executed work				
	m <sup>2</sup> 5,480.00	m <sup>2</sup>	5,480.00		
<b>Total 2. :</b>					
<b>3 SUPERSTRUCTURE</b>					
3.1	Supply and embedding of crushed stone material for construction of the bearing road-base layer Payment is done by 1 m <sup>3</sup> of executed work				
	from tabular overview m <sup>3</sup> 1,425.40	m <sup>3</sup>	1,425.40		
3.2	Supply and embedding of prefabricated concrete curbs on concrete bedding. Payment is done by 1 m' of executed work				
	-angled curbs 24/20/100 995.00	m'	995		
	- straight curbs 8/15/100 477.00	m'	477		
3.3	Construction of bearing layer on the road surface with bituminous mixture (BNS 22) with thickness of 8,00 cm. on road surface Payment is done by 1 m <sup>2</sup> of executed work				
	m <sup>2</sup> 3,992.55	m <sup>2</sup>	3,992.55		
3.4	Construction of a wearing layer of asphalt concrete AB 11 with thickness of t= 4,00 cm . on the road surface with previous clearing and spraying of the road surface with emulsion. Payment is done by 1 m <sup>2</sup> of executed work				
	m <sup>2</sup> 3,992.55	m <sup>2</sup>	3,992.55		
3.5	Construction of upper layer with prefabricated paver elements with dimension 10x20x 6,00 cm with grey color for the sidewalks. Payment is done by 1 m <sup>2</sup> of executed work				
	m <sup>2</sup> 1,286.94	m <sup>2</sup>	1,286.94		

**Total Construction of Roadway SRU2 :**

**III.1.2 Bill of Quantities for excavations for energy cables of "SRU 2" str. in ARM 1 - Bitola L = 80m**

<b>Pos.</b>	<b>Description</b>	<b>Measure</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
<b>1</b>	Marking and securing of the route Payment –by 1,00 m' executed work				
	<b>m'</b> 80.00	<i>m'</i>	80		
<b>2</b>	Making document of the connection site with absolute coordinates (x,y,z) and marking the field area with metal spike Ø 14 mm (L = 50 sm). Payment - executed work - unit price				
	<i>pcs</i> 10	<i>pcs</i>	10		
<b>3</b>	Excavation of soil III category for canal trenches 0.80 m. average depth. Payment by 1.00 m <sup>3</sup> executed work				
	<b>m<sup>3</sup></b> 38.40				
	<b>m<sup>3</sup> - mechanical</b> 30.72	<i>m<sup>3</sup></i>	30.72		
	<b>m<sup>3</sup> - manual work</b> 7.68	<i>m<sup>3</sup></i>	7.68		
<b>4</b>	Purchase and installation of HDPE red protective pipes ND 160 mm placed in PVC separators (combs) in gaps of 1.00m. Payment – by 1,00m' executed work				
	<b>m' ND 160</b> 160.00	<i>m'</i>	160		
<b>5</b>	Manual and mechanical backfilling with compacting in layers of 20 - 30 cm. Payment – by 1,00m'executed work				
	<i>m<sup>3</sup></i> 31,97	<i>m<sup>3</sup></i>	31.97		
<b>6</b>	Loading and transport of the residue soil into landfill site up to 8,00 km distance Payment – by 1.00 m <sup>3</sup> executed work on free-germinate soil				
	<i>m<sup>3</sup></i> 6.43	<i>m<sup>3</sup></i>	6.43		
<b>7</b>	Securing the pipes ends with PVC cover and foil. Payment - unit price				
	<i>pcs</i> 20	<i>pcs</i>	20		

**TOTAL Excavations for energy cablesSRU2 :****III.1.3 Bill of Quantities  
for excavations for telecommunication cables of "SRU 2" str. in ARM 1 - Bitola L = 80 m**

<b>Pos.</b>	<b>Description</b>	<b>Measure</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
<b>1</b>	Marking and securing of the route Payment – by 1,00 m' executed work				
	<b>m'</b> 80,00	<b>m'</b>	<b>80</b>		
<b>2</b>	Making document of the connection site with absolute coordinates (x,y,z) and marking the field area with metal spike Ø 14 mm (L = 50 cm). Payment - executed work - unit price				
	<b>pcs</b> 10	<b>pcs</b>	<b>10</b>		
<b>3</b>	Excavation of soil III category for canal trenches 0.80 m. average depth. Payment – by 1.00 m <sup>3</sup> executed work				
	<b>m<sup>3</sup></b> 38,40				
	<b>m<sup>3</sup> - mechanical</b> 30,72	<b>m<sup>3</sup></b>	<b>30,72</b>		
	<b>m<sup>3</sup> - manual work</b> 7,68	<b>m<sup>3</sup></b>	<b>7,68</b>		
<b>4</b>	Purchase and installation of HDPE yellow protective pipes ND110 mm placed in PVC separators (combs) with 4 pipes at a distance of 1.00m. Payment -.by 1,00m' executed work				
	<b>m' ND 110</b> 320.00	<b>m'</b>	<b>320.00</b>		
	<b>separators for 4 pipes</b> 80	<b>pcs</b>	<b>80</b>		
<b>5</b>	Manual and mechanical backfilling with compacting in layers of 20 - 30 cm. Payment – by 1,00m'executed work				
	<b>m<sup>3</sup></b>	<b>m<sup>3</sup></b>	<b>28,35</b>		
<b>6</b>	Loading and transport of the residue soil into landfill site up to 8,00 km distance Payment – by 1.00 m <sup>3</sup> executed work on free-germinate soil				
	<b>m<sup>3</sup></b> 10,05	<b>m<sup>3</sup></b>	<b>10,05</b>		
<b>7</b>	Securing the pipes ends with PVC cover and foil. Payment - unit price				
	<b>pcs</b> 40	<b>pcs</b>	<b>40</b>		

<b>8</b>	<i>Complete manual construction of reinforced concrete manholes for excavations on the streets, with internal base dimensions 0.7 x 0.7m and a height of 0.8 mm, thickness of walls and bottom plate 0.1m and constructively reinforced Q 188, covered with reinforced concrete cover in two parts with dimensions 0.9 x 0.45 and thickness t = 0.12, PA F8mm and concrete class MB30. (According detal) Payment-executed work - unit price.</i>	<i>pcs</i>	<i>10</i>		
<b>-Total Excavations for telecommunication cables SRU2:</b>					

*SrU 3 in ARM1*

**III.1.4 Bill of quantity for construction of a roadway  
in SrU 3 in ARM 1 - Bitola L = 309,68m**

<b>Item</b>	<b>Description of works</b>	<b>Measure</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
<b>1. Preparatory and Earth works</b>					
<b>1.1</b>	<i>Geodetic staking out and securing the alignment according to the situation.</i>				
	<i>m' 309.68</i>	<i>m'</i>	<i>309.68</i>		
<b>1.2</b>	<i>Mechanical and manual clearing of the terrain from above-ground and underground structures and installations with transport to permanent landfill. A lump sum is paid.</i>				
	<i>lump sump 1</i>	<i>lump sum</i>	<i>1</i>		
<b>1.3</b>	<i>Mechanical excavation of humus with loading and transport to permanent landfill at a distance to 8,00 km. Payment is done by 1,00 m3 executed work</i>				
	<i>from tabular overview m<sup>3</sup> 967.95</i>	<i>m<sup>3</sup></i>	<i>967.95</i>		



1.4	<p><i>Mechanical excavation of earth III category with wide excavation according to the cross-sectional profile up to elevation of placement of replacement material. In the price are included the excavation of earth, loading and transport to the permanent landfill at a distance of 8,00 km.</i></p> <p><i>Payment is done by 1,00 m3 executed work</i></p>				
	<p><i>from tabular overview</i> m<sup>3</sup> 1,821.09</p>	m <sup>3</sup>	1,821.09		
<b>Total 1. :</b>					
<b>2. SUBSTRUCTURE</b>					
2.1	<p><i>Mechanical compaction and rolling of the earth where the humus is excavated (subsoil) and planning with accuracy up to 3 cm. as base for placing the replacement material</i></p> <p><i>Payment is done by 1 m2 executed work</i></p>				
	m <sup>2</sup> 4,635.36	m <sup>2</sup>	4,635.36		
2.2	<p><i>Construction of drainage for drying up the sub-base. The work includes completion of the excavation of earth (0,10 x 0,30), concreting the base with concrete class MB20 (0,10x0,30) , placing a perforated PVC pipe ND 110mm. at 80 cm below the road surface, connected to the storm water manholes with 16 fittings with PVC elbow 45° with ND 110mm and installation of 3 non-return valves Ø100 mm in the pipes at the connection point.</i></p> <p><i>Payment is done by 1,00 m' executed work</i></p>				
	m' 90.50	m'	90.50		
2.3	<p><i>Construction of improved sub-base and filling of drainage with improved material by mechanical spreading and compaction in layers of 25 cm .To use material according to the standards (MKS B.B0, MKS B. B8, MKS U. B1, MKS U. C4, MKS U. E4, MKS U. E8 and MKS U. E4 with there subgroups) To use material with maximum presence of small particles up to 5% and fraction d50 from 0-63mm or equivalent material according to regulations. The bidder procurement material</i></p> <p><i>Payment is done by 1,00 m3 executed work</i></p>				
	m <sup>3</sup> 407.25	m <sup>3</sup>	407.25		
2.4	<p><i>Purchase and installation of complete street gullies constructed of reinforced concrete pipe F 400 mm with cust iron grating RP 511 heavy</i></p>				
		pcs	10		

	<i>type 400KN and connectionPVC pipe ND 200 with L = 1 m' (according to detail) It is charged by installed pieces</i>				
<b>2.5</b>	<i>Construction of earth embankments with mechanical spreading and compaction in layers of 25 cm. with imported earth. Payment is done by 1,00 m3 executed work</i>				
	<i>from tabular overview m<sup>3</sup> 464.80</i>	<i>m<sup>3</sup></i>	<i>464.80</i>		
<b>2.6</b>	<i>Compaction and rolling of sub-base. Payment is done by 1,00 m2 executed work</i>				
	<i>m<sup>2</sup> 4,515.36</i>	<i>m<sup>2</sup></i>	<i>4,515.36</i>		
<b>Total 2. :</b>					
<b>3 SUPERSTRUCTURE</b>					
<b>3.1</b>	<i>Supply and embedding of crushed stone material for construction of the bearing road-base layer</i>				
	<i>Payment is done by 1,00 m<sup>3</sup> executed work</i>				
	<i>from tabular overview m<sup>3</sup> 1,132.93</i>	<i>m<sup>3</sup></i>	<i>1,132.93</i>		
<b>3.2</b>	<i>Purchase and embedding of prefabricated concrete curbs on concrete bedding. Payment is done by 1,00 m' executed work</i>				
	<i>-angle curbs 24/20/100 505.00</i>	<i>m'</i>	<i>505</i>		
	<i>- straight curbs 8/15/100 480.00</i>	<i>m'</i>	<i>480</i>		
<b>3.3</b>	<i>Construction of bearing layer on the road surface with bituminous mixture (BNHS 16a) with thickness of 7,00 cm. on road surface</i>				
	<i>Payment is done by 1,00 m2 built in material</i>				
	<i>m<sup>2</sup> 2,834.75</i>	<i>m<sup>2</sup></i>	<i>2,834.75</i>		
<b>3.4</b>	<i>Construction of upper layer with prefabricated paver elements with dimension 10x20x 6cm with grey color for the sidewalks. Payment is done by 1,00 m2 built in material</i>				
	<i>m<sup>2</sup> 1,292.96</i>	<i>m<sup>2</sup></i>	<i>1,292.96</i>		
<b>Total 3 :</b>					
<b>Total Construction roadway on SRU3:</b>					

<b>III.1.5 Bill of Quantities</b>					
<i>excavations for telecommunication cables of "SRU 3" str. in ARM 1 - Bitola L = 77m</i>					
<i>for</i>					
<b>Pos.</b>	<b>Description</b>	<b>Measure</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
<b>1</b>	<i>Marking and securing of the route</i>				
	<i>Payment by 1,00 m' executed work</i>				
	<i>m' 77.00</i>	<i>m'</i>	<i>77</i>		

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2	<p>Making document of the connection site with absolute coordinates (x,y,z) and marking the field area with metal spike Ø 14 mm (L = 50 cm). Payment - executed work - unit price</p>					
		pcs	14	pcs	14	
3	<p>Excavation of soil III category for canal trenches 0.75 m. average depth. Payment by 1.00 m<sup>3</sup> executed work</p>					
		m <sup>3</sup>	31.50			
		m <sup>3</sup> - mechanical	25.20	m <sup>3</sup>	25.20	
		m <sup>3</sup> - manual work	6.30	m <sup>3</sup>	6.30	
4	<p>Purchase and installation of HDPE yellow protective pipes ND 110 mm placed in PVC separators (combs) with 4 pipes in gaps at a distance of 1.00m. Payment by 1,00m' of executed work</p>					
		m' ND 110	308.00	m'	308	
		separators for 4 pipes	77	unit	77	
5	<p>Manual and mechanical backfilling with compacting in layers of 20 - 30 cm. Payment by 1,00m'executed work</p>					
		m <sup>3</sup>	21.82	m <sup>3</sup>	21.82	
6	<p>Loading and transport of the residue soil into landfill site up to 8,00 km distance Payment – by 1.00 m<sup>3</sup> executed work . on free-germinate soil</p>					
		m <sup>3</sup>	9.68	m <sup>3</sup>	9.68	
7	<p>Securing the pipes ends with PVC cover and foil. Payment - unit price</p>					
		unit	56	unit	56	
8	<p>Complete manual construction of reinforced concrete manholes for excavations on the streets, with internal base dimensions 0.7 x 0.7m and a height of 0.8 mm, thickness of walls and bottom plate 0.1m and constructively reinforced Q 188, covered with reinforced concrete cover in two parts with dimensions 0.9 x 0.45 and thickness t = 0.12, PA F8mm and concrete class MB30. (According detal) Payment-executed work - unit price.</p>			pcs	6	

**Total Excavations fot telecommunication cables SRU3:**

<b>III.1.6 Bill of Quantities for excavations for energy cables of "SRU 3" str. in ARM 1 - Bitola L = 77m</b>					
<b>Pos.</b>	<b>Description</b>	<b>Measurement</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
<b>1</b>	Marking and securing of the route Payment –by 1,00 m' executed work				
	<b>m'</b> 77.00	<b>m'</b>	<b>77</b>		
<b>2</b>	Making document of the connection site with absolute coordinates (x,y,z) and marking the field area with metal spike Ø 14 mm (L = 50 sm). Payment - executed work - unit price				
	<b>pcs</b> 14	<b>pcs</b>	<b>14</b>		
<b>3</b>	Excavation of soil III category for canal trenches 0.75 m. average depth. Payment by 1.00 m <sup>3</sup> executed work				
	<b>m<sup>3</sup></b> 31.50				
	<b>m<sup>3</sup> - mechanical</b> 25.20	<b>m<sup>3</sup></b>	<b>25.20</b>		
	<b>m<sup>3</sup> - manual work</b> 6.30	<b>m<sup>3</sup></b>	<b>6.30</b>		
<b>4</b>	Purchase and installation of HDPE red protective pipes ND 160 mm placed in PVC separators (combs) in gaps of 1.00m. Payment by 1,00m' - executed work				
	<b>m' ND 160</b> 154.00	<b>m'</b>	<b>154</b>		
<b>5</b>	Manual and mechanical backfilling with compacting in layers of 20 - 30 cm. Payment by 1,00m' executed work				
	<b>m<sup>3</sup></b> 25.31	<b>m<sup>3</sup></b>	<b>25.31</b>		
<b>6</b>	Loading and transport of the residue soil into landfill site up to 8,00 km distance Payment by 1.00 m <sup>3</sup> executed work free-germinate soil				
	<b>m<sup>3</sup></b> 6.19	<b>m<sup>3</sup></b>	<b>6.19</b>		
<b>7</b>	Securing the pipes ends with PVC cover and foil. Payment - unit price				
	<b>unit</b> 28	<b>unit</b>	<b>28</b>		
<b>-Total Excavation for energy cables SRU3:</b>					

## SrU 4 in ARM1

<b>III.1.7 Bill of quantity for construction of a roadway at str."SrU 4" in ARM 1 - Bitola L = 405,02 m</b>					
<b>Ite m</b>	<b>Description of works</b>	<b>Measur emen</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
<b>1. Preparatory and Earth works</b>					
<b>1.1</b>	<i>Geodetic staking out and securing the alignment according to the situation.</i>				
	<i>m' 405.02</i>	<i>m'</i>	<i>405.02</i>		
<b>1.2</b>	<i>Mechanical and manual clearing of the terrain from above-ground and underground structures and installations, with transport to permanent landfill. A lump sum is paid.</i>				
	<i>lump sum 1</i>	<i>lump sum</i>	<i>1</i>		
<b>1.3</b>	<i>Mechanical excavation of humus with loading and transport to permanent landfill at a distance to 8,00 km. Payment is done by 1,00 m3 executed work</i>				
	<i>from tabular overview m<sup>3</sup> 1,326.51</i>	<i>m<sup>3</sup></i>	<i>1,326.51</i>		
<b>1.4</b>	<i>Mechanical excavation of earth III category with wide excavation according to the cross-sectional profile up to elevation of placement of replacement material. In the price are included the excavation of earth, loading and transport to the permanent landfill at a distance of 8,00 km. Payment is done by 1,00 m3 executed work</i>				
	<i>from tabular overview m<sup>3</sup> 2,568.63</i>	<i>m<sup>3</sup></i>	<i>2,568.63</i>		
<b>Total 1. :</b>					
<b>2. SUBSTRUCTURE</b>					
<b>2.1</b>	<i>Mechanical compaction and rolling of the earth where the humus is excavated (subsoil) and planning with accuracy up to 3 cm. as base for placing the replacement material Payment is done by 1,00 m2 executed work</i>				
	<i>m<sup>2</sup> 6,529.03</i>	<i>m<sup>2</sup></i>	<i>6,529.03</i>		
<b>2.2</b>	<i>Construction of drainage for drying up the sub-base. The work includes completion of the excavation of earth (0,10 x 0,30), concreting the base with concrete class</i>				

	<p>MB20 (0,10x0,30) , placing a perforated PVC pipe ND 110mm. at 80 cm below the road surface, and construction of fittings in the manholes for the external sewerage network with PVC elbow 45° with ND 110mm. Payment is done by 1 m'of executed work</p>				
	m' 392.22	m'	392.22		
2.3	<p>Purchase and installation of complete street gullies constructed of reinforced concrete pipe F 400 mm with cast iron grating RP 511 heavy type 400KN and connectionPVC pipe ND 200 with L = 1 m' (according to detail) It is charged by installed pieces</p>				
	pieces 11	pcs	11		
2.4	<p>Construction of improved sub-base and filling of drainage with improved material by mechanical spreading and compaction in layers of 25 cm. To use material according to the standards (MKS B.B0, MKS B. B8, MKS U. B1, MKS U. C4, MKS U. E4, MKS U. E8 and MKS U. E4 with there subgroups)To use material with maximum presence of small particles up to 5% and fraction d50 from 0-63mm or equivalent material according to regulations. The bidder procurement material Payment is done by 1 m3of executed work</p>				
	m <sup>3</sup> 2,166.24	m <sup>3</sup>	2,166.24		
2.5	<p>Construction of earth embankments with mechanical spreading and compaction in layers of 25 cm with imported earth. Payment is done by 1 m3of executed work</p>				
	from tabular overview m <sup>3</sup> 593.61	m <sup>3</sup>	593.61		
2.6	<p>Compaction and rolling of sub-base. Payment is done by 1 m3of executed work</p>				
	m <sup>2</sup> 6,167.67	m'	6,167.67		
<b>Total 2. :</b>					
<b>3 SUPERSTRUCTURE</b>					
3.1	<p>Supply and embedding of crushed stone material for construction of the bearing road-base layer Payment is done by 1 m<sup>3</sup> of executed work</p>				
	from tabular overview m <sup>3</sup> 1,576.30	m <sup>3</sup>	1,576.30		

3.2	<i>Purchase and embedding of prefabricated concrete curbs on concrete bedding. Payment is done by 1m'of executed work</i>					
	-angled curbs 24/20/100	758.83	m'	758.83		
	- straight curbs 8/15/100	77.66	m'	77.66		
3.3	<i>Construction of bearing layer on the road surface with bituminous mixture (BNHS 16a) with thickness of 7,00 cm. on road surface Payment is done by 1 m2 of built in material</i>					
	m <sup>2</sup>	4,180.72	m <sup>2</sup>	4,180.72		
3.5	<i>Construction of upper layer of prefabricated paver elements with dimension 10x20x 6,00 cm with grey color for the sidewalks. Payment is done by 1 m2 of built in material</i>					
	m <sup>2</sup>	1,771.24	m <sup>2</sup>	1,771.24		
<b>Total 3. :</b>						
<b>Total Construction of roadway SRU4:</b>						

**III.1.8 Bill of Quantities for excavations for telecommunication cables  
of "SRU 4" str. in ARM 1 - Bitola L = 101,50m**

<b>Pos.</b>	<b>Description</b>	<b>Measu rement</b>	<b>Quant ity</b>	<b>Unit price</b>	<b>Total</b>
1	<i>Marking and securing of the route Payment - executed work min. 1,00 m'</i>				
	m'	101.50	m'	101.50	
2	<i>Making document of the connection site with absolute coordinates (x,y,z) and marking the field area with metal spike Ø 14 mm (L = 50 cm). Payment - executed work - unit price</i>				
	pcs	20	pcs	20	
3	<i>Excavation of soil III category for canal trenches 0.68 m. average depth. Payment by 1.00 m<sup>3</sup> executed work</i>				
	m <sup>3</sup>	41.41			
	m <sup>3</sup> - mechanical	33.13	m <sup>3</sup>	33.13	
	m <sup>3</sup> - manual	8.28	m <sup>3</sup>	8.28	

4	Purchase and installation of HDPE yellow protective pipes 110 mm placed in PVC separators (combs) with 4 pipes in gaps of 1.00m. Payment by 1m' of executed work				
	<b>m' ND 110</b> 406.00	m'	406		
	<b>separators for 4 pipes</b> 102	pcs	102		
5	Manual and mechanical backfilling with compacting in layers of 20 - 30 cm. Payment by 1,00m'executed work				
	m <sup>3</sup> 28.65	m <sup>3</sup>	28.65		
6	Loading and transport of the residue soil into landfill site up to 8 km distance Payment by 1 m3of executed work on free-germinate soil				
	m <sup>3</sup> 12.76	m <sup>3</sup>	12.76		
7	Securing the pipes ends with PVC cover and foil. Payment - unit price				
	pcs 80	pcs	80		
8	Complete manual construction of reinforced concrete manholes for excavations on the streets, with internal base dimensions 0.7 x 0.7m and a height of 0.8 mm, thickness of walls and bottom plate 0.1m and constructively reinforced Q 188, covered with reinforced concrete cover in two parts with dimensions 0.9 x 0.45 and thickness t = 0.12, PA F8mm and concrete class MB30. (According detal) Payment-executed work - unit price.	pcs	10		
<b>Total Excavation for telecommunication cables SRU4:</b>					
<b>III.1.9 Bill of Quantities for excavations for energy cables of "SRU 4" str. in ARM 1 - Bitola L = 101,50m</b>					
<b>Pos.</b>	<b>Description</b>	<b>Measur ement</b>	<b>Quant ity</b>	<b>Unit price</b>	<b>Total</b>
1	Marking and securing of the route Payment by 1,00 m' executed work				
	m' 101.50	m'	101.50		



2	Making document of the connection site with absolute coordinates (x,y,z) and marking the field area with metal spike Ø 14 mm (L = 50 cm). Payment - executed work - unit price				
	pcs 20	pcs	20		
3	Excavation of soil III category for canal trenches 0.68 m. average depth. Payment by 1 m <sup>3</sup> of executed work				
	m <sup>3</sup> 41.41				
	m <sup>3</sup> - mechanical 33.13	m <sup>3</sup>	33.13		
	m <sup>3</sup> - manual 8.28	m <sup>3</sup>	8.28		
4	Purchase and installation of HDPE red protective pipes ND160 mm . Payment by 1m' executed work				
	m' ND 160 203.00	m'	203		
5	Manual and mechanical backfilling with compacting in layers of 20 - 30 cm. Payment by 1m' of executed work				
	m <sup>3</sup> 33.25	m <sup>3</sup>	33.25		
6	Loading and transport of the residue soil into landfill site up to 8,00 km distance Payment by 1 m <sup>3</sup> of executed work on free-germinate soil				
	m <sup>3</sup> 8.16	m <sup>3</sup>	8.16		
7	Securing the pipes ends with PVC cover and foil. Payment - unit price				
	pcs 40	pcs	40		
<b>Total Excavations for energy cables SRU4 :</b>					

StU 5b in ARM1

<b>III.1.10 BILL OF QUANTITY for construction of roadway of the Str. "StU 5b" in ARM 1 - Bitola L = 126,40m</b>					
<b>Item</b>	<b>Description of works</b>	<b>Measur ement</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
<b>1. Preparatory and Earth works</b>					
<b>1.1</b>	Geodetic staking out and securing the alignment according to the situation.				

	<i>m'</i>	126.40	<i>m'</i>	126.40		
<b>1.2</b>	<i>Mechanical and manual clearing of the terrain from above-ground and underground structures and installations, with transport to permanent landfill. A lump sum is paid.</i>					
	<i>lump sum</i>	1	<i>lump sum</i>	1		
<b>1.3</b>	<i>Mechanical excavation of humus with loading and transport to permanent landfill at a distance to 8,00 km. Payment is done by 1,00 m3 executed work</i>					
	<i>from tabular overview</i>	<i>m<sup>3</sup></i>	308.06	<i>m<sup>3</sup></i>	308.06	
<b>1.4</b>	<i>Mechanical excavation of earth III category with wide excavation according to the cross-sectional profile up to elevation of placement of replacement material. In the price are included the excavation of earth, loading and transport to the permanent landfill at a distance of 8 km. Payment is done by 1,00 m3 executed work</i>					
	<i>from tabular overview</i>	<i>m<sup>3</sup></i>	738.49	<i>m<sup>3</sup></i>	738.49	
<b>Total 1. :</b>						
<b>2. SUBSTRUCTURE</b>						
<b>2.1</b>	<i>Mechanical compaction and rolling of the earth where the humus is excavated (subsoil) and planning with accuracy up to 3 cm. as base for placing the replacement material Payment is done by 1,00 m2 executed work</i>					
	<i>m<sup>2</sup></i>	1,508.90	<i>m<sup>2</sup></i>	1,508.90		
<b>2.2</b>	<i>Construction of drainage for drying up the sub-base. The work includes completion of the excavation of earth (0,10 x 0,30), concreting the base with concrete class MB20 (0,10x0,30), placing a perforated PVC pipe ND 110mm. at 80 cm below the road surface, and construction of fittings in the manholes for the external sewerage network with PVC elbow 45° with ND 110mm.</i>					

	<i>Payment is done by 1,00 m' executed work</i>				
	<i>m' 130.90</i>	<i>m' 130.90</i>			
<b>2.3</b>	<i>Purchase and installation of complete street gullies constructed of reinforced concrete pipe F 400 mm with cast iron grating RP 511 heavy type 400KN and connectionPVC pipe ND 200 with L = 1 m' (according to detail) It is charged by installed pieces</i>				
	<i>pieces 3</i>	<i>pcs 3</i>			
<b>2.4</b>	<i>Construction of improved sub-base and filling of drainage with improved material by mechanical spreading and compaction in layers of 25 cm . To use material with maximum presence of small particles up to 5% and fraction d50 from 0-63mm or equivalent material according to regulations To use material according to the standards (MKS B.B0, MKS B. B8, MKS U. B1, MKS U. C4, MKS U. E4, MKS U. E8 and MKS U. E4 with there subgroups) The bidder procurement material Payment is done by 1,00 m3 executed work</i>				
	<i>m<sup>3</sup> 406.87</i>	<i>m<sup>3</sup> 406.87</i>			
<b>2.5</b>	<i>Construction of earth embankments with mechanical spreading and compaction in layers of 25 cm with imported earth. Payment is done by 1,00 m3 executed work</i>				
	<i>from tabular overview m<sup>3</sup> 92.60</i>	<i>m<sup>3</sup> 92.60</i>			
<b>2.6</b>	<i>Compaction and rolling of sub-base. Payment is done by 1,00 m2 executed work</i>				
	<i>m<sup>2</sup> 1,432.30</i>	<i>m' 1,432.30</i>			
<b>Total 2. :</b>					
<b>3 SUPERSTRUCTURE</b>					
<b>3.1</b>	<i>Supply and embedding of crushed stone material for construction of the bearing road-base layer Payment is done by 1,00 m<sup>3</sup> executed</i>				

	work				
	from tabular overview	m <sup>3</sup> 369.69	m <sup>3</sup>	369.69	
<b>3.2</b>	<i>Purchase and embedding of prefabricated concrete curbs on concrete bedding. Payment is done by 1,00 m' executed work</i>				
	-angled curbs 24/20/100	221.90	m'	221.90	
	- straight curbs 8/15/100	189.13	m'	189.13	
<b>3.3</b>	<i>Construction of bearing layer on the road surface with bituminous mixture (BNHS 16a) with thickness of 7,00 cm. on road surface Payment is done by 1,00 m2 built in material</i>				
		m <sup>2</sup> 769.35	m <sup>2</sup>	769.35	
<b>3.4</b>	<i>Construction of upper layer of prefabricated paver elements with dimension 10x20x6,00 cm with grey color for the sidewalks. Payment is done by 1,00 m2 built in material</i>				
		m <sup>2</sup> 315.42	m <sup>2</sup>	315.42	
				<b>Total 3. :</b>	
				-	
				-	
				<b>Total Construction of Roadway STU5b:</b>	

**III.1.11 Bill of Quantities for excavations for energy cables  
of "STU 5b" str. in ARM 1 - Bitola L = 14,00m**

<b>Pos.</b>	<b>Description</b>	<b>Measure</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
<b>1</b>	Marking and securing of the route Payment - executed work min. 1,00 m'				
		m'	14.00		
<b>2</b>	Making document of the connection site with absolute coordinates (x,y,z) and marking the field area with metal spike Ø 14 mm (L = 50 cm). Payment - executed work - unit price				

	<i>pcs</i>	4	<i>pcs</i>	4		
<b>3</b>	<i>Excavation of III soil category for canal trenches 0.80 m. average depth.</i>					
	<i>Payment - executed work of min. od 1.00 m<sup>3</sup></i>					
	<i>m<sup>3</sup></i>	6.72				
	<i>m<sup>3</sup> - machine-made</i>	5.38	<i>m<sup>3</sup></i>	5.38		
	<i>m<sup>3</sup> - manual work</i>	1.34	<i>m<sup>3</sup></i>	1.34		
<b>4</b>	<i>Purchase and installation of HDPE red protective pipes 160 in gaps of 1.00m.</i>					
	<i>Payment – by 1' executed work</i>					
	<i>m' Ø 160</i>	28.00	<i>m'</i>	28		
<b>5</b>	<i>Manual and mechanical backfilling with compacting in layers of 20 - 30 cm.</i>					
	<i>Payment – by 1m<sup>3</sup> executed</i>					
	<i>m<sup>3</sup></i>	5.59	<i>m<sup>3</sup></i>	5.59		
<b>6</b>	<i>Loading and transport of the residue soil into landfill site up to 8,00 km distance</i>					
	<i>Payment – by 1m<sup>3</sup> executed work on free-germinate soil</i>					
	<i>m<sup>3</sup></i>	1.13	<i>m<sup>3</sup></i>	1.13		
<b>7</b>	<i>Securing the pipes ends with PVC cover and foil.</i>					
	<i>Payment - unit price</i>					
	<i>pcs</i>	8	<i>pcs</i>	8		

**Total Excavations for energy cables STU5b :**

**III.1.12 Bill of Quantities for excavations for telecommunication cables of "STU 5b" str. in ARM 1 - Bitola L = 14,00m**

<b>Pos.</b>	<b>Description</b>	<b>Measure</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
<b>1</b>	<i>Marking and securing of the route</i>				
	<i>Payment by 1,00 m' executed work</i>				
	<i>m'</i>	14.00	<i>m'</i>	14	
<b>2</b>	<i>Making document of the connection site with absolute coordinates (x,y,z) and marking the field area with metal spike Ø 14 mm (L = 50 cm).</i>				
	<i>Payment - executed work - unit price</i>				
	<i>pcs</i>	4	<i>pcs</i>	4	

3	Excavation of soil III category for canal trenches 0.80 m. average depth. Payment by 1.00 m <sup>3</sup> executed work				
	<b>m<sup>3</sup></b> 6.72				
	<b>m<sup>3</sup> - mechanical</b> 5.38	<b>m<sup>3</sup></b>	5.38		
	<b>m<sup>3</sup> - manual work</b> 1.34	<b>m<sup>3</sup></b>	1.34		
4	Purchase and installation of HDPE yellow protective pipes ND110 mm placed in PVC separators (combs) with 4 pipes at a distance of 1.00m. Payment by 1,00m' executed work				
	<b>m' ND 110</b> 56.00	<b>m'</b>	56		
	<b>separators for 4 pipes</b> 14	<b>pcs</b>	14		
5	Manual and mechanical backfilling with compacting in layers of 20 - 30 cm. Payment by 1,00m'executed work				
	<b>m<sup>3</sup></b> 4.96	<b>m<sup>3</sup></b>	4.96		
6	Loading and transport of the residue soil into landfill site up to 8,00 km distance Payment by 1.00 m <sup>3</sup> executed work on free-germinate soil				
	<b>m<sup>3</sup></b> 1.76	<b>m<sup>3</sup></b>	1.76		
7	Securing the pipes ends with PVC cover and foil. Payment - unit price				
	<b>pcs</b> 16	<b>pcs</b>	16		
<b>Total Excavations for telecommunications cables</b>					-
<b>STU5b:</b>					-

### III.2 Roadway in ARM 2

SrU 4 in ARM2.

<b>III.2..1 BILL OF QUANTITY OF THE WORKS FOR THE DETAILED DESIGN FOR ASPHALTING of the street SRU 4 in ARM - 2 in BITOLA</b>					
Item	Type of activity	Unit measure	Quantity	Unit price	Total price
1	Staking out the route with wooden poles and maintenance of the staked out route during the execution of the works	m1	805		

2	Mechanical excavation of the humus, loading and transport to the landfill at a distance of 10 km.	m3	3,138		
3	Excavation of earth in wide excavation of fourth and fifth category by pushing up to 30 m and local transport up to 300m.	m3	3,278		
4	Excavation of earth for retaining wall foundation and creation of longitudinal side-cut of a terrain with gradient >20% for stabilization of the slope and foundation of retaining wall, loading and transport to the landfill at a distance of 10 km.	m3	525		
5	Planning and compaction of the subgrade	m2	3,210		
6	Embankment of the subgrade with local material in layers of 30cm. up to the sub-base level by planning, compaction and control of the compaction	m3	4,749		
7	Construction of drainage with semi-perforated pipes F100 for drainage of the sub-base , complete with excavation of the earth, concrete base 10x30cm. with Concrete class MB20 and connection to the manhole	m1	785		
8	Mechanical crushing of concrete and rock	m3	60		
9	Loading and transport of earth material and debris to the landfill at a distance of 10 km.	m3	2,547		
10	Planning and rolling of the sub-base to the necessary compaction level Ms=40 Mra, complete with testing of the compaction	m2	10,200		
11	Purchase, transport and construction of a road-base layer of crushed stone, planning and rolling, complete with testing of compaction	m3	2,724		
12	Purchase, transport and placement of concrete curbs on a concrete base with Concrete Class 20, including joints				
	<b>18/24 cm</b>	m1	1,638		
	<b>8/20 cm</b>	m1	1,638		
13	Mechanical cutting of asphalt and concrete t=10 cm	m1	50		

<b>14</b>	Mechanical embedding of asphalt on the street as a whole, bigger than 1000 m <sup>2</sup> , previously spinkled with emulsion				
	<b>BNS-22, t=8cm</b>	m <sup>2</sup>	6,459		
	<b>AC-11, d= 4cm.</b>	m <sup>2</sup>	6,459		
<b>15</b>	Concreting of foundations of the retaining wall with Concrete Class MB 30	m <sup>3</sup>	21		
	Formwork and concreting of reinforced concrete retaining wall with Concrete Class 30, t=25cm, H=1,8 to 3,1m with dilatation of rubber-coated band, with two rows of drainage holes.	m <sup>3</sup>	18		
<b>17</b>	Purchase, transport and embedding of a two-sided wire-mesh reinforcement R335 and R196 in the walls and foundation	kg	1,210		
<b>18</b>	Purchase, transport and bedding of anchors with rebars F12 and F14 in the walls and foundation	kg	465		
<b>19</b>	Purchase, transport and placement of interlock tiles t=6cm. on a layer of fine sand 3-5cm.	m <sup>2</sup>	2,845		
<b>20</b>	Complete manual construction of reinforced concrete manholes for excavations on the streets, with internal base dimensions 0.7 x 0.7m and a height of 0.8 mm, thickness of walls and bottom plate 0.1m and constructively reinforced Q 188, covered with reinforced concrete cover in two parts with dimensions 0.9 x 0.45 and thickness t = 0.12, PA F8mm and concrete class MB30. (According detal) Payment-executed work - unit price.	pcs	14		
<b><i>TOTAL Construction of Roadway SRU 4:</i></b>					

StU 7 in ARM2.



**III.2.2 BILL OF QUANTITY OF THE WORKS FOR THE DETAILED DESIGN  
FOR ASPHALTING of the street STU 7 in ARM - 2 in BITOLA**

<b>Item</b>	<b>Type of work</b>	<b>Unit measure</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total price</b>
<b>1</b>	Staking out the route with wooden poles and maintenance of the staked out route during the execution of the works	m1	600		
<b>2</b>	Mechanical excavation of the humus, loading and transport to the landfill at a distance of 10 km.	m3	2,165		
<b>3</b>	Excavation of earth in wide excavation of fourth and fifth category by pushing up to 30 m and local transport up to 300m.	m3	5,820		
<b>4</b>	Excavation of earth for retaining wall foundation and creation of longitudinal side-cut of a terrain with gradient >20% for stabilization of the slope and foundation of retaining wall, loading and transport to the landfill at a distance of 10 km.	m3	900		
<b>5</b>	Planning and compaction of the subgrade	m2	2,178		
<b>6</b>	Embankment of the subgrade with local material in layers of 30cm. up to the sub-base level by planning, compaction and control of the compaction	m3	3,956		
<b>7</b>	Construction of drainage with semi-perforated pipes F100 for drainage of the sub-base , complete with excavation of the earth, concrete base 10x30cm. with Concrete class MB20 and connection to the manhole	m1	580		
<b>8</b>	Mechanical crushing of concrete and rock	m3	30		
<b>9</b>	Loading and transport of surplus earth material to the landfill at a distance of 10km.	m3	1,894		

<b>10</b>	Planning and rolling of the sub-base to the necessary compaction level Ms=40 Mra, complete with testing of the compaction	m2	6,400		
<b>11</b>	Purchase, transport and construction of a road-base layer of crushed stone, planning and rolling, complete with testing of compaction	m3	1,792		
<b>12</b>	Purchase, transport and placement of concrete curbs on a concrete base with Concrete Class 20, including joints				
	<b>18/24 cm</b>	m1	1,205		
	<b>8/20 cm</b>	m1	1,205		
<b>13</b>	Mechanical cutting of asphalt and concrete t=10 tm	m1	25		
<b>14</b>	Mechanical embedding of asphalt on the street as a whole, bigger than 1000 m2, previously sprinkled with emulsion				
	<b>BNS-22, t=8cm.</b>	m2	4,422		
	<b>AB-11, t= 4cm.</b>	m2	4,422		
<b>15</b>	Concreting of foundations of the retaining wall with Concrete Class 30	m3	20		
<b>16</b>	Formwork and concreting of reinforced concrete retaining wall with Concrete Class 30, t=25cm, N=1,8 to 3,1m with dilatation of rubber-coated band, with two rows of drainage holes.	m3	22		
<b>17</b>	Purchase, transport and embedding of a two-sided wire-mesh reinforcement R335 and R196 in the walls and foundation	kg	1110		
<b>18</b>	Purchase, transport and bedding of anchors with rebars F12 in the walls and foundation	kg	525		
<b>19</b>	Purchase, transport and embedding of interlock tiles t=6cm. On a layer of fine sand 3-5 cm.	m2	1,544		
<b>20</b>	Complete manual construction of reinforced concrete manholes for excavations on the streets, with internal	pcs	4		

	base dimensions 0.7 x 0.7m and a height of 0.8 mm, thickness of walls and bottom plate 0.1m and constructively reinforced Q 188, covered with reinforced concrete covers in two parts with dimensions 0.9 x 0.45 and thickness t = 0.12, PA F8mm and concrete class MB30. (According detal) Payment-executed work - unit price.				
	<b><i>TOTAL Construction of Roadway STU 7:</i></b>				

*StU 12 in ARM2.*

<b><i>III.2.3 BILL OF QUANTITY OF THE WORKS FOR THE DETAILED DESIGN FOR ASPHALTING of the street STU 12 in ARM - 2 in BITOLA</i></b>					
<b>Item</b>	<b>Type of work</b>	<b>Unit measure</b>	<b>Quantity</b>	<b>Unit price</b>	
<b>1</b>	Staking out the route with wooden poles and maintenance of the staked out route during the execution of the works	m1	270		
<b>2</b>	Mechanical excavation of the humus, loading and transport to the landfill at a distance of 10 km.	m3	880		
<b>3</b>	Excavation of earth in wide excavation of fourth and fifth category by pushing up to 30 m and local transport up to 300m.	m3	1660		
<b>4</b>	Excavation of earth for retaining wall foundation and creation of longitudinal side-cut of a terrain with gradient >20% for stabilization of the slope, loading and transport to the landfill at a distance of 10 km.	m3	110		
<b>5</b>	Planning and compaction of the subgrade	m2	943		

<b>6</b>	Embankment of the subgrade with local material in layers of 30cm. up to the sub-base level by planning, compaction and control of the compaction	m3	524		
<b>7</b>	Construction of drainage with semi-perforated pipes F100 for drainage of the sub-base , complete with excavation of the earth, concrete base 10x30cm. with Concrete class MB20 and connection to the manhole	m1	260		
<b>8</b>	Mechanical crushing of concrete and rock	m3	30		
<b>9</b>	Loading and transport of surplus earth material to the landfill at a distance of 10km.	m3	1276		
<b>10</b>	Planning and rolling of the sub-base to the necessary compaction level Ms=40 Mra, complete with testing of the compaction	m2	3000		
<b>11</b>	Purchase, transport and construction of a road-base layer of crushed stone, planning and rolling, complete with testing of compaction	m3	780		
<b>12</b>	Purchase, transport and placement of concrete curbs on a concrete base with Concrete Class 20, including joints				
	<b>18/24 cm</b>	m1	545		
	<b>8/20 cm</b>	m1	545		
<b>13</b>	Mechanical cutting of asphalt and concrete t=10 cm	m1	25		
<b>14</b>	Mechanical embedding of asphalt on the street as a whole, bigger than 1000 m2, previously sprinkled with emulsion				
	<b>BNS-22, t=8cm.</b>	m2	1900		
	<b>AB-11, t= 4cm.</b>	m2	1900		
<b>15</b>	Purchase, transport and embedding of interlock tiles t=6cm. On a layer of fine sand 3-5 cm.	m2	680		

<b>16</b>	Complete manual construction of reinforced concrete manholes for excavations on the streets, with internal base dimensions 0.7 x 0.7m and a height of 0.8 mm, thickness of walls and bottom plate 0.1m and constructively reinforced Q 188, covered with reinforced concrete cover in two parts with dimensions 0.9 x 0.45 and thickness t = 0.12, PA F8mm and concrete class MB30. (According detal) Payment-executed work - unit price.	pcs	4		
<b><i>TOTAL Construction of roadway STU12:</i></b>					

### ***V.1 Electrical Lighting in ARM 1***

#### *SrU -2 - Street Lighting*

<b><i>IV.1.1 Bill of Quantities for materials and activities for electrical lighting of SrU-2 str. In ARM 1 Bitola</i></b>					
<b><i>1. Power supply line no. 3 from distribution board KRO-A no.4 substation TS 4.18</i></b>					
<b><i>Pos</i></b>	<b><i>Materials and activities description</i></b>	<b><i>Measure</i></b>	<b><i>Quantity</i></b>	<b><i>Unit price</i></b>	<b><i>Total</i></b>
<b><i>1</i></b>	<i>Cable type PP00-Al 4 16mm<sup>2</sup> to be placed from distribution board for street lighting KRO type A no.4 into ground trench with 0,8 m depth and 0,4m wide for Power supply line number 3 (10 poles) and to be connected into connection box on the pole following the INPUT-OUTPUT system.</i>	<i>m'</i>	<i>410.00</i>		
<b><i>2</i></b>	<i>From KRO Type A: no.4 (before TS4.18) A cable type PP00-Al 2 2,5mm<sup>2</sup> to be placed in parallel with the main supply cable from a position number 1 to each of the poles for lighting. The cable to be connected into the pole connection box and to continue toward the next pole following the INPUT - OUTPUT system.</i>	<i>m'</i>	<i>410.00</i>		
<b><i>3</i></b>	<i>From KRO - A no.4 to each of the pole from the power supply line number 3 a zink-plated tape 30 4 mm to be placed in parallel line with the power supply cables. The tape should be connected with</i>	<i>m'</i>	<i>390.00</i>		

	<i>the distribution board and each anchor plate of every pole.</i>				
<b>4</b>	<i>A plastic warning tape - ATTENTION CABLE to be placed above the cable in the trench.</i>	<i>m'</i>	<i>410.00</i>		
<b>5</b>	<i>Waterproof complete lamp to be supplied for public street lighting. The security level is IP65 completed with a fitting highpressed natrium lamp of 250W, light switch and subduer which provide two level work regime. The lamp must be installed at an angle of 10 degrees. As an example to which a photometric calculation has been done a DISANO or equivalent light was taken into calculation</i>	<i>pcs</i>	<i>20.00</i>		
<b>6</b>	<i>A metal pole 8m. high to be supplied and mounted The pole consists of three parts. The pole can be seen in the graphic part of the project. The pole to be painted with waterproof grey colour. The pole should have a TWOSIDED arc 1m long under angle of 100 in relation to the horizontal line. ( 8 arcs under 180 degrees angle in relation to each other and 2 arcs under 90 degrees angle).It should be completed with a connection box with two automatic fuses 16A and anchor base plate. The pole should be wired with a cable from the connection box of the pole to the light for two-leveled work regime.</i>	<i>pcs</i>	<i>10.00</i>		
<b>7</b>	<i>A concrete foundation for the pole of the position 6 to be produced on the site. The look and the dimensions of the foundation are presented in the graphic part of this documentation. The price includes the excavation of soil for the foundation, too. The foundation for the pole should be made with concrete class 20 with the dimensions 0,9x0,9x1m. A non-flexible PVC pipe with D=70mm should be placed on the opposite sides of the foundation under 45 degrees angle. In the middle of the foundation there should be a hole for placement of the two cables - the main</i>	<i>pcs</i>	<i>10.00</i>		

	<i>supply one 4 16mm<sup>2</sup> and the command one 2 2,5mm<sup>2</sup> following the INPUT-OUTPUT system.</i>				
<b>8</b>	<i>A manual excavation should be done because of the plenty of already existing underground installations (water supply, sewage and electricity) in the field where this electric infrastructure should be installed for parking lighting. The excavation should be made as a trench 0,8m depth, 0,4m wide with a small surrounding jagged ring in order to be protected from surrounding soil derrogation knowing that there is a shallow storm water drainage network. After the cables, zink-plated tape and the warning tape are placed in the trench, the trench to be closed in layers and the soil residue to be removed together with the soil that is left from the wide excavation of the street ring.</i>	<i>m'</i>	<i>350</i>		
<b>9</b>	<i>Fine sand should be supplied and placed into two layers of 10cm. The first layer of 10cm should be placed before cables placing, and the second sand layer follows after the cables placing.</i>	<i>m<sup>3</sup></i>	<i>28</i>		
<b>10</b>	<i>One armed cable protective covers should be supplied and mounted above the cables.</i>	<i>m'</i>	<i>350</i>		
<b>11</b>	<i>The asphalt cutting should be done right where the cables cross toward the opposite side of the street. After PVC pipe D=110mm placing the cutting should be repaired with asphalt. The soil digging is in the position 8.</i>	<i>m'</i>	<i>40</i>		
<b>12</b>	<i>A non flexible PVC pipe D=110mm to be supplied and placed into already excavated trench.</i>	<i>m'</i>	<i>60</i>		
<b>Total- 1 :</b>					
<b>2. Power supply line no. 4</b>					
<b>Pos.</b>	<b>Materials and activities description</b>	<b>Measure</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>

<p><b>1</b></p>	<p><i>Cable type PP00-Al 4 10mm<sup>2</sup> to be placed from distribution board for street lighting KRO type A no.4 into ground trench with 0,8 m depth and 0,4m wide for Power supply line number 64 (14 poles) and to be connected into connection box on the pole following the INPUT-OUTPUT system. Six independent power supply lines exit from KRO type A no.1. Cable for power supply line number 6 :</i></p>	<p><i>m'</i></p>	<p>323.00</p>		
<p><b>2</b></p>	<p><i>From KRO Type A: no.1 (before TS) A cable type PP00-Al 2 2,5mm<sup>2</sup> to be placed in parallel with the main supply cable from a position number 1 to each of the poles for lighting. The cable to be connected into the pole connection box and to continue toward the next pole following the INPUT - OUTPUT system.</i></p>	<p><i>m'</i></p>	<p>323.00</p>		
<p><b>3</b></p>	<p><i>From KRO - A no.4 to each of the pole from the power supply line number 4 (1 pole H=8m with two armed arc and 13 poles H-5m with direct planted of the light without an arc) a zink-plated tape 30 4 mm to be placed in parallel line with the power supply cables.The tape should be connected with the distribution board and each anchor plate of every pole.</i></p>	<p><i>m'</i></p>	<p>300.00</p>		
<p><b>4</b></p>	<p><i>A plastic warning tape - ATTENTION CABLE to be placed above the cable in the trench.</i></p>	<p><i>m'</i></p>	<p>300.00</p>		
<p><b>5</b></p>	<p><i>Waterproof complete lamp to be supplied for public street lighting. The security level is IP65 completed with a fitting highpressed natrium lamp of 250W, light switch and subduer which provide two-level work regime. The lamp must be installed at an angle of 10 degrees. As an example to which a photometric calculation has been done a DISANO or equivalent light was taken into calculation:</i></p>	<p><i>pcs</i></p>	<p>2.00</p>		



6	<p><i>A metal pole 8m. high to be supplied and mounted The pole consists of three parts. The pole can be seen in the graphic part of the project. The pole to be painted with waterproof grey colour. The pole should have a two sided arcs on the top 1m long under angle of 90 degrees in relation to each other and under angle of 10 degrees in relation to the horizontal line. It should be completed with a connection box with two automatic fuses 16A and anchor base plate. The pole should be wired with a cable from the connection box of the pole to the light for two-leveled work regime.</i></p>	pcs	1.00		
7	<p><i>Waterproof complete lamp to be supplied for public street lighting. The security level is IP65 completed with a fitting highpressed natrium lamp of 150W, light switch and subduer which provide two-level work regime. The lamp must be installed at an angle of 10 degrees. As an example to which a photometric calculation has been done a DISANO light or equivalent was taken into calculation</i></p>	pcs	13		
8	<p><i>A metal pole 5m. high to be supplied and mounted The pole consists of one part. The pole can be seen in the graphic part of the project. The pole to be painted with waterproof grey colour. The pole should have an arc 1m long under angle of 10 degrees in relation to the horizontal line. ( 13 arcs onearmed). It should be completed with a connection box with two automatic fuses 16A and anchor base plate. The pole should be wired with a cable from the connection box of the pole to the light for two-leveled work regime.</i></p>	pcs	13		

<p><b>9</b></p>	<p><i>A concrete foundation for the pole of the position 6 to be produced on the site. The look and the dimensions of the foundation are presented in the graphic part of this documentation. The price includes the excavation of soil for the foundation, too. The foundation for the pole should be made with concrete class MB 20 with the dimensions 0,9x0,9x1m. A non-flexible PVC pipe D=70mm should be placed on the opposite sides of the foundation under 45 degrees angle. In the middle of the foundation there should be a hole for placement of the two cables - the main supply one 4 16mm<sup>2</sup> and the command one 2 2,5mm<sup>2</sup> following the INPUT-OUTPUT system.</i></p>	<p>pcs</p>	<p>1</p>		
<p><b>10</b></p>	<p><i>A concrete foundation for the pole of the position 8 to be produced on the site. The look and the dimensions of the foundation are presented in the graphic part of this documentation. The price includes the excavation of soil for the foundation, too. The foundation for the pole should be made with concrete class 20 with the dimensions 0,6x0,6x0,8m. A non-flexible PVC pipe D=70mm should be placed on the opposite sides of the foundation under 45 degrees angle. In the middle of the foundation there should be a hole for placement of the two cables - the main supply one 4 16mm<sup>2</sup> and the command one 2 2,5mm<sup>2</sup> following the INPUT-OUTPUT system.</i></p>	<p>pcs</p>	<p>13</p>		
<p><b>11</b></p>	<p><i>A manual excavation should be done because of the plenty of already existing underground installations (water supply, sewage and electricity) in the field where this electric infrastructure should be installed for parking lighting. The excavation should be made as a trench 0,8m depth, 0,4m wide with a small surrounding jagged ring in order to be protected from surrounding soil derogation knowing that there is a shallow storm water drainage network. After the cables, zink-plated tape and the warning tape are placed in the trench, the trench to be closed in layers and the soil residue to be removed together with the soil that is left from the wide excavation of the street ring.</i></p>	<p>m'</p>	<p>300</p>		
<p><b>12</b></p>	<p><i>Fine sand should be supplied and placed into two layers of 10cm. The first layer of 10cm should be placed before cables placing, and the second sand layer follows after the cables placing.</i></p>	<p>m<sup>3</sup></p>	<p>24</p>		
<p><b>13</b></p>	<p><i>Onearmed cable protective covers should be supplied and mounted above the cables.</i></p>	<p>m'</p>	<p>300</p>		

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<b>14</b>	<i>The asphalt cutting should be done right where the cables cross toward the opposite side of the street. After PVC pipe D=110mm placing the cutting should be repaired with asphalt. The soil digging is in the position 11.</i>	m'	40		
<b>15</b>	<i>A non flexible PVC pipe D=110mm to be supplied and placed into already excavated trench.</i>	m'	100		
			<b>Total2 :</b>		
<b>Total 1:</b>					
<b>Total 2:</b>					
<b>-Total Electrical lighting SRU2:</b>					

SrU-3 - Street Lighting

**IV.1.2 Bill of Quantities for materials and activities for electrical lighting of SrU-3 str. in ARM 1 Bitola**

**1. Power supply line no. 4 from distribution board KRO type A no.8 substation TS 6.12**

<b>Pos.</b>	<b>Materials and activities description</b>	<b>Measure</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
<b>1</b>	<i>Cable type PP00-AI 4 16mm<sup>2</sup> to be placed from distribution board for street lighting KRO type A no.8 into ground trench with 0,8 m depth and 0,4m wide for Power supply line number 4 (4 poles) and to be connected into the connection box on the pole following the INPUT-OUTPUT. Six independent power supply lines exit from KRO type A no.8. Cable for power supply line number 4:</i>	m'	165		
<b>2</b>	<i>From KRO Type A: no.4 (before TS6.12) a cable type PP00-AI 2 2,5mm<sup>2</sup> to be placed in parallel with the main supply cable from a position number 1 to each of the poles for lighting. The cable to be connected into the pole connection box and to continue toward the next pole following the INPUT - OUTPUT system</i>	m'	165		
<b>3</b>	<i>From KRO - A no.8 to each of the pole from the power supply line number 4 (4 poles 8m) a zink-plated tape 30 4 mm to be placed in parallel line with the power supply cables.The tape should be connected with the distribution board and each anchor plate of every pole.</i>	m'	165		
<b>4</b>	<i>A plastic warning tape - ATTENTION CABLE to be placed above the cable in the trench.</i>	m'	165		
<b>5</b>	<i>Waterproof complete lamp to be supplied for public street lighting. The security level is IP65 completed with a fitting highpressed natrium lamp of 250W, light switch and subduer which provide two level work regime. The lamp must be installed at an angle of 10 degrees. As an example to which a photometric calculation has been done a DISANO or equivalent light was taken into calculation:</i>	pcs	4		

6	<i>A metal pole 8m. high to be supplied and mounted. The pole consists of three parts. The pole can be seen in the graphic part of the project. The pole to be painted with waterproof grey colour. The pole should have an arc 1m long on the top under angle of 10 degrees in relation to the horizontal line. (4 onearmed arcs). It should be completed with a connection box with two automatic fuses 16A and anchor base plate. The pole should be wired with a cable from the connection box of the pole to the light for twoleveled work regime.</i>	pcs	4		
7	<i>A concrete foundation for the pole of the position 6 to be produced on the site. The look and the dimensions of the foundation are presented in the graphic part of this documentation. The price includes the excavation of soil for the foundation, too. The foundation for the pole should be made with concrete class MB30 with the dimensions 0,9x0,9x1m. A non-flexible PVC pipe D=70mm should be placed on the opposite sides of the foundation under 45 degrees angle. In the middle of the foundation there should be a hole for placement of the two cables - the main supply one 4 16mm<sup>2</sup> and the command one 2 2,5mm<sup>2</sup> following the INPUT-OUTPUT system.</i>	pcs	4		
8	<i>A MANUAL excavation should be done because of the plenty of already existing underground installations (water supply, sewage and electricity) in the field where this electric infrastructure should be installed for parking lighting. The excavation should be made as a trench 0,8m depth, 0,4m wide with a small surrounding jagged ring in order to be protected from surrounding soil derogation knowing that there is a shallow storm water drainage network. After the cables, zink-plated tape and the warning tape are placed in the trench, the trench to be closed in layers and the soil residue to be removed together with the soil that is left from the wide excavation of the street ring.</i>	m'	140		
9	<i>Fine sand should be supplied and placed into two layers of 10cm. The first layer of 10cm should be placed before cables placing, and the second sand layer follows after the cables placing.</i>	m <sup>3</sup>	11.2		
10	<i>Onearmed cable protective covers should be supplied and mounted above the cables</i>	m'	140		
11	<i>The asphalt cutting should be done right where the cables cross toward the opposite side of the street. After PVC pipe D=110mm placing the cutting should be repaired with asphalt. The soil digging is in the position 8.</i>	m'	40		
12	<i>A non flexible PVC pipe D=110mm to be supplied and placed into already excavated trench.</i>	m'	60		
			<b>Total 1 :</b>		

<b>2. Power supply line no. 5</b>					
<b>Pos.</b>	<b>Materials and activities description</b>	<b>Measure</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
1	Cable type PP00-Al 4 16mm <sup>2</sup> to be placed from distribution board for street lighting KRO type A no.8 into ground trench with 0,8 m depth and 0,4m wide for Power supply line number 5 (6 poles) and to be connected into connection box on the pole following the INPUT-OUTPUT system.	m'	210		
2	From KRO Type A: no.8 (before TS6.12) a cable type PP00-Al 2 2,5mm <sup>2</sup> to be placed in parallel with the main supply cable from a position number 1 to each of the poles for lighting. The cable to be connected into the connection box and to continue toward the next pole following the INPUT - OUTPUT system.	m'	210		
3	From KRO - A no.8 to each of the pole site from the power supply line number 5 (6 poles) a zink-plated tape 30 4 mm to be placed in parallel line with the power supply cables. The tape should be connected with the distribution board and each anchor plate of every pole. This tape should be connected to the tape from the power supply line number 5 between the pole number 4 and 5 power supply line number 5.	m'	210.00		
4	A plastic warning tape - ATTENTION CABLE to be placed above the cable in the trench.	m'	210.00		
5	Waterproof complete lamp to be supplied for public street lighting. The security level is IP65 completed with a fitting highpressed natrium lamp of 250W, light switch and subduer which provide two level work regime. The lamp must be installed at an angle of 10 degrees. As an example to which a photometric calculation has been done a DISANO or equivalent light was taken into calculation	pcs	9.00		
6	A metal pole 8m. high to be supplied and mounted. The pole consists of three parts. The pole can be seen in the graphic part of the project. The pole to be painted with waterproof grey colour. The pole should have an arc on the top 1m long under angle of 10 degrees in relation to the horizontal line (3 onarmed arcs). It should be completed with a connection box with two authomatic fuses 16A and anchor base plate. The pole should be wired with a cable from the connection box of the pole to the light for two-leveled work regime.	pcs	3.00		
7	Same as position number 6, a metal pole with a two-armed arc on the top placed under angle of 90 degrees in relation to eachother, with two lights to be produced.	pcs	3.00		

8	A concrete foundation for the pole of the positions 6 and 7 to be produced on the site. The look and the dimensions of the foundation are presented in the graphic part of this documentation. The price includes the excavation of soil for the foundation, too. The foundation for the pole should be made with concrete class MB30 with the dimensions 0,9x0,9x1m. A non-flexible PVC pipe D=70mm should be placed on the opposite sides of the foundation under 45 degrees angle. In the middle of the foundation there should be a hole for placement of the two cables - the main supply one 4 16mm <sup>2</sup> and the command one 2 2,5mm <sup>2</sup> following the INPUT-OUTPUT system.	pcs	6.00		
9	A MANUAL excavation should be done because of the plenty of already existing underground installations (water supply, sewage and electricity) in the field where this electric infrastructure should be installed for parking lighting. The excavation should be made as a trench 0,8m depth, 0,4m wide with a small surrounding jagged ring in order to be protected from surrounding soil derrogation knowing that there is a shallow storm water drainage network. After the cables, zink-plated tape and the warning tape are placed in the trench, the trench to be closed in layers and the soil residue to be removed together with the soil that is left from the wide excavation of the street ring.	m'	175		
10	Fine sand should be supplied and placed into two layers of 10cm. The first layer of 10cm should be placed before cables placing, and the second sand layer follows after the cables placing.	m <sup>3</sup>	14		
11	Onearmed cable protective covers should be supplied and mounted above the cables.	m'	175		
12	The asphalt cutting should be done right where the cables cross toward the opposite side of the street. After PVC pipe D=110mm placing the cutting should be repaired with asphalt. The soil digging is in the position 9.	m'	40		
13	A non flexible PVC pipe D=110mm to be supplied and placed into already excavated trench.	m'	60		
			<b>Total 2 :</b>		
<b>3. Power supply line no. 6</b>					
<b>Pos.</b>	<b>Materials and activities description</b>	<b>Measure</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
1	Cable type PP00-Al 4 25mm <sup>2</sup> to be placed from distribution board for street lighting KRO type A no.4 into ground trench with 0,8 m depth and 0,4m wide .	m'	20		

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2	<i>Cable type PP00-Al 4 16mm<sup>2</sup> to be placed from distribution board for street lighting KRO type A no.8 into ground trench with 0,8 m depth and 0,4m wide for Power supply line number 6 that has 8 poles with 11 lights 250W. It should be connected into connection box on the pole following the INPUT-OUTPUT system. Cable for the power supply line number 6 :</i>	<i>m'</i>	<i>400.00</i>		
3	<i>From KRO Type A: no.8 (before TS6.12) a cable type PP00-Al 2 2,5mm<sup>2</sup> to be placed in parallel with the main supply cable from a position number 1 to each of the poles for lighting. The cable to be connected into the pole connection box and to continue toward the next pole following the INPUT - OUTPUT system..</i>	<i>m'</i>	<i>400.00</i>		
4	<i>From KRO - A no.8 to each of the pole from the power supply line number 6 (8 poles) a zink-plated tape 30 4 mm to be placed in parallel line with the energetic cables. The tape should be connected with the distribution board and each anchor plate of every pole.</i>	<i>m'</i>	<i>400.00</i>		
5	<i>A plastic warning tape - ATTENTION CABLE to be placed above the cable in the trench.</i>	<i>m'</i>	<i>400.00</i>		
6	<i>Waterproof complete lamp to be supplied for public street lighting. The security level is IP65 completed with a fitting highpressed natrium lamp of 250W, light switch and subduer which provide two level work regime. The lamp must be installed at an angle of 10 degrees. As an example to which a photometric calculation has been done a DISANO or equivalent light was taken into calculation</i>	<i>pcs</i>	<i>11</i>		
7	<i>A metal pole 8m. high to be supplied and mounted The pole consists of three parts. The pole can be seen in the graphic part of the project. The pole to be painted with waterproof grey colour. The pole should have an arc on the top 1m long under angle of 10 degrees in relation to the horizontal line. ( 5 onearmed arcs).It should be completed with a connection box with two automatic fuses 16A and anchor base plate. The pole should be wired with a cable from the connection box of the pole to the light for two-leveled work regime</i>	<i>pcs</i>	<i>5.</i>		
8	<i>Same as position number 7, a metal pole with a two-armed arc on the top placed under angle of 90 degrees in relation to each other, these poles will be with two lights</i>	<i>pcs</i>	<i>3.00</i>		
9	<i>A concrete foundation for the pole of the positions 7 and 8 to be produced on the site. The look and the dimensions of the foundation are presented in the graphic part of this documentation. The price includes the excavation of soil for the foundation, too. The foundation for the pole should be made with concrete class MB30 with the dimensions 0,9x0,9x1m. A non-flexible PVC pipe D=70mm should be placed on the twp opposite sidesof the</i>	<i>pcs</i>	<i>8.00</i>		

	<i>foundation under 45 degrees angle. In the middle of the foundation there should be a hole for placement of the two cables - the main supply one 4 16mm<sup>2</sup> and the command one 2 2,5mm<sup>2</sup> following the INPUT-OUTPUT system.</i>				
<b>10</b>	<i>A MANUAL excavation should be done because of the plenty of already existing underground installations (water supply, sewage and electricity) in the field where this electric infrastructure should be installed for parking lighting. The excavation should be made as a trench 0,8m depth, 0,4m wide with a small surrounding jagged ring in order to be protected from surrounding soil derrogation knowing that there is a shallow storm water drainage network. After the cables, zink-plated tape and the warning tape are placed in the trench, the trench to be closed in layers and the soil residue to be removed together with the soil that is left from the wide excavation of the street ring.</i>	<i>m'</i>	<i>368</i>		
<b>11</b>	<i>Fine sand should be supplied and placed into two layers of 10cm. The first layer of 10cm should be placed before cables placing, and the second sand layer follows after the cables placing.</i>	<i>m<sup>3</sup></i>	<i>30</i>		
<b>12</b>	<i>Onearmed cable protective covers should be supplied and mounted above the cables.</i>	<i>m'</i>	<i>368</i>		
<b>13</b>	<i>The asphalt cutting should be done right where the cables cross toward the opposite side of the street. After PVC pipe D=110mm placing the cutting should be repaired with asphalt. The soil digging is in the position 9.</i>	<i>m'</i>	<i>40</i>		
<b>14</b>	<i>A non flexible PVC pipe D=110mm to be supplied and placed into already excavated trench.</i>	<i>m'</i>	<i>40</i>		
<b>15</b>	<i>Supply and installation of a freestanding distribution board for outdoor installation. The distribution board KRO type A no.8 to be placed on a concrete foundation that should be produced on the site. The distribution board is of type A defined by EVN. The level of protection is IP44 and there is installed equipment that can be seen in the graphic part of the project from the functional scheme and by the look:</i> <ul style="list-style-type: none"> <li>- a switch mounted on the door for activation of lights pcs 1</li> <li>- compact fluorescent light 26W pcs 1</li> <li>- OG one-phased connector for incident use pcs 1</li> <li>- prevoltage protection - cathodes flows of prevoltage 5KA - pcs 3</li> <li>- three-pole automatic switch C60-N10 - pcs 1</li> <li>- AC 100 with electronic overvoltage protection with timer to instant short bond electricity reaction and regulation of the electricity selection - pcs 1</li> <li>- PHOTO RELAY or time programmer - twocannal with a possibility of astronomy time - pcs 1</li> <li>- three-pole contactor with nominal electricity</li> </ul>	<i>unit</i>	<i>1</i>		



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	<p>80A-400B - pcs 1x                  - two-pole installation contactor 63A, 230V and command voltage of the coil 230V - pcs 1                  - Cam switch with three positions 1-0-2 - pcs 2                  - automatic switch C60N - B/16A - pcs 6                  *armoured three-pole fuse - circuit breaker for nominal electricity up to 80A for the power supply line with cable PP00-Al 4x16mm<sup>2</sup>-pcs 4                  - Concrete foundation for this distribution board type A - pcs 1</p> <p>Completely mounted, tested under voltage and certified - attested for the level of insulation and put into operation:</p>				
				<b>Total 3</b>	
	<b>Total 1:</b>				
	<b>Total 2:</b>				
	<b>Total 3:</b>				
<b>TotalElectrical lighting SRU3-:</b>					

SrU-4 and SrU-5 - Street Lighting

Premeasuring with calculation

**IV.1.3 Bill of Quantities for materials and activities for electrical lighting of SrU-4 str. and StU-5b in ARM 1 Bitola**

**1. Power supply line no. 1 from distribution board KRO type A no.5 substation TS 8.9**

Pos.	Materials and activities description	Measure	Quantity	Unit price	Total
1	Cable type PP00-Al 4 25mm <sup>2</sup> to be placed from the existing substation TC10/0,4kV marked with the number (8.9) in the graphic part of the project on the street SrU4 to the distribution board for electricity KRO type A no.5 into ground trench with 0,8 m depth and 0,4m wide to a new distribution board for lighting regulation. The board is marked as KRO Type A no. 5. It is according to the request of EVN. Power supply line for street lighting exit from that distribution board.	m'	15		
2	Cable type PP00-Al 4 16mm <sup>2</sup> to be placed from distribution board for street lighting KRO type A no.5 into ground trench with 0,8 m depth and 0,4m wide for power supply line number 1 (18 poles) and to be connected into the connection box on the pole following the system INPUT-OUTPUT. Cable for power supply line number 1:	m'	700		
3	From KRO Type A: no.5 (before TS) a cable type PP00-Al 2 2,5mm <sup>2</sup> to be placed in parallel with the main supply cable from a position number 1 to each of the poles for lighting. The cable to be connected into the pole connection box and to continue toward the next pole following the INPUT - OUTPUT	m'	700		

	system				
4	From KRO - A no.5 to each of the pole from the power supply line number 1 (18 poles 8m) a zink-plated tape 30 4 mm to be placed in parallel line with the power supply cables.The tape should be connected with the distribution board and each anchor plate of every pole.	m'	634		
5	A plastic warning tape - ATTENTION CABLE to be placed above the cable in the trench.	m'	598		
6	Waterproof complete lamp to be supplied for public street lighting. The security level is IP65 completed with a fitting highpressed natrium lamp of 250W, light switch and subduer which provide two level work regime. The lamp must be installed at an angle of 10 degrees.. As an example to which a photometric calculation has been done a DISANO or equivalent light was taken into calculation	pcs	22		
7	A metal pole 8m. high to be supplied and mounted. The pole consists of three parts. The pole can be seen in the graphic part of the project. The pole to be painted with waterproof grey colour. The pole should have an arc 1m long on the top under angle of 10 degrees in relation to the horizontal line. It should be completed with a connection box with two automatic fuses 16A and anchor base plate. The pole should be wired up with a cable from the connection box of the pole to the light for two-leveled work regime.	pcs	14		
8	Same as position number 8, a metal pole with a two armed arc on the top placed under angle of 90 degrees in relation to eachother, with two lights to be produced.	pcs	4		
9	A concrete foundation for the pole of the positions 8 and 9 to be produced on the site. The look and the dimensions of the foundation are presented in the graphic part of this documentation. The price includes the excavation of soil for the foundation, too. The foundation for the pole should be made of concrete class MB30 with the dimensions 0,9x0,9x1m. A non-flexible PVC pipe D=70mm should be placed on the two opposite sides of the foundation under 45 degrees angle. In the middle of the foundation there should be a hole for placement of the two cables - the main supply one 4 16mm <sup>2</sup> and the command one 2 2,5mm <sup>2</sup> following the INPUT-OUTPUT system.	pcs	18		
10	A MANUAL excavation should be done because of the plenty of already existing underground installations (water supply, sewage and electricity) in the field where this electric infrastructure should	m'	598		

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	<i>be installed for parking lighting. The digging should be made as a trench 0,8m depth, 0,4m wide with a small surrounding jagged ring in order to be protected from surrounding soil derrogation knowing that there is a shallow storm water drainage network. After the cables, zink-plated tape and the warning tape are placed in the trench, the trench to be closed in layers and the soil residue to be removed together with the soil that is left from the wide excavation of the street ring.</i>				
<b>11</b>	<i>Fine sand should be supplied and placed into two layers of 10cm. The first layer of 10cm should be placed before cables placing, and the second sand layer follows after the cables placing.</i>	<i>m<sup>3</sup></i>	<i>48</i>		
<b>12</b>	<i>One armed cable protective covers should be supplied and mounted above the cables.</i>	<i>m'</i>	<i>598</i>		
<b>13</b>	<i>The asphalt cutting should be done right where the cables cross toward the opposite side of the street. After PVC pipe D=110mm placing the cutting should be repaired with asphalt. The soil digging is in the position 11.</i>	<i>m'</i>	<i>80</i>		
<b>14</b>	<i>A non flexible PVC pipe D=110mm to be supplied and placed into already excavated trench.</i>	<i>m'</i>	<i>80</i>		
<b>15</b>	<p><b>Supply and installation of a freestanding distribution board for outdoor installation. The distribution board KRO type A no.8 to be placed on the concrete foundation that should be produced on the site. The distribution board is of type A defined by EVN. The level of protection is IP44 and there is installed equipment that can be seen in the graphic part of the project from the functional scheme and by the look:</b></p> <ul style="list-style-type: none"> <li>- a switch mounted on the door for activation of lights pcs 1</li> <li>- compact fluorescent light 26W pcs 1</li> <li>- OG one-phased connector for incident use pcs 1</li> <li>- surge protection – cathodic surge diverter 5KA - pcs 3</li> <li>- three pole automatic switch C60-N10 - pcs 1</li> <li>- AC 100 with electronic overvoltage protection with timer to instant short bond electricity reaction and regulation of the electricity selection - pcs 1</li> <li>- PHOTO RELAY or time programmer - twocannal with a possibility of astronomical time - pcs 1</li> <li>- three pole contactor with nominal electricity 80A-400B - pcs 1x</li> <li>- two pole installation contactor 63A, 230V and command voltage of the coil 230V - pcs 1</li> <li>- Cam switch with three positions 1-0-2 - pcs 2</li> <li>- automatic switch C60N - B/16A - pcs 6</li> <li>- shielded three pole fuse - circuit breaker for nominal electricity up to 80A for the power supply line with cable PP00-AI 4x16mm<sup>2</sup> - pcs 4</li> <li>- Concrete foundation for this distribution board type A - pcs 1</li> </ul>	<i>Unit</i>	<i>1</i>		

	<i>Completely mounted, tested under voltage and certified - attested for the level of insulation and put into operation</i>				
<b>TotalElectrical lighting SRU4 and STU5b:</b>					

### *IV.2 Electrical lighting ARM2*

#### **IV.2.1 BILL OF QUANTITY FOR THE ELECTRICAL LIGHTING StU-7 AND PART OF SrU-4 140m) in ARM2**

Unit	Materials – activity	Unit measure	Quantity	Unit price	Total
<b>1</b>	Purchase and installation of freestanding distribution board for outdoor installation. The distribution board shall be placed on a concrete foundation which will be built on the spot. The distribution board is of type A which is defined by EVN (company which performs power distribution and supply on the territory of the Republic of Macedonia). The level of protection is IP44 and inside it has installed equipment which can be seen in the graphic part of the project from the functional scheme and from its layout				
	*switch installed on the door for activation of the light - 1 piece				
	*compact fluorescent lamp 26W - 1 piece				
	*OG single-phase connector for possible use - 1 piece				
	*surge protection - cathodic surge diverter 5kA - 3 pieces				
	*three-pole switch C60-N 10 - 1 piece				
	* 100 with electronic overvoltage protection with time straining and immediate response to the current of short circuit and tuning of electric selectivity - 1 piece			<b>1</b>	

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	*PHOTO RELAY" and time programmer - two channel with the possibility of adjusting the geo coordinates for astronomical time - 1 piece				
	*three pole contactor with nominal current 80 , 400V - 1 piece				
	*two pole installation contactor of 40 , 230V and commanding voltage of the coil 230V - 1 piece				
	*Rotary Changeover cam switch in three positions 1-0-2 - 2 pieces				
	*Automatic switch C60N -B/16 - 6 pieces.				
	*shielded three pole fuse - isolator for nominal current up to 80 for the outlets with cable PP00-Al 4x16mm <sup>2</sup> - 1 piece				
	*Concrete foundation for this distribution board type - 1 piece				
	Complete installed tested under voltage and issued attestation of the degree of insulation and put into operation, the cabinet is paid:	set			
2	Cable of type PP00-Al 4x16mm <sup>2</sup> is placed in earth trench with depth of 0,8m and 0,4m wide	m´	<b>560</b>		
3	A cable PP00-Al 2x2,5mm <sup>2</sup> to be placed parallel to the mains cable from position number 1 to each pole for illumination. The cable to be connected to the connecting cabinet from the pole and through the system input-output continues to the next pole	m´	<b>560</b>		
4	From KRO-A number 2 to each pole (21 poles), a galvanized band 30 x 4 mm to be laid parallel to the power cables. The band to be connected to the casing of the distribution boards and to each anchoring plate of each pole.	m´	<b>491</b>		
5	Above the cable in the trench a plastic warning tape - WARNING CABLE should be placed.	piece	<b>491</b>		

6	<p>Purchase and installment of a complete lighting body which is product from a known manufacturer that has all the necessary certificates of quality and technical characteristics for an aluminum lighting body for outdoor installation with degree of protection IP65, aluminum diffuser and flat tempered glass. The lamp to be equipped with ballast that will allow two modes of operation 50% and 100% of the specified electric power. The type of source is a high pressure sodium 250W, the height of mounting is <math>h = 8m</math>, the method of mounting is direct at the top of the pole on the appropriate arc which is 1m long, each leg at an angle of <math>10^\circ</math> (angle variable according to the holder)</p>	piece	<b>26</b>		
7	<p>Purchase and installation of a metal pole 8m high above the ground. The pole can be seen in the graphic part of the project. The pole can be painted with waterproof paint and previous primer coating. The pole will have at the top an installed arc 1 m long under an angle of <math>10^\circ</math> compared to the horizontal (17 poles with single arcs and one with double arcs and angle between them of <math>90^\circ</math>, two double arced with angle between them of <math>180^\circ</math> and one three arced with an angle between the legs of <math>90^\circ</math> given in position number 9. It will be completed with a switchbox with two automatic fuses of 16A and an anchored base plate. Wired with the switchboard of the pole to the bulb with a two-way mode of operation.</p>	piece	<b>21</b>		
8	<p>For the poles from item 8 a double-arc holder to be installed with an angle between them of <math>90^\circ</math> total 1 piece, and two arcs with angle of <math>180^\circ</math>, and one three-leg arc with angle of <math>90^\circ</math>.</p>	piece	<b>9</b>		

9	Construction of a concrete foundation at the spot for poles from item number 8. The layout and dimensions of the foundation are given in the graphic part from this detailed design. In the price are included the excavation of the earth for the foundation. The foundation shall be made with Concrete class MB30 and with dimensions 0,9 0,9 1 (m). During the construction of the foundation, from two opposite sides, a non-flexible PVC pipe shall be placed with dimension of t=70 mm under an angle of 45°. In the middle of the foundation from the upper side there will be an opening for input and output of two main supply cables 4 16 mm <sup>2</sup> and the commanding one 2 2,5 mm <sup>2</sup> . by the system input-output	piece	<b>21</b>		
	<b>EARTH WORKS FOR THE CABLE DUCTS</b>				
10	Manual excavation of the earth third category. (because of unknown underground installations not entered in the underground Cadastre(water, electricity, drain and steam). A trench shall be excavated with depth 0,8m and 0,4m wide, if excavated mechanically it should be excavated with small yoke - bucket because of the unknown terrain. After placing the cables the trench shall be closed in layers, and the surplus earth shall be used to fill nearby bigger holes that need to be filled.	m´	<b>491</b>		
11	Purchase and filling in two layers of 10 cm of fine sand. One layer of 10 cm before placing the cables and the other after placing the cables.	m <sup>3</sup>	<b>39.3</b>		
12	Purchase and placing above the cables in the trench single core cable protective covers	m1	<b>491</b>		
13	Purchase and in the previously excavated trench placing of non-flexible PVC pipe with dimension t=110mm.	M´	<b>100</b>		
	<b>Total Electrical lighting STU7 and part of SRU4:</b>				

**IV.2.2 BILL OF QUANTITY FOR ELECTRICAL LIGHTING FOR THE STREET SrU-4 IN ARM-2**

<b>Unit Nr.</b>	<b>Material - activity</b>	<b>Unit measure</b>	<b>Quantity</b>	<b>Unit price</b>	<b>Total</b>
	Purchase and installation of freestanding distribution board for outdoor installation. The distribution board shall be placed on a concrete foundation which will be built on the spot. The distribution board is of type A which is defined by EVN (company which performs power distribution and supply on the territory of the Republic of Macedonia). The level of protection is IP44 and inside it has installed equipment which can be seen in the graphic part of the project from the functional scheme and from its layout				
	*switch installed on the door for activation of the light - 1 piece				
	*compact fluorescent lamp 26W - 1 piece				
	*OG single-phase connector for possible use - 1 piece				
	*surge protection - cathodic surge diverter 5kA - 3 pieces				
	*three-pole switch C60-N 10 - 1 piece				
	* 100 with electronic overvoltage protection with time straining and immediate response to the current of short circuit and tuning of electric selectivity - 1 piece				
	*"PHOTO RELAY" and time programmer - two channel with the possibility of adjusting the geo coordinates for astronomical time - 1 piece				
	*three pole contactor with nominal current 80 , 400V - 1 piece				
	*two pole installation contactor of 40 , 230V and commanding voltage of the coil 230V - 1 piece				
	*Rotary Changeover cam switch in three positions 1-0-2 - 2 pieces				
<b>1</b>	*Automatic switch C60N -B/16 - 6		<b>1</b>		



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	pieces.				
	*shielded three pole fuse - isolator for nominal current up to 80 for the outlets with cable PP00-Al 4x16mm <sup>2</sup> - 1 piece				
	*Concrete foundation for this distribution board - 1 piece				
	Complete installed tested under voltage and issued attestation of the degree of insulation and put into operation, the cabinet is paid:	set			
2	In earth trench with depth of 0,8m and 0,4m wide, a cabel is placed of type PP00-Al 4x16mm <sup>2</sup>	m´	<b>566</b>		
2-a	In earth trench with depth of 0,8m and 0,4m wide, a cabel is placed of type PP00-Al 4x16mm <sup>2</sup>	m´	<b>189</b>		
3	A cable PP00-Al 2x2,5mm <sup>2</sup> to be placed parallel to the mains cable from position number 1 to each pole for illumination. The cable to be connected to the connecting cabinet from the pole and through the system input-output continues to the nearby pole	m´	<b>755</b>		
4	From KRO-A number 2 to each pole (19 poles), a galvanized band 30 x 4 mm to be laid parallel to the power cables. The band to be connected to the casing of the distribution boards and to each anchoring plate of each pole.	m´	<b>709</b>		
5	Above the cable in the trench a plastic warning tape - WARNING CABLE should be placed.	piece	<b>709</b>		
6	Purchase and installment of a complete lighting body which is product from a known manufacturer that has all the necessary certificates of quality and technical characteristics for an aluminum lighting body for outdoor installation with degree of protection IP65, aluminum diffuser and flat tempered glass. The bulb to be equipped with ballast that will allow two modes of operation 50% and 100% of the specified electric power. The type of source is a high pressure sodium 250W, the height of mounting is h = 8m, the method of mounting is direct at the top of the pole on the appropriate arc	piece	<b>19</b>		

	which is 1m long, each leg at an angle of 10 ° (variable angle according to the holder)				
7	Purchase and installation of a metal pole 8m high above the ground. The pole can be seen in the graphic part of the project. The pole can be painted with waterproof paint and previously with primer coating. The pole will have at the top an installed arc 1 m long under an angle of 10° It will be completed with a switchbox with two automatic fuses of 16A and an anchored base plate. Wired with the switchboard of the pole to the bulb with a two-way mode of operation..	piece	<b>19</b>		
8	Construction of a concrete foundation at the spot for a pole from item number 8. The layout and dimensions of the foundation are given in the graphic part from this detailed design. In the price are included the excavation of the earth for the foundation. The foundation shall be made with Concrete class MB30 and with dimensions 0,9 0,9 1 (m). During the construction of the foundation, from two opposite sides, a non-flexible PVC pipe shall be placed with dimension of t=70 mm under an angle of 45°. In the middle of the foundation from the upper side there will be an opening for input and output of two main supply cables 4 16 mm2 and the commanding one 2 2,5 mm2. by the system input-output	piece	<b>19</b>		
	EARTH WORKS FOR THE CABLE DUCTS				

9	Manual excavation of the earth third category. (because of unknown underground installations not entered in the underground Cadastre(water, electricity, drain and steam). A trench shall be excavated with depth 0,8m and 0,4m wide, if excavated mechanically it should be excavated with small yoke - bucket because of the unknown terrain. After placing the cables the trench shall be closed in layers, and the surplus earth shall be used to fill nearby bigger holes that need to be filled.	m´	645		
10	Purchase and filling in two layers of 10 cm of fine sand. One layer of 10 cm before placing the cables and the other after placing the cables.	m3	51.6		
11	Purchase and placing above the cables in the trench single core cable protective covers	m1	645		
12	Purchase and in the previously excavated trench placing of non-flexible PVC pipe with dimension t=110mm.	M´	100		
<b>Total Electrical lighting STU4:</b>					

#### IV.2.3 BILL OF QUANTITY AND CALCULATION FOR THE LIGHTING ON STREET StU-12 IN ARM2

Power supply line number 1 from substation TS number 12 (trench 422m) and CABLE PP00-A1 4x16mm<sup>2</sup>, L=495m

Unit	Materials -activities	Unit measure	Quantity	Unit price	Total
1	Purchase and installation of freestanding distribution board for outdoor installation. The distribution board shall be placed on a concrete foundation which will be built on the spot. The distribution board is of type A which is defined by EVN (company which performs power distribution and supply on the territory of the Republic of Macedonia). The level of protection is IP44 and inside it has installed equipment which can be seen in the graphic part of the project from the functional scheme and from its layout *switch installed on the door for activation of the light - 1 piece		1		

	*compact fluorescent lamp 26W - 1 piece			
	*OG single-phase connector for possible use - 1 piece			
	*surge protection - cathodic surge diverter 5kA - 3 pieces			
	**three pole switch C60-N 10 - 1 piece			
	* 100 with electronic overvoltage protection with time straining and immediate response to the current of short circuit and tuning of electric selectivity - 1 piece			
	*"PHOTO RELAY" and time programmer - two channel with the possibility of adjusting the geo coordinates for astronomical time - 1 piece			
	*three pole contactor with nominal current 80 , 400V - 1 piece			
	*two pole installation contactor of 40 , 230V and commanding voltage of the coil 230V - 1 piece			
	*Rotary Changeover cam switch in three positions 1-0-2 - 2 pieces			
	*Automatic switch C60N -B/16 - 6 pieces			
	*shielded three pole fuse - isolator for nominal current up to 80 for the outlets with cable PP00-Al 4x16mm <sup>2</sup> - 1 piece			
	*Concrete foundation for this distribution board type - 1 piece			
	Complete installed tested under voltage and issued attestation of the degree of insulation and put into operation, the cabinet is paid	set		
2	A cable type PP00-Al 4x16mm <sup>2</sup> is placed in earth trench with depth of 0,8m and 0,4m wide,	m´	481	
3	A cable PP00-Al 2x2,5mm <sup>2</sup> to be placed parallel to the mains cable from position number 1 to each pole for illumination. The cable to be connected to the connecting cabinet from the pole and through the system input-output continues to the next pole	m´	481	

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4	From KRO-A number 2 to each pole (19 poles), a galvanized band 30 x 4 mm parallel to be laid to the power cables. The band to be connected to the casing of the distribution boards and to each anchoring plate of each pole	m'	<b>444</b>		
5	Above the cable in the trench a plastic warning tape - WARNING CABLE should be placed.	piece	<b>444</b>		
6	Purchase and installation of a complete lighting body which is a product from a known manufacturer that has all the necessary certificates of quality and technical characteristics for an aluminum lighting body for outdoor installation with degree of protection IP65, aluminum diffuser and flat tempered glass. The bulb to be equipped with ballast that will allow two modes of operation 50% and 100% of the specified electric power. The type of source is a high pressure sodium 250W, the height of mounting is h = 8m, the method of mounting is direct at the top of the pole on the appropriate arc which is 1m long, each leg at an angle of 10 ° (variable angle according to holder)	piece	<b>12</b>		
7	Purchase and installation of a metal pole 8m high above the ground. The pole can be seen in the graphic part of the project. The pole can be painted with waterproof paint and previously with primer coating. The pole will have at the top an installed arc 1 m long under an angle of 10° It will be completed to a switchbox with two automatic fuses of 16A and an anchored base plate. The pole should be wired from the switchbox on the pole to the lamp for two-way mode of operation.	piece	<b>19</b>		

8	<p>Construction of concrete foundation at the spot for poles from item number 7. The layout and dimensions of the foundations are given in the graphic part of this documentation. In the price are included the excavation of the earth for the foundation. The foundation shall be made with Concrete class MB30 and with dimensions 0,9 0,9 1 (m). During the construction of the pole, a non-flexible PVC pipe shall be placed with dimension of t=70 mm from two opposite sides in the same direction under an angle of 45°. In the middle of the foundation from the upper side there will be an opening for input and output of two main supply cables 4 25 mm<sup>2</sup> and the commanding one 2 2,5 mm<sup>2</sup>. by the system input-output</p>	piece	<b>12</b>		
9	<p>Manual excavation of the earth to be performed because of the existing unknown underground installations which is not entered in the underground Cadastre(water, electricity, drain) on the terrain where there is need for realization of this electrical infrastructure for lighting of the street. The excavation shall be in form of a trench with depth of 0,8 m, 0,4 m wide with a small yoke so the surrounding earth from the trench will not be distructed, because there is stormwater drainage sewer which is not very deep. After placing the cables and the galvanized band and the warning band in the trench, the trench shall be closed in layers , and the surplus earth removed.</p>	m´	<b>422</b>		
10	<p>Purchase and filling in two layers of 10 cm of fine sand. One layer of 10 cm before placing the cables and the other after placing the cables.</p>	m3	<b>33.8</b>		
11	<p>Purchase and placing above the cables in the trench single core cable protective covers</p>	m1	<b>444</b>		
12	<p>Purchase and in the previously excavated trench placing a non-flexible PVC pipe with t=110 mm</p>	m	<b>100</b>		

	<b>Total <i>Electrical lighting STU12:</i></b>	
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## RECAPITULATION ARM1 AND ARM2 IN BITOLA

<b>I</b>	<b><i>Storm water drainage system</i></b>	
I.1	<b><i>Storm water drainage at ARM1</i></b>	
I.1.1	<i>Storm water drainage at str. SRU2</i>	
I.1.2	<i>Storm water connections at str. SRU2</i>	
I.1.3	<i>Storm water drainage at str. SRU3</i>	
I.1.4	<i>Storm water connections at str. SRU3</i>	
I.1.5	<i>Storm water drainage at str. SRU4</i>	
I.1.6	<i>Storm water connections at str. SRU4</i>	
I.1.7	<i>Storm water drainage at str. STU5b</i>	
I.1.8	<i>Storm water connections at str. STU5b</i>	
I.2	<b><i>Storm water drainage at ARM2</i></b>	
I.2.1	<i>Storm water drainage at str. SRU4 with connections</i>	
I.2.2	<i>Storm water drainage at str. STU7 with connections</i>	
I.2.3	<i>Storm water drainage at str. STU12 with connections</i>	
	<b><i>Total Storm water drainage system ARM1 and ARM2:</i></b>	
<b>II</b>	<b><i>Water supplying system</i></b>	
II.1	<b><i>Water supplying ARM1</i></b>	
II.1.1	<i>--- water supplying at str. SRU2, Prof Nmb. 26</i>	
II.1.2	<i>--- water supplying at str. SRU2, Prof Nmb. 9</i>	
II.1.3	<i>--- water supplying connections at str. SRU2</i>	
II.1.4	<i>--- water supplying at str. SRU3, Prof. Nmb. 12</i>	
II.1.5	<i>--- water supplying connections at str. SRU3</i>	
II.1.6	<i>--- water supplying at str. SRU4, Prof Nmb. 16</i>	
II.1.7	<i>--- water supplying connections at str. SRU4</i>	
II.1.8	<i>--- water supplying at str. STU5b, Prof.Nmb.17</i>	
II.2	<b><i>Water supplying ARM2</i></b>	
II.2.1	<i>--- water supplying and hydrant network with water suply conection at str. SRU4</i>	
II.2.2	<i>--- water supplying and hydrant network with water suply conection at str. STU7</i>	
II.2.3	<i>--- water supplying and hydrant network with water suply conection at str. STU12</i>	
	<b><i>Total Water supplying system ARM1 and ARM2:</i></b>	
<b>III</b>	<b><i>Roadway with street gullies and excavations for telecommunication and energy cables</i></b>	
III.1	<b><i>Roadway and excavations ARM1</i></b>	
III.1.1	<i>--- roadway at str. SRU2</i>	
III.1.2	<i>--- excavations for energy cables at str. SRU2</i>	
III.1.3	<i>--- excavations for telecommunication cables at str. SRU2</i>	

III.1.4	--- roadway at str. SRU3	
III.1.5	--- excavations for telecommunication cables at str. SRU3	
III.1.6	--- excavations for energy cables at str. SRU3	
III.1.7	--- roadway at str. SRU4	
III.1.8	--- excavations for telecommunication cables at str. SRU4	
III.1.9	--- excavations for energy cables at str. SRU4	
III.1.10	--- roadway at str. STU5b	
III.1.11	--- excavations for energy cables at str. STU5b	
III.1.12	--- excavations for telecommunication cables at str. STU5b	
III.2	<b>Roadway ARM2</b>	
III.2.1	--- roadway at str. SRU4	
III.2.2	--- roadway at str. STU7	
III.2.3	--- roadway at str. STU12	
	<b>Total Roadway with street gullies and excavations for telecommunication and energy cables ARM1 and ARM2</b>	

<b>IV Electrical lighting</b>		
IV.1	<b>Electrical lighting ARM1</b>	
IV.1.1	--- electrical lighting at str. SRU2	
IV.1.2	--- electrical lighting at str. SRU3	
IV.1.3	--- electrical lighting at str. SRU4 and STU5b	
IV.2	<b>Electrical lighting ARM2</b>	
IV.2.1	--- electrical lighting at str. STU 7 and part SRU4	
IV.2.2	--- electrical lighting at str. SRU 4	
IV.2.3	--- electrical lighting at str. STU12	
	<b>Total electrical lighting ARM1 and ARM2:</b>	

I	<b>Total Storm water drainage system ARM1 and ARM2:</b>	
II	<b>Total Water supplying system ARM1 and ARM2:</b>	
III	<b>Total Roadway and excavations for telecommunication and energy cables ARM1 and ARM2</b>	
IV	<b>Total electrical lighting ARM1 and ARM2:</b>	
	<b>Total ARM1 and ARM2:</b>	
	<b>VAT 18%:</b>	
	<b>Total with VAT:</b>	

## 2. Schedule of Payment Currencies

For .....insert name of Section of the Works

Separate tables may be required if the various sections of the Works (or of the Bill of Quantities) will have substantially different foreign and local currency requirements. The Employer should insert the names of each Section of the Works.

	A	B	C	D
Name of Payment Currency	Amount of Currency	Rate of Exchange to Local Currency	Local Currency Equivalent $C = A \times B$	Percentage of Total Bid Price (TBP) $\frac{100 \times C}{TBP}$
Local currency _____		1.00		
Foreign Currency #1 _____				
Foreign Currency #2 _____				
Foreign Currency #3 _____				
<b>Total Bid Price</b>				<b>100.00</b>
Provisional Sums Expressed in Local Currency		1.00		
<b>TOTAL BID PRICE (Including provisional sum)</b>				

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## Form of Bid Security (Bank Guarantee)

*[Guarantor letterhead or SWIFT identifier code]*

**Beneficiary:** ---

**Invitation for Bids No**

**Date:** *[Insert date of issue]*

**BID GUARANTEE No.:** *[Insert guarantee reference number]*

**Guarantor:** *\_[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that *[insert name of the Bidder, which in the case of a joint venture shall be the name of the joint venture (whether legally constituted or prospective) or the names of all members thereof]* (hereinafter called "the Applicant") has submitted or will submit to the Beneficiary its bid (hereinafter called "the Bid") for the execution of *[insert description of contract]* under Invitation for Bids No. *[insert number]* ("the IFB").

Furthermore, we understand that, according to the Beneficiary's conditions, bids must be supported by a bid guarantee.

At the request of the Applicant, we, as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of *[insert amount in letters]* (*insert amount in numbers*) upon receipt by us of the Beneficiary's complying supported by the Beneficiary's statement, whether in the demand itself or a separate signed document accompanying or identifying the demand, stating either that the Applicant:

- (a) has withdrawn its Bid during the period of bid validity specified by the Applicant in the Letter of Bid, or any extension thereto provided by the Applicant; or
- (b) having been notified of the acceptance of its Bid by the Beneficiary during the period of bid validity, (i) fails to execute the Contract Agreement or (ii) fails to furnish the performance security, in accordance with the Instructions to Bidders ("ITB") of the Beneficiary's bidding document.

This guarantee will expire: (a) if the Applicant is the successful Bidder, upon our receipt of copies of the contract agreement signed by the Applicant and the performance security issued to the Beneficiary upon the instruction of the Applicant; and (b) if the Applicant is not the successful Bidder, upon the earlier of (i) our receipt of a copy of the Beneficiary's notification to the Applicant of the results of the bidding process; or (ii) twenty-eight days after the Validity Period, which date shall be established by presentation to us of copies of the Letter of Bid and any extension(s) thereto, accompanied by the bidding document; or (c) three years after the date of issue of this guarantee.

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Consequently, any demand for payment under this guarantee must be received by us at the office indicated above on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758.

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*[signature(s)]*

***Note: All italicized text is for use in preparing this form and shall be deleted from the final product.***

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## **Technical Proposal**

### **Technical Proposal Forms**

**Personnel**

**Equipment**

**Site Organization**

**Method Statement**

**Mobilization Schedule**

**Construction Schedule**

**Others**

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## Forms for Personnel

### Form PER – 1: Proposed Personnel

Bidders should provide the names of suitably qualified personnel to meet the specified requirements for each of the positions listed in Section III (Evaluation and Qualification Criteria). The data on their experience should be supplied using the Form below for each candidate.

<b>1.</b>	<b>Title of position</b>
	<b>Name</b>
<b>2.</b>	<b>Title of position</b>
	<b>Name</b>
<b>3.</b>	<b>Title of position</b>
	<b>Name</b>
<b>4.</b>	<b>Title of position</b>
	<b>Name</b>
<b>5.</b>	<b>Title of position</b>
	<b>Name</b>
<b>6.</b>	<b>Title of position</b>
	<b>Name</b>
<b>etc.</b>	<b>Title of position</b>
	<b>Name</b>





## Forms for Equipment

The Bidder shall provide adequate information to demonstrate clearly that it has the capability to meet the requirements for the key equipment listed in Section III (Evaluation and Qualification Criteria). A separate Form shall be prepared for each item of equipment listed, or for alternative equipment proposed by the Bidder. The Bidder shall provide all the information requested below, to the extent possible. Fields with asterisk (\*) shall be used for evaluation.

<b>Type of Equipment*</b>		
<b>Equipment Information</b>	<b>Name of manufacturer</b>	<b>Model and power rating</b>
	<b>Capacity*</b>	<b>Year of manufacture*</b>
<b>Current Status</b>	<b>Current location</b>	
	<b>Details of current commitments</b>	
<b>Source</b>	<b>Indicate source of the equipment</b> <input type="checkbox"/> Owned <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured	

The following information shall be provided only for equipment not owned by the Bidder.

<b>Owner</b>	<b>Name of owner</b>	
	<b>Address of owner</b>	
	<b>Telephone</b>	<b>Contact name and title</b>
	<b>Fax</b>	<b>Telex</b>
<b>Agreements</b>	<b>Details of rental / lease / manufacture agreements specific to the project</b>	

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### **Bidder's Qualification**

To establish its qualifications to perform the contract in accordance with Section III (Evaluation and Qualification Criteria) the Bidder shall provide the information requested in the corresponding Information Sheets included hereunder

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**Form ELI -1.1: Bidder Information Form**

Date: \_\_\_\_\_  
ICB No. and title: \_\_\_\_\_  
Page \_\_\_\_\_ of \_\_\_\_\_ pages

Bidder's name
In case of Joint Venture (JV), name of each member:
Bidder's actual or intended country of registration: <i>[indicate country of Constitution]</i>
Bidder's actual or intended year of incorporation:
Bidder's legal address [in country of registration]:
Bidder's authorized representative information Name: _____ Address: _____ Telephone/Fax numbers: _____ E-mail address: _____
1. Attached are copies of original documents of <input type="checkbox"/> Articles of Incorporation (or equivalent documents of constitution or association), and/or documents of registration of the legal entity named above, in accordance with ITB 4.3. <input type="checkbox"/> In case of JV, letter of intent to form JV or JV agreement, in accordance with ITB 4.1. <input type="checkbox"/> In case of Government-owned enterprise or institution, in accordance with ITB 4.5 documents establishing: <ul style="list-style-type: none"><li>• Legal and financial autonomy</li><li>• Operation under commercial law</li><li>• Establishing that the Bidder is not dependent agency of the Employer</li></ul>
2. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership.

---

**Form ELI -1.2: Information Form for JV Bidders**

(to be completed for each member of Joint Venture)

Date: \_\_\_\_\_

ICB No. and title: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_ pages

Bidder's Joint Venture name:
JV member's name:
JV member's country of registration:
JV member's year of constitution:
JV member's legal address in country of constitution:
JV member's authorized representative information Name: _____ Address: _____ Telephone/Fax numbers: _____ E-mail address: _____
1. Attached are copies of original documents of <input type="checkbox"/> Articles of Incorporation (or equivalent documents of constitution or association), and/or registration documents of the legal entity named above, in accordance with ITB 4.3. <input type="checkbox"/> In case of a Government-owned enterprise or institution, documents establishing legal and financial autonomy, operation in accordance with commercial law, and absence of dependent status, in accordance with ITB 4.5.
2. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership.

**Form CON – 2: Historical Contract Non-Performance, Pending Litigation and Litigation History**

Bidder's Name: \_\_\_\_\_

Date: \_\_\_\_\_

Joint Venture Member's Name \_\_\_\_\_

ICB No. and title: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_ pages

Non-Performed Contracts in accordance with Section III, Evaluation Criteria and Qualifications			
<input type="checkbox"/> Contract non-performance did not occur since 1 <sup>st</sup> January [ <i>insert year</i> ] specified in Section III, Evaluation Criteria and Qualifications, Sub-Factor 2.1.			
<input type="checkbox"/> Contract(s) not performed since 1 <sup>st</sup> January [ <i>insert year</i> ] specified in Section III, Evaluation Criteria and Qualifications, requirement 2.1			
Year	Non-performed portion of contract	Contract Identification	Total Contract Amount (current value, currency, exchange rate and EUR equivalent)
		Contract Identification: Name of Employer: Address of Employer: Reason(s) for non performance:	
Pending Litigation, in accordance with Section III, Evaluation Criteria and Qualifications			
<input type="checkbox"/> No pending litigation in accordance with Section III, Evaluation Criteria and Qualifications, Sub-Factor 2.3.			
<input type="checkbox"/> Pending litigation in accordance with Section III, Evaluation Criteria and Qualifications, Sub-Factor 2.3 as indicated below.			

---

**Form CCC: Current Contract Commitments / Works in Progress**

Bidders and each partner to a JV should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

Name of contract	Employer, contact address/tel/fax	Value of outstanding work (current EUR equivalent)	Estimated completion date	Average monthly invoicing over last six months (EUR month)
1.				
2.				
3.				
4.				
5.				
etc.				

**Form FIN – 3.1: Financial Situation and Performance**

Bidder's Name: \_\_\_\_\_

Date: \_\_\_\_\_

Joint Venture Member's Name \_\_\_\_\_

ICB No. and title: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_ pages

**1. Financial data**

Type of Financial information in (currency)	Historic information for previous _____ years, (amount in currency, currency, exchange rate, USD equivalent)				
	Year 1	Year 2	Year 3	Year 4	Year 5
Statement of Financial Position (Information from Balance Sheet)					
Total Assets (TA)					
Total Liabilities (TL)					
Total Equity/Net Worth (NW)					
Current Assets (CA)					
Current Liabilities (CL)					
Working Capital (WC)					
Information from Income Statement					
Total Revenue (TR)					
Profits Before Taxes (PBT)					
Cash Flow Information					
Cash Flow from Operating Activities					

---

## 2. Sources of Finance

Specify sources of finance to meet the cash flow requirements on works currently in progress and for future contract commitments.

No.	Source of finance	Amount (EUR equivalent)
1		
2		
3		

## 2. Financial documents

The Bidder and its parties shall provide copies of financial statements for \_\_\_\_\_ years pursuant Section III, Evaluation and Qualifications Criteria, Sub-factor 3.2. The financial statements shall:

- (a) reflect the financial situation of the Bidder or in case of JV member , and not an affiliated entity (such as parent company or group member).
  - (b) be independently audited or certified in accordance with local legislation.
  - (c) be complete, including all notes to the financial statements.
  - (d) correspond to accounting periods already completed and audited.
- Attached are copies of financial statements<sup>21</sup> for the \_\_\_\_\_ years required above; and complying with the requirements

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<sup>21</sup> If the most recent set of financial statements is for a period earlier than 12 months from the date of bid, the reason for this should be justified.



**Form FIN - 3.2: Average Annual Construction Turnover**

Bidder's Name: \_\_\_\_\_

Date: \_\_\_\_\_

Joint Venture Member's Name \_\_\_\_\_

ICB No. and title: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_ pages

<b>Annual turnover data (construction only)</b>			
<b>Year</b>	<b>Amount Currency</b>	<b>Exchange rate</b>	<b>USD equivalent</b>
<i>[indicate year]</i>	<i>[insert amount and indicate currency]</i>		
Average Annual Construction Turnover *			

\* See Section III, Evaluation and Qualification Criteria, Sub-Factor 3.2.

---

### Form FIN3.3: Financial Resources

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject contract or contracts as specified in Section III (Evaluation and Qualification Criteria)

Source of financing	Amount (EUR equivalent)
1.	
2.	
3.	
4.	

**Form EXP - 4.1: General Construction Experience**

Bidder's Name: \_\_\_\_\_

Date: \_\_\_\_\_

Joint Venture Member's Name \_\_\_\_\_

ICB No. and title: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_ pages

Starting Year	Ending Year	Contract Identification	Role of Bidder
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of Employer: _____ Address: _____	
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of Employer: _____ Address: _____	
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of Employer: _____ Address: _____	

**Form EXP - 4.2(a): Specific Construction and Contract Management Experience**

Bidder's Name: \_\_\_\_\_

Date: \_\_\_\_\_

Joint Venture Member's Name \_\_\_\_\_

ICB No. and title: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_ pages

Similar Contract No.	Information			
Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor <input type="checkbox"/>	Member in JV <input type="checkbox"/>	Management Contractor <input type="checkbox"/>	Sub-contractor <input type="checkbox"/>
Total Contract Amount			EUR*	
If member in a JV or sub-contractor, specify participation in total Contract amount			*	
Employer's Name:				
Address:				
Telephone/fax number				
E-mail:				

**Form EXP - 4.2(a) (cont.)**  
**Specific Construction and Contract Management Experience (cont.)**

<b>Similar Contract No.</b>	<b>Information</b>
Description of the similarity in accordance with Sub-Factor 4.2(a) of Section III:	
1. Amount	
2. Physical size of required works items	
3. Complexity	
4. Methods/Technology	
5. Construction rate for key activities	
6. Other Characteristics	

**Form EXP - 4.2(b): Construction Experience in Key Activities**

Bidder's Name: \_\_\_\_\_

Date: \_\_\_\_\_

Joint Venture Member's Name \_\_\_\_\_

Sub-contractor's Name<sup>22</sup> (as per ITB 34.2 and 34.3): \_\_\_\_\_

ICB No. and title: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_ pages

Sub-contractor's Name (as per ITB 34.2 and 34.3): \_\_\_\_\_

All Sub-contractors for key activities must complete the information in this form as per ITB 34.2 and 34.3 and Section III, Qualification Criteria and Requirements, Sub-Factor 4.2.

1. Key Activity No One: \_\_\_\_\_

	<b>Information</b>			
Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor <input type="checkbox"/>	Member in JV <input type="checkbox"/>	Management Contractor <input type="checkbox"/>	Sub- contractor <input type="checkbox"/>
Total Contract Amount			EUR	
Quantity (Volume, number or rate of production, as applicable) performed under the contract per year or part of the year	Total quantity in the contract (i)	Percentage participation (ii)		Actual Quantity Performed (i) x (ii)
Year 1				
Year 2				
Year 3				
Year 4				

<sup>22</sup> If applicable.

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Employer's Name:	
Address: Telephone/fax number E-mail:	

	<b>Information</b>
Employer's Name:	
Address:	
Telephone/fax number	
E-mail:	

. Activity No. Two

3. ....

	<b>Information</b>
Description of the key activities in accordance with Sub-Factor 4.2(b) of Section III:	



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## Section V - Eligible Countries

### Eligibility for the Provision of Goods, Works and Services in Bank-Financed Procurement

1. In reference to ITB 4.7, and 5.1, for the information of the Bidders, at the present time firms, goods and services from the following countries are excluded from this bidding process:

Under ITB 4.7 (a) and 5.1      *“none”*

Under ITB 4.7 (b) and 5.1      *“none”*

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## Section VI. Bank Policy - Corrupt and Fraudulent Practices

(Section VI shall not be modified)

### **Guidelines for Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, dated January 2011:**

#### **“Fraud and Corruption:**

1.16 It is the Bank’s policy to require that Borrowers (including beneficiaries of Bank loans), bidders, suppliers, contractors and their agents (whether declared or not), sub-contractors, sub-consultants, service providers or suppliers, and any personnel thereof, observe the highest standard of ethics during the procurement and execution of Bank-financed contracts.<sup>23</sup> In pursuance of this policy, the Bank:

- (a) defines, for the purposes of this provision, the terms set forth below as follows:
  - (i) “corrupt practice” is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;<sup>24</sup>
  - (ii) “fraudulent practice” is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;<sup>25</sup>
  - (iii) “collusive practice” is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;<sup>26</sup>
  - (iv) “coercive practice” is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;<sup>27</sup>
  - (v) “obstructive practice” is

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<sup>23</sup> In this context, any action to influence the procurement process or contract execution for undue advantage is improper.

<sup>24</sup> For the purpose of this sub-paragraph, “another party” refers to a public official acting in relation to the procurement process or contract execution. In this context, “public official” includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

<sup>25</sup> For the purpose of this sub-paragraph, “party” refers to a public official; the terms “benefit” and “obligation” relate to the procurement process or contract execution; and the “act or omission” is intended to influence the procurement process or contract execution.

<sup>26</sup> For the purpose of this sub-paragraph, “parties” refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non-competitive levels, or are privy to each other’s bid prices or other conditions.

<sup>27</sup> For the purpose of this sub-paragraph, “party” refers to a participant in the procurement process or contract execution.

- (aa) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or
  - (bb) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under paragraph 1.16(e) below.
- (b) will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
  - (c) will declare misprocurement and cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement or the implementation of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;
  - (d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank's sanctions procedures,<sup>28</sup> including by publicly declaring such firm or individual ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract; and (ii) to be a nominated<sup>29</sup>;
  - (e) will require that a clause be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers and contractors, and their sub-contractors, agents, personnel, consultants, service providers, or suppliers, to permit the Bank to inspect all accounts, records, and other documents relating to the submission of bids and contract performance, and to have them audited by auditors appointed by the Bank."

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<sup>28</sup> A firm or individual may be declared ineligible to be awarded a Bank financed contract upon: (i) completion of the Bank's sanctions proceedings as per its sanctions procedures, including, inter alia, cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, and through the application the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption; and (ii) as a result of temporary suspension or early temporary suspension in connection with an ongoing sanctions proceeding. See footnote 14 and paragraph 8 of Appendix 1 of these Guidelines.

<sup>29</sup> A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which has either been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

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## **PART 2 – Works Requirements**

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## **Section VII - Works Requirements**

### **SPECIFICATIONS**

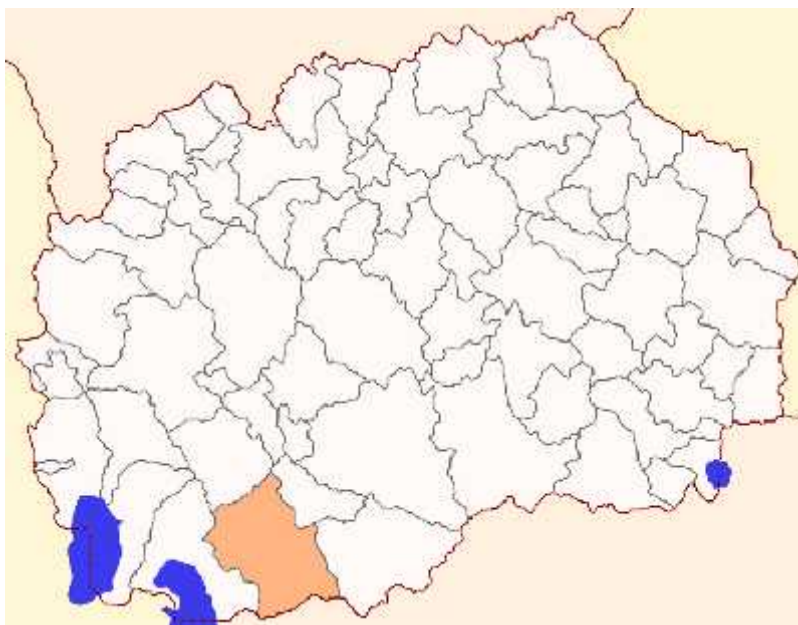
#### **“Equivalency of Standards and Codes”**

Wherever reference is made in the Contract to specific standards and codes to be met by the goods and materials to be furnished, and work performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise expressly stated in the Contract. Where such standards and codes are national, or relate to a particular country or region, other authoritative standards that ensure a substantially equal or higher quality than the standards and codes specified shall be accepted subject to the Project Manager’s prior review and written consent. Differences between the standards specified and the proposed alternative standards shall be fully described in writing by the Contractor and submitted to the Project Manager at least 28 days prior to the date when the Contractor desires the Project Manager’s consent. In the event the Project Manager determines that such proposed deviations do not ensure substantially equal or higher quality, the Contractor shall comply with the standards specified in the documents.”

#### **Specifications & Performance Requirements**

##### **General information on municipality Bitola**

The municipality Bitola is located in the south-western part of the Republic of Macedonia and according to the size of its territory is the fourth municipality in the country. It extends from the north-west to south-east. The location of the municipality is marked with an orange color on the map below.



**Location map of the municipality Bitola**

Municipality Bitola borders with the municipality Demir Hisar on the north, municipality Mogila and Novaci on the east, municipality Resen on the west and the Republic of Greece on the south. It has good geographical position and traffic connections because it is located in the Pelagonia Valley. The most important traffic and communicational directions are Bitola-

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Prilep (M-5) a main road that is connected to the highway that has an international meaning (M-1) and then Bitola-Ohrid (M-5) that is connected to the western main road. Also, through the municipality crosses the highway M-5, which connects the municipality with the northern and eastern part of the country and through the border crossing Medzitlija-Niki, continuing to the neighboring Greece.

The city is also connected through a railroad in the direction Bitola-Prilep-Bogomila-Veles, and from there with directions to Skopje, Gevgelija or Stip. Bitola is connected by railroad with Greece, through Florina, Edessa and Thessalonica. This direction has lost its meaning since the definition of the state borders, which does not mean the present situation will remain unchanged in the future.

According to the morphological structure, the territory of the municipality comprises 66 settlements, and this is the biggest number in any municipality in Macedonia. The average altitude is 753m, which is above the average in the country. The highest settlement is Drevenik with 1,200m and the lowest is Dolno Egri with 572m. According to the relative attitude of Pelagonija's Valley 51 settlements are lowland, while the others are hilly.

The city of Bitola is located in the foot of the mountain Baba with the top Pelister (2,601m m.a.s.l) near the Greece border which is located 115km far away. The land where the city is located is sloping between 715m and 585m above the sea level, from west to east, i.e. between Pelister and Baba Mountain and Pelagonia Valley, by which the city has average altitude of 650m. These differences have significant influence on the appearance of the city and the structure of its landscape. Bitola is located in the area where are present two different arable sections, crop-gardening on east, north-east and south-east and orchard-gardening and livestock breeding on west and south-west. The city of Bitola is an administrative center of the municipality Bitola, but also the main regional center of the south-west region in the country. It is a university center with most of the existing faculties, city with consular offices, museum, bars and restaurants.



### Settlements within the municipality Bitola

Municipality Bitola, as well as the whole Pelagonia Valley is at a distance of 155 kilometers from the Adriatic Sea, and at about 130 kilometers from the Aegean Sea due to which should have an altered Mediterranean climate. However, the climate in Bitola has moderate-continental characteristics with an emphasized continental component, because of the closeness of the mountainous relief, the height above the sea level, the near-by valley etc., and these facts make the climate in Bitola and Pelagonia very dynamic and non-stable. The municipality has dry and very warm summer, and a rainy winter period, divided into a shorter cold and dry period, with the first maximum rainfall in autumn and the second one in spring.

According to the meteorological data, the average annual temperature is 11.1<sup>0</sup>C. The coldest month is January with an average air temperature of 0.6<sup>0</sup>C and absolute minimal temperature of -30.4<sup>0</sup>C. The warmest month is July with an average annual temperature 22.2<sup>0</sup>C and absolute maximal temperature 41.2<sup>0</sup>C. The absolute yearly dynamic of the air temperature is 71.6<sup>0</sup>C which is specific for the areas with continental climate. The average annual amount of rainfall is 601mm (usually between 338mm and 879mm rainfall).

**Table 1 Temperature in municipality Bitola in <sup>0</sup>C**

Month	Measurement unit	Temperature
The warmest month - July	average	22.2
	absolute minimum	-30.4
The coldest months - January	average	0.6
	absolute maximum	41.2
<b>Average annual temperature</b>		<b>11.1</b>

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Municipality Bitola has 65 rural communities – villages and only one urban community – city of Bitola. According to the State Statistical Office, last revised Census data (2005) in 2002 most of the population lives in the city 78.2%, while the reminding 21.8% is rural population. Comparing to the population structure in the Republic of Macedonia, there is 57.8% urban population. Comparing to the previous Census in 1994 in municipality Bitola 80% is urban population, while the remaining 20% of the population lives in the rural areas. This indicated on gradual abandonment of villages and increased concentration of the population in the urban areas, which is especially represented in municipality Bitola.

The most prevalent in the agrarian structure is the cultivated agrarian soil with 32,223ha, pastures with 22,572ha and forests with 16,598ha. Bitola is a famous industrial center for growing and processing of grains, sugar, tobacco, beer, dairy products, gardening cultures and wine plantations. The most famous enterprises are ZIK Pelagonia, Bitola milk factory, Lozar, Transkop, the factory for production of sugar, the factory for production of beer and others.

## **General description of the project**

### **Present situation**

The project assumes construction of streets with sidewalks, water supply system, storm water system and street lightening on the location of the former military barracks “Stiv Naumov”. In the past sixty years, the land was used for special purposes of the army. The former area of the Army of the Republic of Macedonia (ARM), now represent a new settlement called “Zlaten Rid”. Zlaten Rid is divided in three districts (ARM1, ARM 2 and ARM3). In accordance with the Law of Physical and Urban Planning, municipality Bitola prepared three Detail Urban Plans (DUPs) called: DUP for ARM district 1, DUP for ARM district 2 and DUP for ARM district 3.

Only two districts (ARM1 and ARM2) in the settlement “Zlaten Rid” are considered for construction at this phase and therefore the implementation of the project activities will be provided in this area. ARM1 has 327,400m<sup>2</sup> or 32.74ha land planned for construction of residential, commercial, cultural and educational buildings. Moreover, in ARM1 there are already existing buildings where some residents live and new buildings that are already constructed but not connected to the storm water and water supply systems. Also, in ARM1 there are located Faculty of Law, Faculty for business and administration and Biotechnical Faculty, local television station “Mega” and the training center for fire protection. ARM2 has 397,546m<sup>2</sup> or 39.75ha not constructed land planned for construction of individual houses. Located on urban public land, this area will represent the spirit of Bitola in the 21 century and will complement the old architecture in Bitola.

With the detail urban plans for ARM districts 1, 2 and 3 new opportunities are opened for development and investment components of Bitola. Municipality Bitola works on ensuring favorable infrastructure conditions of the area of former military barracks, which means ensuring availability of all underground installations and access to all residential and commercial buildings that will be built in this area.

Construction of new buildings in the settlement “Zlaten Rid” will represent every day needs of the residents who live and work in this area. According to the technical design the following buildings are planned for construction: primary and secondary school, kindergarten, fire station, oil station, police station, regional mail, two healthcare centers, three religious buildings, hotels with restaurants, townhouse, residential part - villas, viewing point, monument, sport center and spa center with mini pool, and other services in the form of laundries, bakeries, etc. Additionally, five administrative buildings with public enterprises, three big markets (malls), around ten restaurants, film city with studios, few sport fields with



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an aqua park, a museum of the history and significant personalities of Bitola, galactic observatory, dwellings with about 1,300 apartments, location of 184 individual households, ten bigger buildings with temporary housing, a new city center with a small square, small gym, location of several smaller banks, heating center for the entire complex, multiple locations for monumental purposes, three garages, fifteen substations and public parking spaces are also planned for construction. In ARM districts 1 and 2 the largest area is designed for housing, i.e. ARM district 1 for residential dwellings, while ARM district 2 for individual households.

In ARM1 are planned to live or work 15,686 residents or 356 residents per hectare. If the plan is realized in 60% in this district will live approximately 215 residents per hectare. In ARM1, in each parcel are predicted parking spaces to be built in accordance with the size of the building and the number of people that will live there. In the public parking places are designed 2,332 parking spaces and in the garages are designed additional 960 parking spaces or in total 3,292 public parking spaces. Considering the additional parking places in residential and commercial buildings, there will be 4,724 parking places in total.

In ARM2 are planned to live or work approximately 5,007 residents, or here will live approximately 150 residents per hectare. If the plan is realized in 60% in this district will live approximately 90 residents per hectare. For the thirteen blocks in this part of the district, parking spaces in each parcel are predicted to be built in accordance with the size of the building and the number of people that will live there. According to the technical design, there are 3,939 public parking places including 960 parking places in parking garages and together with the parking places in the residential and commercial buildings there are 5,667 parking places in total.

In more details, the project assumes construction of streets with sidewalks, water supply system, storm water system and street lightening of three streets in ARM1 - SRU2, SRU3 and SRU4; construction of street with sidewalks, water supply system and storm water system of STU5b in ARM1 and construction of streets, water supply system, storm water system and street lightening of three streets in ARM2 - SRU4, STU7 and STU12.

At present, there is a poorly traced traffic network throughout the planning scope of ARM (all districts) that there is no way to be put in operation for the newly projected traffic demand. The same applies to paths that were used as already existing routes. The existing traffic network in the location has been built without prescribed profiles and without the required radiuses of horizontal and vertical curves, while all streets are planned for low speed driving. The existing streets do not meet the legal requirements which are a prerequisite for smooth and quality realization of the traffic.

In terms of water supply on the location, there is a digital plan of the existing water supply system. The maintenance and the upgrading are in jurisdiction of the CSE "Vodovod"-Bitola. The existing water supply system is planned to be used in further development of project documentation as a supply pipeline for part of the settlement with special technical solutions or as an additional line for equalization of the pressure in the remaining system. The existing water supply system is fully used for the connectivity in ARM district 1, 2 and 3. Water supply system is carried out under the streets construction. With such approach, the construction of the water supply system on the planned streets will contribute to timely regulation of the water supply and will avoid damage to the streets after their construction.

In the planned scope covered by the DUP there is a collection channel for drainage the waste water towards the "5<sup>th</sup> channel". This channel collects the waste water from the buildings and

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storm water. This system was built to satisfy the needs of the previous buildings and people that stay in it. There is no technical documentation for the existing water supply system, but analysis show that there is a small parts of the existing storm water system with no capacity for connecting new buildings, and has inappropriate technical construction, quite shallow at some places with pipes profile that will not satisfy the need of the newly designed buildings.

Throughout the planned scope of the territory of ARM district 1, 2 and 3 passes the regulated basin of the River Kurderes, which is partly covered. According to the DUP of ARM the river basin stays unchanged, with eventually covering of some parts. The technical solution for placement of storm water system will contribute to solving the drainage of storm water from the newly constructed streets without causing contamination of the surface and underground waters in the area.

Municipality Bitola, in order to provide good power supply in ARM districts 1, 2 and 3, plans to use the existing routes of the transmission lines, that crosses near the cable for electricity supply from the transformer station “Bitola 4”. The electricity supply will be made on the sidewalk part of the street “Partizanska” with the cable XJL-49-AI3h (1x150mm<sup>2</sup>) 10(20) kV. The power supply will be made with input and output in each of the transformer stations, without cutting the cable in the interspaces. Maximum two contiguous blocks will be supplied with electricity from one transformer station, which will be built with a size of 2x1,000kV. If newer types of transformer stations are placed, their size should be 2x1,200kV. In winter, the electrical energy is used for heating, so particular problems occur in the low voltage network. Some of the transformer stations 10/0.4 kV are loaded with 95% or more of the installed capacity. Therefore, in this area, the installed transformer stations will have greater capacity than the requirements of the settlement in order to avoid such problems in the system while using electricity in maximum capacity of the transformer stations. Also, a new connection with the transformer station “Bitola 3” will be made to the future transformer stations with new underground supply cables in order to provide safety electricity connection with each block separately. This will ensure good connection and power supply in the settlement. According to the existing situation, placement of street lightening is planned on three streets in ARM district 1: SRU2, SRU3 and SRU4, as well as on three streets in ARM district 2: SRU4, STU7 and STU12. This will contribute to safe communication and use of the streets by all of inhabitants in the new settlement.

The investment in the settlement “Zlaten Rid” is favorable due to its location near the city center, the developed infrastructure, the excellent accessibility and the favorable climate conditions. With the sale of the building lots in the area of the ARM district 1 and 2, the majority of the investors, after receiving the appropriate documentation from the competent authorities and construction permit, started with construction activities that should be finished in the period of 6 to 10 years (according to the country regulation). After they finish with the construction activities, the municipality is obligated to ensure appropriate infrastructure (streets, sidewalks, water supply system, sewerage and street lightening). At the same time, as previously mentioned, there are residents who already live in ARM1 in the existing buildings, which are connected to the old water supply and storm water systems. However, the existing water supply and storm water systems are very old, when there were former military barracks of Army of the Republic of Macedonia (ARM), and have not enough capacity to connect the new constructed buildings.

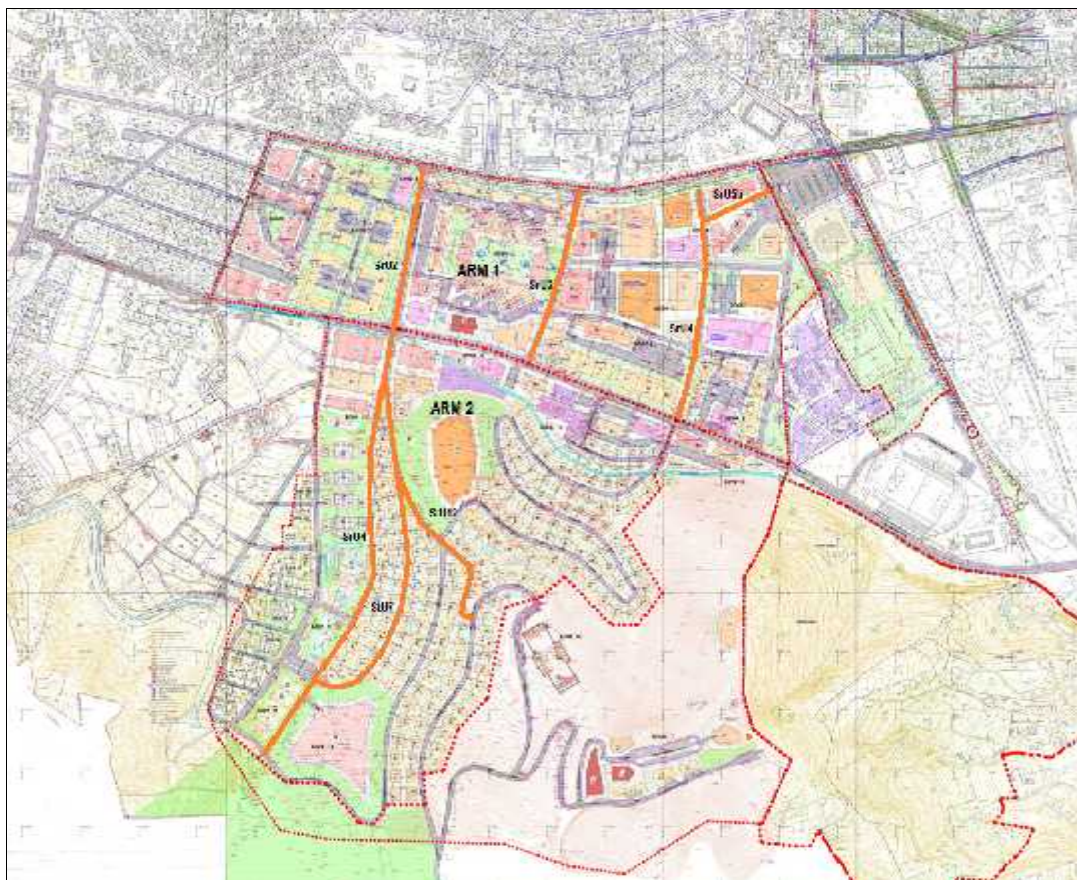
### **Future situation**

The total length of streets that are subject of this project is: 1,124.54m in ARM1 and 1,675.00m in ARM2, respectively the total length of streets projected for construction in the settlement “Zlaten Rid” is 2,799.54m. The project solution provides simultaneous placement of water supply system, storm water system, construction of streets and placement of street

lighting. With such approach, the additional damage to the newly constructed streets and some partial solutions which will cause damage to the streets and sidewalks will be prevented.

One of the most important benefits of this project is the possibility for placement of new transport links in the area of the settlement “Zlaten Rid”, which will significantly improve the traffic circulation in southern parts of the city Bitola (due to the fact that the area was closed during the stay of the army, all the traffic flows took place around the area of the settlement). The alignment of the streets is made in accordance with the General Urban Plan (GUP), i.e. in accordance with the Detailed Urban Plan (DUP) or the Law on Spatial and Urban Planning and follows the terrain configuration and spatial limitation of the area, and the available data on existing and planned infrastructure facilities. The alignment of the streets which are part of the technical documentation for construction in ARM district 1 and 2 are marked on the map below.

The traffic and transportation system of the city Bitola with the construction of the new streets in the new settlement will unite the older parts of the city (some of them with significant historical and architectural significance) and the new buildings, and will fulfill the requirements for achievement of functional modern transportation system. The regulation of the traffic will contribute to increase in the traffic safety and comfort, increase in the traffic capacity and communications, providing sense of security by pedestrians, improvement of the commercial activities, as well as continuation of the social and recreational activities for the residents who live in the southern parts of Bitola.



**Alignment of the streets to be constructed in ARM district 1 and 2\***

\*Note: The streets that are subject to construction are marked with orange color

Benefit from the implementation of the project activities is also the on time solution and

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placement of the water supply system, which supplies the entire area of the former military barracks with drinking water (ARM district 1, 2 and 3). The same water supply system is independent, with capped water source size form 8-12 liters per second. The water supply system of the whole area is planned to be connected with the city water supply system with new water pipelines with diameter no less than Ø200mm, with closed rings so called quarter. At later stage, for the construction of the other phases, a ring will be made with the urban blocks for quality and smooth supply of the area with water for personal and sanitation needs.

The technical documentation is in accordance with the laws and regulations in the area of design and urban planning, and the current standards for construction of streets, water supply system and storm water system and street lighting. The simultaneous construction of the storm water system will provide drainage of the storm water without flooding of the residential and commercial buildings during heavy rainfall and will reduce the damage to the constructed streets.

Placement of the street lighting on the streets will contribute to increased safety of the residents and the visitors. The construction of the area in the settlement “Zlaten Rid” should cause positive impacts and effects on the nearby surroundings due to better organization, infrastructure equipment and arrangement of the area. Also the construction of the area should be in line with the principals and regulations of sustainable development and environmental protection.

The implementation of the project is also expected to increase the property value of houses and other residential or commercial objects on the streets, thus increasing the growth of revenues from property taxes in the municipality. It is extremely important thorough and fast realization of the infrastructure project in every part of the new construction planned at the subject location.

## **TECHNICAL SOLUTION**

### **Description**

The project includes technical solution for complete construction of 7 streets in the newly designed settlement “Zlaten Rid” on the territory of the former military barracks “Stiv Naumov” in municipality Bitola. The project assumes also financing the supervision. The project provides construction of public streets on the secondary network of streets, which consists of service streets (SrU) and residential streets (StU). In ARM district 1, which is intended for collective residential housing, the streets are named as: SrU2, SrU3, SrU4 and StU5b. ARM district 2 is intended for individual housing and the streets are named as: SrU4, StU7 and StU12. The construction of the streets includes:

- Construction of streets, water supply system, storm water system and sidewalks and street lighting in ARM district 1 on streets SrU2, SrU3 and SrU4;
- Construction of streets, water supply system, storm water system and sidewalks on street StU5b in ARM district 1 and
- Construction of streets, water supply system, storm water system, and street lighting on streets SrU4, StU7 and StU12 in ARM district 2.

According to the General Urban Plan (GUP) of 1999, the roads of the city Bitola are classified as: arterial streets, collection streets and local streets (service, residential, access streets, etc.). The streets that are subject to construction are classified as service streets (SrU) and residential streets (StU). The plan for the project has been prepared in accordance with the General Urban Plan (GUP), follows the terrain configuration and spatial limitation of the area and the available data on existing and planned infrastructure facilities.

The project documentation is prepared on the basis of previously performed geo-mechanical and geotechnical analysis on the terrain.

The total length of streets projected for construction in the area of the settlement “Zlaten Rid” is 2,799.54m. The following table provides the projected length and activities for construction of the infrastructural network:

**Technical characteristic of the streets provided for construction**

#	Street	District	Description of activities	Length (m)
1	“SrU 2”	ARM 1	Construction of streets, water supply system, storm water system and street lighting	283.44
2	“SrU 3”	ARM 1	Construction of streets, water supply system, storm water system and street lighting	309.68
3	“SrU 4”	ARM 1	Construction of streets, water supply system, storm water system and street lighting	405.02
4	“StU 5b”	ARM 1	Construction of streets, water supply system and storm water system	126.40
5	“SrU 4”	ARM 2	Construction of streets, water supply system, storm water system and street lighting	805.00
6	“StU 7”	ARM 2	Construction of streets, water supply system, storm water system and street lighting	600.00
7	“StU 12”	ARM 2	Construction of streets, water supply system, storm water system and street lighting	270.00
<b>Total</b>				<b>2,799.54</b>

The construction of streets will include various construction works for construction of streets with sidewalks, water supply system, storm water system and street lighting, including:

a. Construction of water supply system:

- Marking and securing of the alignment of the channel for setting the water supply system – the operation includes marking the channel, geodetic measurements regarding the transfer of data from the project to the location or from the location to the drawings and maintaining the marks of the location during the construction;
- Excavation of channel for setting of the water supply system, mechanically 80% and manually 20%;
- Setting sand along the channel width 60cm and 10cm thick by setting slope which is projected in the longitudinal profiles;
- Setting and installation of polyethylene water supply pipes along with the necessary parts and materials for connecting with a working pressure of 10 bars;
- The filling of the excavated channels is performed with compaction in layers from 20 to 30cm;
- Installation of firefighting and park hydrants.

b. Construction of storm water system:

- Marking and ensuring of the alignment of the channel;
- Excavation of channel for setting the storm water system, mechanically and manually;
- Setting sand along the channel width 60cm and 10cm thick by setting slope which is projected in the longitudinal profiles;

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- Setting and installation of polyethylene pipes along with the necessary parts and material for connecting;
  - The filling of the excavated channels is performed with compaction in layers from 20 to 30cm;
  - Construction of manholes.
- c. Construction of streets with sidewalks:
- Marking and ensuring of the alignment – the operation includes marking of the alignment, geodetic measurements regarding the transfer of data from the project to the location or from the location to the drawings and keeping the marks of the location throughout the period of construction;
  - Excavations for making the underground (removal of humus of the parts under the embankment, compaction of the underground layers performed with mechanization for compacting according to the type of the underground layers), making embankments, leveling and compaction of the base;
  - Excavations for the upper part of the street which includes making of the buffer;
  - Paving the upper part of the street construction in accordance with the project documentation;
  - Making sidewalks from concrete tiles, placed on compacted ground of macadam.
- d. Setting public lighting:
- Marking and ensuring the alignment;
  - Excavation of channel for setting electric power cables with average depth of 0.8m and a width of 0.4m;
  - Setting fine sand along the channel with thickness 10cm;
  - Setting and installation of protective tubes for placement of the electric power cables and communication cables;
  - The filling of the excavated channel is performed with compaction in layers from 20 to 30cm;
  - Protection of the ends of the tubes with PVC cover and foil;
  - Construction of foundations for setting lampposts for street lighting in accordance with the project documentation;
  - Installation of water-resistant lighting armature for street lighting;
  - Installation of metal poles and street lights in accordance with the project documentation.

### **Construction of streets in ARM district 1**

The total length of streets which are subject to construction in ARM district 1 is 1,124.54m. The goal is to build an infrastructural network of streets with fully set water supply system, storm water system and street lighting. In this district, the street lighting along the route of the residential street StU5b will be financed with funds that will be additionally provided by the municipality.

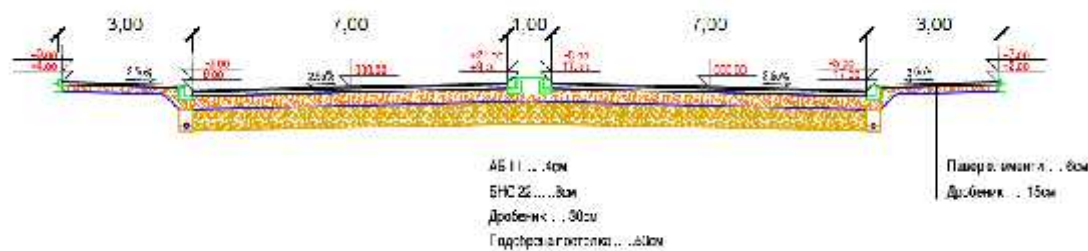
For dimensioning of the streets that belong to ARM district 1 and which are subject of this Appraisal, are used previously developed documents: DUP “ARM district 1” – Bitola, Infrastructural project for roadway and communal installations prepared by “Proing” – Bitola with technical number 44/2021 from September 2012, an updated geodetic base in scale 1:1000. Due to the construction of new alignments of the streets, a geo-mechanical elaborate is prepared for the subject location by “Evro Konsalting” – Skopje with technical number 180-05/12.



### a. Service street “SrU2”

The location for the construction of the street “SrU2” is in the central part of ARM district 1 and it represents direct connection between the street “Partizanska” and the main service street “SrU1”. The street is also known as “Mal Bulevar”. The terrain on which the construction of this street is planned is very flat with small slopes from south towards north and from west towards east. The area is partly built. This part of the area has also been used as a street in the former military barracks “Stiv Naumov”.

The length of the street “SrU2” is 283.44m. It is planned with two street lanes, each with a width of 7m. The street lanes will be separated between with greenery with width 1m and sidewalks on both sides with a variable width of 1.5 to 3.0m.



### Typical normal profile of street SrU2

The construction of the street “SrU2” will be performed on the following way:

- Wearing Course AB11 (Asphalt concrete layer).....4cm
- Bearing Course BNS22.....8cm
- Street base crushed stone layer.....30cm
- Sub-base Course.....50cm

The sidewalks will be made with interlock concrete tiles placed crushed stone base layer with the following sizes:

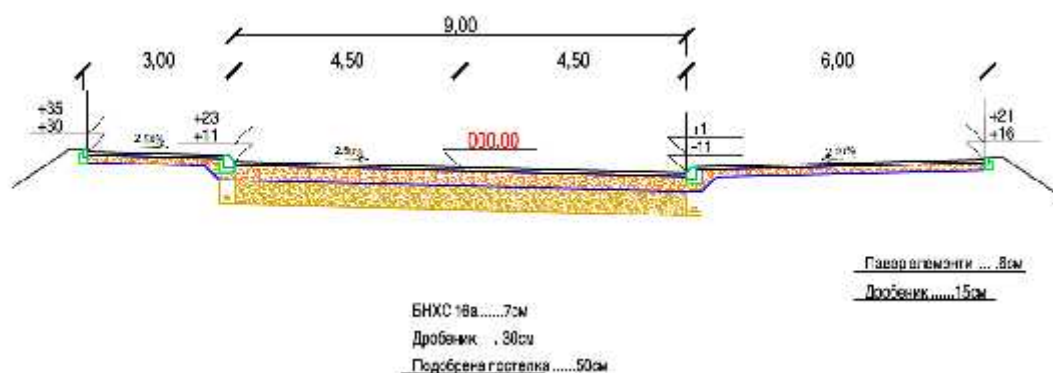
- Interlock concrete tiles.....6cm
- Fine sand made of crushed stone material.....5cm
- Crushed stone base layer.....15cm

The maximal applied longitudinal slope of the vertical alignment along the street “SrU2” is 3.687% and the minimal is 0.892%. The cross section profile of, the street is designed with a cross slope of 2.5%, and the slope of the sidewalks is 2.5% in direction towards the streets. The storm water is planned to be collected through street gullies. The drainage of the sub-base course is planned to be carried out through its cross slope which is minimum 4% and through drainage performed along the street.

### b. Service street “SrU3”

The location of the street “SrU3” is in the central part of ARM district 1 and it represents direct connection between the street “Partizanska” and the main service street “SrU1”. The terrain on which the construction of this street is planned is flat and partly built. This part of the area has also been used as a street in the former military barracks “Stiv Naumov”.

The length of the street “SrU3” is 309.68m. The street is planned with two street lanes 4.5m wide in total the roadway is designed with a width of 9m and with sidewalks on both sides of the street 2.5m wide and the [carriageway](#) profile of the street is 14m wide with additional extensions of the sidewalks where is applicable as it is shown in the following detail.



### Typical normal profile of street SrU3

The construction of the street “SrU3” will be performed on the following way:

- Bearing and Wearing Course BNHS16a.....7cm
- Street base crushed stone layer.....30cm
- Sub-base Course.....50cm

The sidewalks will be made with interlock concrete tiles placed over the crushed stone base layer, and thick layer of fine sand. The sidewalks cross profile is with the following dimension of the embedded layers:

- Interlock concrete tiles.....6cm
- Fine sand made of crushed stone material.....5cm
- Crushed stone base layer.....15cm

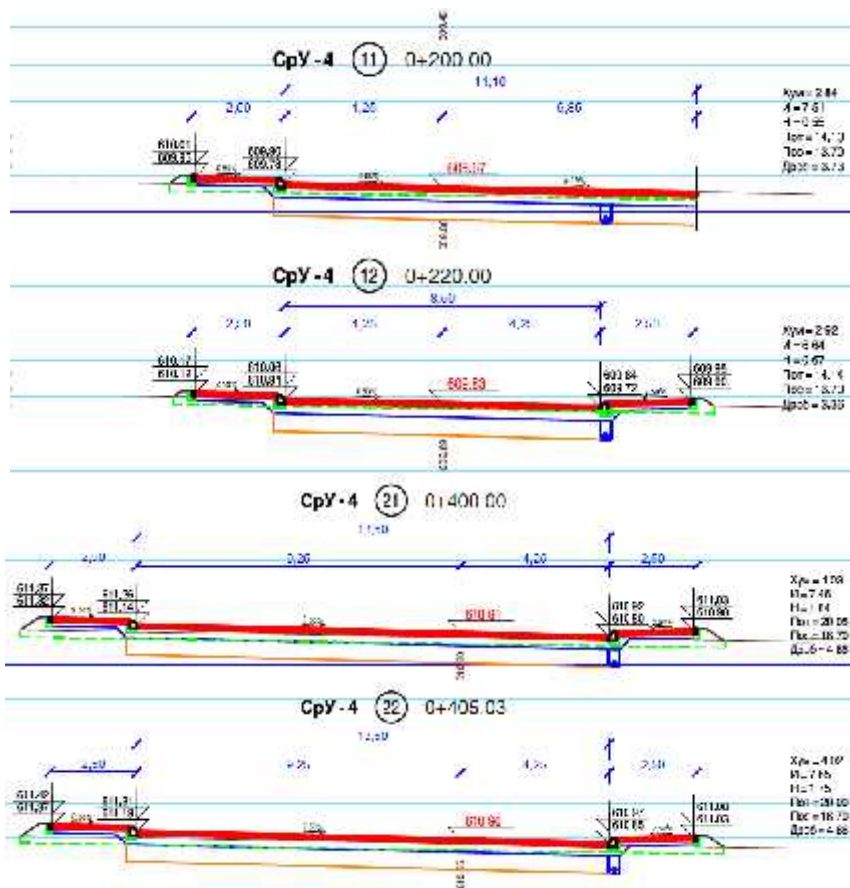
The maximal applied longitudinal slope of the vertical alignment along the street “SrU3” is 3.687% and the smallest 0.892%. In cross-sectional view, the street is designed with a cross slope of 2.5% and the slope of the sidewalks is 2.5% in direction towards the streets. This type of construction of the slope allows natural flow of the storm water and its easier collecting and drainage in to the storm water system. The storm water is planned to be collected through street gullies. The drainage of the sub-base course is planned to be carried out through its cross slope which is minimum 4% and through the drainage system installed along the street.

#### c. Service street “SrU4”

The location of the street “SrU4” is in ARM district 1 and it is not planned to be exposed to heavy traffic loads.

The length of the street “SrU4” is 405.02m. The roadway of the street is with variable width of 8.5 – 13.5m on some places where the extensions are to be used as parking areas. The normal cross profile of the carriageway is 13.5m wide consist of two roadway lanes of 4.25m and 2.5m wide two-sided sidewalks in accordance with the prevailing DUP.





**Transverse profiles of the residential street “SrU4”**

The construction of the street “SrU4” will be performed on the following way:

- Bearing and Wearing Course BNHS16a.....7cm
- Street base crushed stone layer.....30cm
- Sub-base Course.....50cm

The sidewalks will be made with interlock concrete tiles placed crushed stone base layer with the following dimensions:

- Interlock concrete tiles.....6cm
- Fine sand made of crushed stone material.....5cm
- Crushed stone base layer.....15cm

**d. Residential street “StU 5b”**

The location of the street “StU 5b” is in ARM district 1 and it is not planned to be exposed on heavy traffic loads. The length of the street “StU 5b” is 126.4m. The street is planned to be made with two roadway lanes with variable wide of 6-10m depending on the field conditions and sidewalks on both sides of the street with a width of 2m.

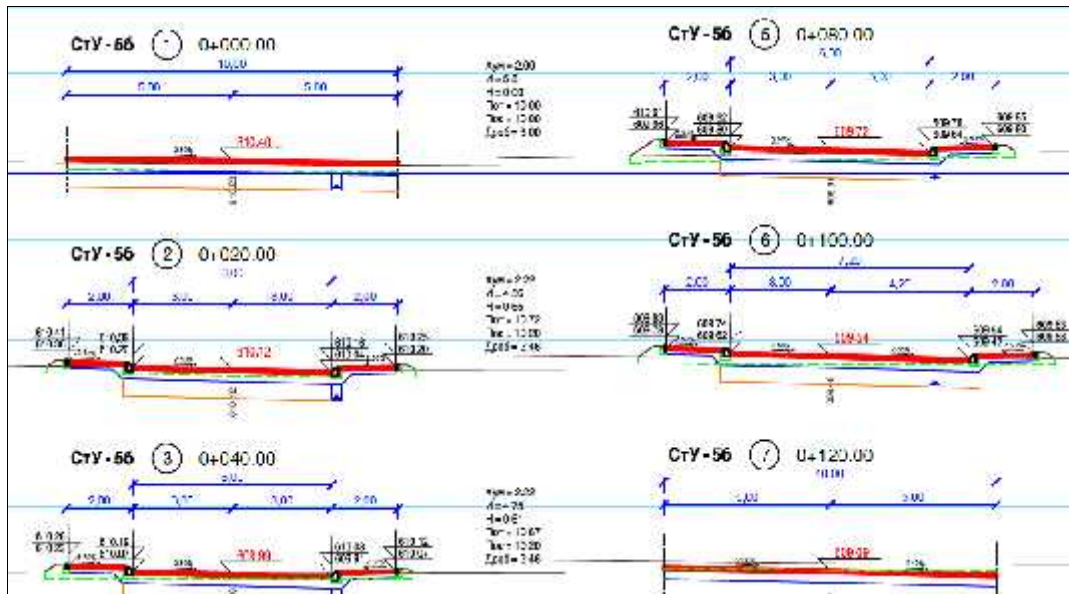
The construction of the street “StU 5b” will be performed on the following way:

- Bearing and Wearing Course BNHS16a.....7cm
- Street base crushed stone layer.....30cm
- Sub-base Course.....50cm

The sidewalks will be made with interlock concrete tiles placed crushed stone base layer with

the following dimensions:

- Interlock concrete tiles.....6cm
- Fine sand made of crushed stone material.....5cm
- Crushed stone base layer.....15cm



**Cross profiles of the residential street “StU 5b”**

### Construction of streets in ARM district 2

The total length of streets which are subject to construction in ARM district 2 is 1,675m. The goal is to build an infrastructural network of street with fully set water supply system, storm water system and street lighting.

For dimensioning of the streets that belong to ARM district 2 and which are subject of this Appraisal, are used previously developed documents: DUP “ARM district 2” – Bitola, Infrastructural project for roadway and communal installations prepared by “Formi DOOEL” – Bitola with technical number 44/2021 from April 2013, an updated geodetic base in scale 1:1000. The documentation is prepared in accordance with relevant legal requirements.

#### a. Service street “SrU4”

The location of the street “SrU4” is in ARM district 2 and begins from the street “SrU1”. The terrain is mostly stable, healthy, with no visible signs of existing landslides and landslides that could possibly arise. The total length of the street is 803.82m.

The street is planned to be constructed with two roadway lanes 2x3.5wide with variable width of the roadway 7 – 12m of which from chainage km 0+00 up to chainage km0+110 is with 12m wide roadway and this part of the street is an access to ARM district2 that further divides in two streets SRU4 and STU7. The design includes sidewalks on both sides of the street with a width of 1.5 to 3m. The cross slope of the street has been adopted as one-sided along the entire length and is 2.5%. This type of construction of the slope allows natural flow of the storm water and its easier collecting and drainage in to the storm water system.

The construction of the street “SrU4” will be performed on the following way:

- Wearing Course AB11 (Asphalt concrete layer).....5cm
- Bearing Course BNS22.....7cm
- Street base crushed stone layer.....30cm

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The sidewalks will be made with interlock concrete tiles placed crushed stone base layer with the following dimensions:

- Interlock concrete tiles.....6cm
- Fine sand layer.....5cm
- Crushed stone base layer.....15cm

**b. Residential Street “StU7”**

The location for the construction of the street “StU7” is in ARM district 2 and begins from the street “SrU4”. The terrain is mostly stable, healthy, with no visible signs of existing landslides and landslides that could possibly arise. The total length of the street is 594m.

The street is planned to be made with two roadway lines with variable width of 7m and sidewalks on both sides of the street with a width of 1.5m. The cross slope of the street profile has been adopted as one-sided along the entire length and is 2.5%. This type of construction of the slope allows natural flow of the storm water and its easier collecting and drainage in to the storm water system.

The construction of the street “StU7” will be performed on the following way:

- Wearing Course AB11 (Asphalt concrete layer).....5cm
- Bearing Course BNS22.....7cm
- Street base crushed stone layer.....30cm

The sidewalks will be made with interlock concrete tiles placed crushed stone base layer with the following dimensions:

- Interlock concrete tiles.....6cm
- Fine sand layer.....5cm
- Crushed stone base layer.....15cm

**c. Residential street “StU 12”**

The location of the street “StU 12” is in ARM district 2 and begins from the street “StU 7”. The terrain is mostly stable, healthy, with no visible signs of existing landslides and landslides that could possibly arise. The total length of the street is 270m.

The street is planned to be made with two roadway lines with wide 7m and sidewalks on both sides of the street with a width of 1.5m. The cross slope of the street has been adopted as one-sided along the entire length and is 2.5%. This type of construction of the slope allows natural flow of the storm water and its easier collecting and drainage in to the storm water system.

The construction of the street “StU12” will be performed on the following way:

- Wearing Course AB11 (Asphalt concrete layer).....5cm
- Bearing Course BNS22.....7cm
- Street base crushed stone layer.....30cm

The sidewalks will be made with interlock concrete tiles placed crushed stone base layer with the following dimensions:

- Interlock concrete tiles.....6cm
- Fine sand layer.....5cm

- Crushed stone base layer.....15cm

### Construction of retaining walls

Construction of retaining walls is planned for safety on certain sections of the route. The retaining walls should be placed on concrete foundations MB30; MAR 500/600; RA400/500 with d=35cm. The foundation should be reinforced with rebars R385 and R84. The retaining walls should be constructed as concrete reinforced with MB30, with wall thickness d=25cm, variable height. For reinforcement of the concrete for retaining walls are used rebars R335 and R196 and anchors of reinforcement rebar 12 in the walls and foundation.

ARM district 2					
Street	Alignments of the retaining wall km	Concreting of foundation for retaining wall 200x35cm / m <sup>3</sup>	Concreting of retaining wall m <sup>3</sup>	Double Sided rebar reinforcement R335 and R196 / kg	Anchors with 12 / kg
SrU4 2 phase <sup>11</sup>	0+420,00 H=376cm d=25cm L=1455cm	19	18	620	480
StU7 <sup>12</sup>	0+160,00 H=252cm d=35cm L=1040cm	20	22	660	525
	0+180,00 H=252cm d=35cm L=1360cm				

### Water supply system

The hydraulic calculations are made for ARM district 1, ARM district 2 and ARM district 3 up to elevation of 630m.a.s.l, covered by the Detailed Urban Plan (DUP). The water supply of the middle water supply zone of the city of Bitola covers ARM district 1, ARM district 2 and ARM district 3. The water supply system should provide sanitary water to the buildings that gravitate towards the streets. Also the system should provide hydrant water connected to the city water supply system. The alignments of the water supply system are passing through the construction site that is partly paved.

The connection of the water supply system of the area to the city water supply system is planned to be made in the node on street "12 Kladenci", the branch of the water supply system on the street "Partizanska" towards the towers block (near the sports hall "Mladost") and the node at the city stadium. The water pipe line is made of polyethylene HDPE 100 with a different diameter of OD 110mm and OD 160mm and working pressure of 10 bars. Fire hydrants and connections are also planned to be set on the water supply system.

The hydraulic calculation of the water supply system in the project documentation is made on the basis of the structure of the consumers. According the Detailed Urban Plan (DUP) a mixed structure of consumers is planned. There are planned to be built family, business and administrative buildings. The table below shows the needs for drinking water for ARM

district 1 and 2 and the need for fire water of 40 l/sec for two fires.

### Determination of water consumption to an area ARM district 1

Types of consumers	Number of consumers	Water supply norm l/day	Total consumption	Average daily consumption	
				Q aver./day	q aver./day
			l/day	l/day	l/sec
Permanent consumers	4,197	300	1,259,100	1,259,100	14.6
Daily consumers	10,843	50	542,150	542,150	6.3
Hotel consumers	1,848	250	462,000	462,000	5.4
Fire water					
<b>Total</b>	<b>15,040</b>		<b>1,801,250</b>	<b>1,801,250</b>	<b>20.9</b>

### Determination of water consumption to an area ARM district 2

Types of consumers	Number of consumers	Water supply norm l/day	Total consumption	Average daily consumption	
				Q aver./day	Q aver./day
			l/day	l/day	l/sec
Permanent consumers	373	300	111,900	111,900	1.3
Daily consumers	2,696	50	134,800	134,800	1.6
Fire water					
<b>Total</b>	<b>3,069</b>		<b>246,700</b>	<b>246,700</b>	<b>2.9</b>

For the construction of the water supply system in ARM district 1 polyethylene water pipes HDPE 100 are selected as the most suitable with a diameter of OD 110mm and OD 160mm and working pressure of 10bars. Underground fire hydrants and connections are planned to be set on the water supply system. Plumbing knobs, in which the water supply lines are crossing, and which are used for regulation (shut-off) of the water flow, are set for operational handling of the water supply line.

### Elements of the water supply system in ARM district 1

ARM district 1					
Street	Profile	Length of the water supply system (m)	Pipes	Number of knobs	Number of fire hydrants
SrU2	9	271.04	HDPE100 OD160/10bars	2	2
	26		HDPE100 OD110/10bars	1	/
SrU3	12	296.30	HDPE100 OD160/10bars	4	1
SrU4	16	408.12	HDPE100 OD160/10bars	5	1
StU5b	17	137.80	HDPE100 OD160/10bars	1	/

The water supply system in ARM district 2 consists of a water supply line for drinking water and a water supply line for technical water. The water supply line of technical water is from

hydro ameliorative system – Strezevo. It starts from the manhole of a pipe located on the street SRU1. Water supply line for drinking water in ARM district 2, is separated from the water supply line of technical water. Both systems have separate manholes and are constructed as separate lines. Supply of technical water from system of PE “Strezevo” is for the objects (water manholes, park hydrants and house connections) on the streets “SRU4”, “SRU5”, “STU7” and “STU12”. This water supply line complements the need for water for a part of ARM district 2, thus considering the principles for sustainable management with water taking into account maintenance and improvement the water regime<sup>13</sup>.

For the construction of the water supply system in ARM district 2 polyethylene water pipes HDPE 100 are selected as the most suitable, with a diameter of OD 160mm and working pressure of 10 bars. Fire hydrants, water manholes and house service connections are planned to be set on the water supply line for sanitary water. On the water supply line for technical water are planned the following elements: water manholes, park hydrants and house service connections. The reinforced concrete water manholes are with dimensions 120/150cm. The thickness of the walls, the cover and the floor is d=15cm. They are made of concrete MB30, reinforced from both sides with reinforced mesh Q188. The manholes are covered with circular cast iron covers according to standard EN 124 and load class D 400.

**Elements of the water supply system in ARM district 2**

<b>ARM district 2</b>				
<b>Street</b>	<b>Length of the water supply system (m)</b>	<b>Pipes and hoses</b>	<b>Number of manholes</b>	<b>Number of fire hydrants</b>
SrU4 part 1	200	HDPE100 OD160/10bars L=200m OD 90 L=76m	2	1
SrU4 part2	1,450	HDPE100 OD160/10bars L=1,450m OD 90 L=304m OD 32 L=700m	6	3
StU7	1,240	HDPE100 OD160/10bars L=620m HDPE100 OD110/10bars L=620m OD 32 L=600m	3	3
StU12	590	HDPE100 OD160/10bari L=290m HDPE100 OD110/10bari L=300m OD 32 L=200m	4	1

### **Storm water system**

The basin of the River Kurderes is regulated in the area near the south boundary of the site ARM district 1. The discharge of storm water is designed to be performed at appropriate location. At the end of the system, it is predicted, the water from all channels to be collected in a common collection channel.

The storm water system in ARM district 2 is designed to collect the storm water from the buildings and the streets and to discharge to the recipient on the north boundary of the area

covered by the ARM district 2 in the existing open channel with profile 2mx2m by which the River Kurderes is regulated. The storm water system is planned to be set along the streets. The depth of the channel in which are placed the pipes for storm water is from 1.5m to maximum 3.8m. The width of the channel is 1.2m. After the excavation of the canal is made planning of the bottom and installation of the pipes, and then is approach towards filling of canal trenches. Filling of the excavated trenches will be performs in layers from 20-30cm with compacting. Treated technical water from the buildings and the water from storm water system of the streets, after the mechanical treatment in a sedimentation system the water will be discharged into the recipient.

Construction of the complete sewerage system for the two districts ARM1 and ARM2 is assumed in the overall project, but is not part of this subproject, and is under the municipality of Bitola responsibilities and competences. For district ARM1 the main sections have been recently completed, and all other sewerage system arms from the service streets are under the construction as well as construction of the sewerage system for the streets in ARM2 district. All these works will be completed prior to start of construction activities in ARM1 district or in parallel with the construction works in ARM2 district for which the contractor should cooperate and adjust their activities with the municipal authorities and the communal enterprise Niskogradba-Bitola.

The storm water pipes and the manholes have to be constructed as 100% water resistant in order to provide optimal drain system. The manholes are to be constructed of waterproof reinforced concrete ring elements with a diameter of 100cm and 150cm sealed with round rubber among the rings. The prefabricated elements are made of waterproofed reinforced concrete class MB30, constructively reinforced with MA type R 308. The covers are class "D" and they are made of cast iron. The system includes construction of street gullies made of reinforced concrete pipes F=400 mm vertically installed, covered on the top with cast iron grating 40x40 type RP-511, and connected to the manholes with PVC pipe ND 200 with L= am.

#### **Pipes and elements of the storm water system for the streets in ARM district 1**

<b>ARM district 1</b>					
<b>Street</b>	<b>Profile</b>	<b>Length of the storm water system (m)</b>	<b>Pipes</b>	<b>Number of manholes</b>	<b>Number of street gullies</b>
SrU2	9	262.95	ID300/SN8 L=190.65m ID400/SN8 L=72.30m	7	18
SrU2	10	277.45	ID300/SN8 L=249.10m ID400/SN8 L=28.30m	6	
SrU3	13	107.00	ID300/SN8 L=70.00m ID400/SN8 L=37.00m	3	10
SrU3	14	69.00	ID300/SN8 L=69.00m	2	
SrU3	18	80.00	ID300/SN8 L=80.00m	2	
SrU4	22	113.65	ID300/SN8	3	11



			L=113.65m		
SrU4	23	127.00	ID300/SN8 L=127.00m	3	
SrU4	28	137.05	ID300/SN8 L=137.05m	3	
StU5 b	29	118.00	ID300/SN8 L=118.00m	3	3

### Pipes and elements of the storm water system for the streets in ARM district 2

ARM district 2				
Street	Length of the storm water system (m)	Pipes and hoses	Number of manholes	Number of street gullies
SrU4 part 1	80	ID150/SN8 L=30.00m ID600/SN8 L=80.00m	2	6
SrU4 part 2	725	ID150/SN8 L=270.00m ID300/SN8 L=170.00m ID350/SN8 L=120.00m ID400/SN8 L=420.00m	19	20
StU7	615	ID150/SN8 L=220.00m ID300/SN8 L=140.00m ID350/SN8 L=260.00m ID450/SN8 L=195.00m	20	14
StU12	270	ID150/SN8 L=120.00m ID350/SN8 L=170.00m ID400/SN8 L=100.00m	14	8

### Street lighting

The power for the street lighting system in the ARM district 1 and 2 is planned to be supplied by construction of new transformer stations. The photometry of ARM district 1 and 2 is determined based on the light classes of streets for motor and mixed traffic which are made in accordance with CIE 115 (1) where all streets are divided into five classes from M1 to M5. According to the urban plans, the streets are divided into different areas which are dictated by the required brightness levels on the surface of the street and the average horizontal drive light. Because the area has various purposes in different parts, the photometry is designed separately for each street.

**Power distribution cabinets** - The power distribution cabinets that will be used are from EVN, type A and marked with KRO-A. The cabinets set on the streets will be numbered



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accordingly. The electricity used by public lighting will be measured by one three-phase electricity meter 40A and one tariff electricity meter which will be placed in the power distribution cabinets. Also the power distribution cabinets will include complete electrical equipment with light relay and timer for managing the lighting in two modes of night. The first mode uses 50% of the capacity of the public lights and the second 100%.

**Cables** – The cables that are used for creation of the network for public lightning in ARM district 1 and 2 are set in underground conduit with a depth of 0.8 x 0.4m. A layer of fine sand, 10cm thick is applied on the bottom of the underground conduit before the cables are set. An aluminum cable type PPOO – Al 4 x 25mm<sup>2</sup> will be used from the transformer station TS 10/0.4kV to the power distribution cabinets. A cable type PPOO – Al 4 x 10mm<sup>2</sup> will be used as a supply line in the electric network. The cable is directed from the command cabinet and by using the system Inter-Enter through concrete foundation penetrates the terminal box of each light pole, where it is connected on automatic fuse of 16A. In the same underground conduit, a cable type PPOO – Al 4 x 2.5mm<sup>2</sup> will be placed and with the help of an electric choke will enable the lights to work in two modes of the electric power 50% and 100% with 250W. Also a galvanized tape 30 x 40mm is placed in the underground conduits where the cables from the transformer station are set. The galvanized tape is used as a protective line from excessive contact voltage. This tape connects to the anchor plate of each light pole.

A cable type PPOO – Al 4 x 16mm<sup>2</sup> is used for the lightning on the streets SrU2 and SrU3. Also, this type of cable is used for the street lightning on one section of the street SrU4, which starts from the street SrU1 and goes towards the city stadium.

**Foundations** – The foundations on which the metal light poles are set with height 8m above the soil, for each lightning place are prepared on site. They are made with concrete MB30 and with dimensions 0.9 x 0.9 x 1.0m. In order to insert the power supply cable and the command cable a PVC pipe with a diameter D = 70mm is placed in the foundation.

**Metal light poles** - The metal light poles are 8m high above the ground and are made in a form of a telescope with three different circular sections that are given in the graphic part of the project. The poles are straight and on them is placed pound long 1m. All metal parts are painted with waterproof gray paint. The poles have a terminal box set on 1.5m height from the ground containing two 16A automated fuses and a connector for the cable with 8 places. For the lightning of the street SrU2 are used 10 metal light poles with two lamps.

**Lights** – For public lightening, sodium lights with 250W will be used. The body of the light will be with lien aluminum, protected from corrosion and chemical influences by phosphatase, painted with metallic gray paint. The body of the light is completed with the needed equipment for startup and from the bottom side will have glass with increased level of protection IP65. The used lights should satisfy the European standards EN 60598-CEI 34-21 and I EN 60529, as well as UNI EN ISO 9002. The lights should match the security norms for flash Zone 1 for urban environment.

The equipment is explained in details in the technical documentation.

### Environmental Mitigation Plan

Project activity	Potential impact	Impact scale	Proposed mitigation measures	Responsibility
<b>Construction of 7 streets with sidewalks, construction of water supply system, water storm system and Placing of street lighting the new settlement “Zlaten Rid” in City of Bitola</b>				
Preparation activities before construction works start Marking out the route and construction of 7 streets, construction of water supply system, storm water system and placing of street lighting the new settlement “Zlaten Rid” in City of Bitola	<b>Possible adverse social and health impacts to the population, drivers and workers due to:</b> <ul style="list-style-type: none"> <li>– Lack of ensured safety measures at the start of construction works</li> <li>– Injury passing near by the construction sites and open trench and manholes</li> <li>– Not compliance with strict OH&amp;S standards and work procedure</li> <li>– Inappropriate public access within the districts and within the settlement</li> </ul>	Local/ within the new settlement “Zlaten Rid” and on micro level on District 1 and District 2 Short term during the construction period (different lengths – from 126.40m up to 805.00m for street and different lengths for water supply system and storm water systems) Significance - major	<ul style="list-style-type: none"> <li>➤ Preparation and implementation of the Traffic Management Plan together with the municipal staff prior start up activities including traffic measures to be applied within the settlement border and outside the settlement: <ul style="list-style-type: none"> <li>• Identification of all public streets that will be affected and proposed for the transport routes during the construction period (which sections will be closed and till when, where the traffic will be diverted);</li> <li>• Training on safety driving of heavy equipment and building materials need to be delivered to the drivers from Contractor Company;</li> <li>• Workforce transportation should be considered within TMP;</li> <li>• Driving standards need to be proposed for driving on and around construction sites;</li> <li>• Limitation of the speed driving within the settlement and outside at the access streets to the urban part of City of Bitola;</li> </ul> </li> <li>➤ Announcement via municipal newspaper (Bitolski Vesnik), local TV station and municipality board/web page the information about the construction activities – start and finish of work for each day and location of activities, duration of work and traffic access on other streets;</li> <li>➤ Application of good construction practice and community safety measures including: <ul style="list-style-type: none"> <li>• Ensure the appropriate marking out the construction site /section by section along the streets;</li> <li>• Placement of horizontal and vertical signalisation and attention signs especially for limitation of speed driving near the streets under construction and surrounding streets and boulevard;</li> <li>• Warning tapes and signage need to be provided;</li> <li>• The streets and around sidewalks should be kept clean;</li> <li>• Installation of Notice board with general information about the project,</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Contractor –Bidder</li> <li>• Supervisor</li> <li>• Municipality staff (Communal Inspector and Environmental Inspector)</li> </ul>

Project activity	Potential impact	Impact scale	Proposed mitigation measures	Responsibility
			<p>Contractor and Supervisor at each street/sub-project;</p> <ul style="list-style-type: none"> <li>• Forbidden of entrance of unemployed persons within the warning tapes;</li> <li>• Constant presence of fire fighting devices should be ensured in case of fire or other damage;</li> <li>• Larger quantities of flammable liquids should not be kept on the site along the construction streets and sites within the settlement.</li> </ul> <p>➤ Development and implementation of OH&amp;S Plan including:</p> <ul style="list-style-type: none"> <li>• Personal protective equipment for the workers at the construction sites should be distributed;</li> <li>• The appropriate changing, resting and dining facilities should be provided for workers as well as the lockers for personal belongs,</li> <li>• Appropriate notices and written guidelines for safety work with the equipment, safety movement and actions in emergency events should be prepared within the OH&amp;S Plan and distributed among the workers;</li> <li>• Measures for first aid and fire protection should applied on the sites (The training on first aid should be organized for the workers);</li> <li>• The first aid room should be ensured;</li> <li>• Transport and parking from/to construction sites need to be ensured;</li> <li>• Construction sites and object facilities will be guarded by guards 24 hours a day;</li> <li>• Sufficient number of toilet facilities need to be provided on sites and their regular maintenance should be organized;</li> <li>• Machines and heavy vehicles should be handled only by experienced and trained personnel;</li> <li>• All workers must be familiar with the fire hazards and fire protection measures and must be trained to handle fire extinguishers, hydrants and other devices used for extinguishing fires.</li> </ul>	
	<p><b>Possible impacts on landscape and visual aspects</b></p>	<p>Local/ within the settlement “Zlaten Rid” short term /minor</p>	<ul style="list-style-type: none"> <li>• Good construction practices have to be implemented – including fencing and protection of construction sites according to national legislation;</li> <li>• Minimization of the construction area as much as possible (careful planning and designing of the project activities according to the Traffic Management Plan for</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor – Bidder</li> <li>• Supervisor</li> </ul>

Project activity	Potential impact	Impact scale	Proposed mitigation measures	Responsibility
			<p>a certain period of time);</p> <ul style="list-style-type: none"> <li>• Fully clean-up of the construction sites immediately after accomplishment of construction activities;</li> <li>• Collection of the generated waste on daily basis, selection of waste, transportation and final disposal on appropriate places (according the type of waste – more details under Waste management issue).</li> <li>• Dust generating activities should be avoid during periods of strong winds and rescheduled if it is possible.</li> </ul>	
	<p><b>Possible emissions by transportation vehicles and impact on air quality in the Municipality of Bitola due to:</b></p> <ul style="list-style-type: none"> <li>– Gases emissions of dust-suspended particulates</li> <li>– Traffic congestion will be caused as well causing changes in existing traffic circulation</li> </ul>	<p>Local/ within the districts short term/ major</p>	<ul style="list-style-type: none"> <li>• Construction site, transportation routes and materials handling sites should be water-sprayed on dry and windy days;</li> <li>• Construction materials should be stored in appropriate places covered to minimize dust;</li> <li>• Vehicle loads likely to emit dust need to be covered;</li> <li>• Engines of construction vehicles should be switched off when vehicles are not in use;</li> <li>• Usage of protective masks for the workers if the dust appears;</li> <li>• Restriction of the vehicle speed within the construction location;</li> <li>• Perform regular maintenance of the vehicles and construction machinery in order to reduce the leakages of motor oils, emissions and dispersion of pollution;</li> <li>• Burning of debris from ground clearance is not permitted.</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor –Bidder</li> <li>• Supervisor</li> </ul>
	<p><b>Possible noise disturbance as a result of outdoor equipment usage and transportation vehicles driving around the sites</b></p>	<p>Local/within the district 1 and district 2  short term /minor</p>	<ul style="list-style-type: none"> <li>• Whole noise protection area is residential and belong to the area with second degree of noise protection and the maximum allowed noise level should be 45dBA for night and 55dBA for evening and day;</li> <li>• The control of noise level should be performed during work peaks in the vicinity of the educational faculty;</li> <li>• The temporary noise protection barriers should be installed around the construction sites;</li> <li>• The construction work should be not permitted during the nights, the operations on site shall be restricted to the hours 7.00 -19.00.</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor –Bidder</li> <li>• Supervisor</li> </ul>

Project activity	Potential impact	Impact scale	Proposed mitigation measures	Responsibility
Operational phase	<b>Possible impact on water courses – river Kurderes near the project site in City of Bitola</b>	Local/ short term/ minor due to the distance from the project site	<ul style="list-style-type: none"> <li>Minimize storage or disposal of substances harmful to water – river Kurderes (e.g. fuels for construction machinery) on the construction site;</li> <li>Organization of proper storage, handling and daily refilling the hazardous materials (fuels, additives, paints, etc);</li> <li>The road should be kept clean and tidy to prevent the build-up of oil and dirt that may be washed into a water course or drain during heavy rainfall.</li> </ul>	<ul style="list-style-type: none"> <li>Contractor – Bidder</li> <li>Supervisor</li> </ul>
	<b>Possible adverse environmental impact and health effects could occur as a result of generation of the different waste streams</b>	Local within the districts 1 and district 2  short term/ major	<ul style="list-style-type: none"> <li>Preparation and implementation of Waste Management Plan including:</li> <li>Identification of the different waste types at the reconstruction site (soil, sand, asphalt, bottles, food, etc.);</li> <li>Classification of waste according the national List of Waste (Official Gazette no.100/05);</li> <li>The main waste would be classified under the Waste Chapter 17 “Construction and demolition wastes (including excavated soil from contaminated sites)” with the waste code 17 01 – Waste from concrete, 17 05 04 – Excavated soil, 17 09 04 – Mixed waste from construction site and other waste streams proposed in <b>Error! Reference source not found.;</b></li> <li>Small amount of solid municipal waste could be found (food, beverages), as well as packaging waste (paper, bottles, glass, etc.).</li> <li>Waste bins posted along the construction sites with different colours for different waste streams should be posted.</li> </ul>	<ul style="list-style-type: none"> <li>Contractor –Bidder</li> <li>Supervisor</li> </ul>
	The inappropriate waste management and not in time collection and transportation of waste streams		<ul style="list-style-type: none"> <li>Collection, transportation and final disposal of the inert and municipal/communal waste by the PE “Komunalec” from Bitola;</li> <li>Possible hazardous waste (motor oils, vehicle fuels) should be collected separately and authorized collector and transporter should be sub-contracted to transport and finally dispose the hazardous waste;</li> <li>The materials should be covered during the transportation to avoid waste dispersion;</li> <li>Burning of construction waste should be prohibited.</li> </ul>	<ul style="list-style-type: none"> <li>Municipality staff (Communal Inspector)</li> <li>Mayor of the Municipality of Bitola</li> <li>CSE “Komunalec” from Bitola</li> </ul>

Project activity	Potential impact	Impact scale	Proposed mitigation measures	Responsibility
<ul style="list-style-type: none"> <li>Regular cleaning of the separation tanks for the storm waters washed away along the streets is needed in order to prevent the overload with solid materials and flooding. The main responsibility is on the Municipality of Bitola in coordination with CSE “Komunalec” from Bitola. Regular inspection and maintenance of the streets, water supply and storm water systems and street lighting and storage of spare parts needed for replacement of failure parts (Development of Preventive and maintenance Plan).</li> <li>Regular checks on supply water quality in accordance with the Plan for water testing performed by the Public Health Institute – Bitola.</li> <li>Positive impacts are expected from the construction of water supply system through supplying the local population with safety and clean drinking water. Construction of streets with sidewalks and street lighting will have positive impact in terms to provide a traffic link with the settlement “Zlaten Rid” and Bitola City and will ensure safe traffic.</li> </ul>				

**Table 2 Environmental Monitoring Plan**

What parameter to be monitored?	Where is the parameter to be monitored?	How is the parameter monitored?	When is the parameter monitored (frequency of measurement)?	Why is the parameter monitored?	Cost		Responsibility	
					Construction	Operations	Construction of 7 streets with sidewalks, construction of water supply system, water storm system and placing the street lighting the new settlement “Zlaten Rid” in Bitola municipality	Operation of 7 streets with sidewalks, water supply system and water storm system and street lighting
Project stage: Preparation activities/ Startup of the construction work (site cleanup, and marking out the route and construction sites along the districts)								
The safety protection measures applied for the workers and proper implementation of OH&S Plan Community safety measures applied	On the construction sites	Visual checks	During the clean-up and preparatory works At the beginning of each working day during the sub-projects activities	To prevent health and safety risks – mechanical injuries To be in compliance with national communal health regulation and OH&S standards			Contractor - Bidder Supervisor Communal Inspector at the Municipality of Bitola	
Project stage: Construction of 7 streets with sidewalks, construction of water supply system, water storm system and Placing of street lighting the new settlement “Zlaten Rid” in Bitola municipality								
Safety traffic flow through the district 1 and district 2 in new settlement “Zlaten Rid” and in surrounding area Proper implementation of Traffic Management Plan	On the site	Visual monitoring and check the Traffic Management Plan	During the working day	To ensure the coordinated traffic flow through the district 1 and district 2 in new settlement “Zlaten Rid”			Contractor - Bidder Supervisor Communal Inspector at the Bitola municipality	

What parameter to be monitored?	Where is the parameter to be monitored?	How is the parameter monitored?	When is the parameter monitored (frequency of measurement)?	Why is the parameter monitored?	Cost		Responsibility	
					Construction	Operations	Construction of 7 streets with sidewalks, construction of water supply system, water storm system and placing the street lighting the new settlement “Zlaten Rid” in Bitola municipality	Operation of 7 streets with sidewalks, water supply system and water storm system and street lighting
Proper implementation of Waste Management Plan	On the site	Review the keeping records on generated and managed waste streams as well as the Contracts for waste collection	Prior start up activities and during daily working period	To ensure proper waste management and minimization of pollution risks			Contractor - Bidder Supervisor Communal Inspector at the Bitola municipality	
Any disposal of the waste streams (solid and liquid) near the river Kurderes as potential pollution of good ecological status of water course	In settlement “Zlaten Rid” near the project areas	Visual check if the waste is disposed near the Kurderes river	During the construction period (once per week)	To ensure good status of water quality			Contractor - Bidder Supervisor	
Primary selection of the waste streams as they are generated at the spots	On the sites	Review the documentation	At the beginning of work with new material/s	To separate hazardous from the non-hazardous waste as well as inert from biodegradable waste			Contractor – Bidder Supervisor	
Collection and transport as well storage of hazardous waste (if any occurs)	On safety temporary storage	Review the transportation list and conditions at the storage facility	Before the transportation of the hazardous waste (if there is any)	To improve the waste management practice on municipality and national level/ Not to dispose the hazardous waste on the waste disposal spots			Authorized Contractor for collection and transportation of hazardous waste (if any occurs)	
Collection transportation and final disposal of the municipal and inert solid waste	On the sites and around the sites	Visual monitoring and reviewing the transportation and disposal lists from the sub-contractor	After the collection and transportation of the solid waste on regular base each day	Not to leave the waste on the spot to avoid the environmental and health impact on residents To have the real data for generated waste streams			Contractor – Bidder Supervisor	

What parameter to be monitored?	Where is the parameter to be monitored?	How is the parameter monitored?	When is the parameter monitored (frequency of measurement)?	Why is the parameter monitored?	Cost		Responsibility	
					Construction	Operations	Construction of 7 streets with sidewalks, construction of water supply system, water storm system and placing the street lighting the new settlement "Zlaten Rid" in Bitola municipality	Operation of 7 streets with sidewalks, water supply system and water storm system and street lighting
				and to improve the waste management				
Fulfilled Annual Report for collection, transportation and disposal of waste	Local self-government administration	Review of documentation – Identification of waste list	After the accomplishment the task of collection, transportation, temporary disposal and final disposal of waste	To improve the waste management on local and national level To be in compliance with national legal requirements			Mayor of Bitola municipality/ Ministry of Environment and Physical Planning	
Temporary noise protection barriers installed around the educational facilities	Around the educational facilities	Visual check	Before the construction work start at the site near the educational facilities	To minimize the noise disturbance of the sensitive group of people			Supervisor/ Communal inspector	
Noise measurements	On the sites	Monitoring of the noise levels  dB ( ) with appropriate monitoring devices	During the work peaks	To ensure noise level limits according regulation			Contractor - Bidder	
<b>Operational phase</b>								
Drinking water quality	Before the water distribution through the water supply network  The water sample should	Laboratory equipment for physical-chemical and microbiological water quality analysis	Continuously according the Plan for drinking water quality analysis (short-medium and long water quality analysis) especially the surplus of the	To ensure the distribution of high quality drinking water to the population minimizing the health risks of waterborne diseases				Mayor /Director of Public Health Institute - Bitola



What parameter to be monitored?	Where is the parameter to be monitored?	How is the parameter monitored?	When is the parameter monitored (frequency of measurement)?	Why is the parameter monitored?	Cost		Responsibility	
					Construction	Operations	Construction of 7 streets with sidewalks, construction of water supply system, water storm system and placing the street lighting the new settlement “Zlaten Rid” in Bitola municipality	Operation of 7 streets with sidewalks, water supply system and water storm system and street lighting
	be analysed by the Authorized laboratory (Public Health Institute – Bitola)		residual chlorine					
Preparation of the Preventive and maintenance Plan including all sub-projects  Regular maintenance of the streets, water supply network, storm water system and street lighting	Along the 7 streets within the District 1 and District 2	Review of the Preventive and maintenance Plan and proposed measures for proper operation of all constructed elements	Regularly on 6 months within the operational phase	To prevent or minimize the risks to human health as a result of water borne diseases, environmental pollution (chemicals, heavy metals, etc), proper operation of the traffic and minimization of traffic accidents				Mayor /Director of CSE “Komunalec” from Bitola and CSE responsible for maintenance of roads and streets
Clean up of the oil/water separators at the end of storm water system along the streets	At the storm water separation tanks location	Visual check	On regular basis and especially after hard rain	To ensure that the separators are clean from disposed solid materials coming from storm waters washing on the streets				Technical staff in the CSE “Komunalec”



## TECHNICAL SPECIFICATION FOR WORKS

### General

This section includes general technical specifications for the materials and the required construction activities within the project for construction of the streets, construction of storm water system, construction of water supply, and construction of street lighting, Technical specifications, details of the designs including detail drawings and bill of quantities for each section of the works are further described.

### Equivalency of standards and codes

Wherever reference is made to specific standards and codes to be met by the goods and materials to be furnished, and work performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise expressly stated in the Contract.

## PRELIMINARY WORKS

### Marking and securing of the route

This work involves staking out of the route, all the geodetic survey referring to transferring of the data from the design onto the site, or from the site onto the drawings, maintenance of the staked out markings on the site during the whole period from the beginning of the works up to the handover of works to the Employer, as well as possible dislocation of the existing control points. This work also involves taking over and maintenance of all the main geodetic shots and drawings and the staking out of the site handed over to the Contractor by the Employer at the beginning of the works. The scope of work must satisfy, in all, the construction requirements, control of the works, the calculation and everything else which is necessary for the performance of works.

### Route hand over

The Employer submits to the Contractor all terrain elements for route marking out (control points and benchmarks). The submission is done with a Taking over report.

The Contractor takes over from the Employer the route design which contains all required elevations and other geodetic information for performance of works.

From the day of taking over, the Contractor is obliged to assure all control points and benchmarks. If individual data on the site are lost or modified (turning point, benchmark), the Contractor is obliged to renew them at its own expense. The Supervising engineer checks and verifies the accuracy of the renewed points.

### Setting of cross profiles

After the taking over of the route and prior to the beginning of works, the Contractor should mark out each profile with timber stakes or iron nails (containing the designed elevations and alignments) which shall provide the basis for control and calculation of performed works. They should be positioned at both sides of the roadway at a distance that will not disturb the performance of works or traffic.

### Technical equipment and preparation of the construction site

Before the beginning of the construction works, the Contractor shall submit to the Employer the project on organization and equipment necessary for performance of works.

The planned equipment and organization of construction activities must enable performance of the works in compliance with the design and these technical specifications and with the dynamics that shall enable performance of works under favorable weather conditions.

The Employer is entitled to require modification in the proposed project on organization of construction activities and proposed equipment, if they are not in compliance with the planned progress of works and these technical conditions.

The Supervising engineer shall approve the starting of the works when assured that the planned equipment are on the site and functional.

#### **Demolition works**

The work includes excavation, demolition of existing street structures and existing sewer structures removal of curbs and other demolition activities required with the design.

#### **Performance of works**

The demolition of structures should be at denoted areas determined by the Supervising engineer which would require clean-up due to the construction activities.

The removal of other installations which, due to the construction activities, have to be redone should be performed together with the removal of other elements i.e. during area clean-up.

The manner of performance of works is determined by the Contractor, taking into consideration all prevailing regulations and provisions for safety at work in order to prevent any property damages. The Contractor shall bear any expenses that might result from its construction activities.

#### **Crossing of existing underground installation**

No warranty is given as to the accuracy or completeness of the information on existing underground installations. The Contractor shall consult all relevant authorities (Telekom, EVN, Vodovod and Niskogradba) and any other owners before commencing any excavations. All newly detected installation should be reported and documented.

The Contractor shall execute the works in such a manner that it does not damage or interfere with existing underground installations. If damage or interference is caused the Contractor shall make his own arrangements to execute the repairs at its own cost in accordance with the directions of the relevant authority.

The Contractor shall make its own arrangements for any relocation or removal of existing installations, which may be required, and shall obtain the prior approval of the Supervisor Engineer for such arrangements.

#### **Protection of the existing structures**

The Contractor shall protect all underground and above ground existing structures from damage, whether or not they lay within the limits of the easements obtained by the Employer. Where such existing walls, fences, gates, sheds, buildings or any other structures must be removed in order to carry out the construction properly, they shall be restored to their original condition to the satisfaction of the property owner, occupier and Supervising Engineer. The Supervising Engineer shall be notified if any damage appears.

#### **Utilities for Site Use**

The Contractor shall arrange at its own cost the supply of electricity, fresh water, telephone, compressed air and other services that are necessary for establishing the Construction Site and shall provide, maintain and remove on completion all pipes, cables and fittings which provide such services to his operations.

#### **Site Clean Up During Construction**

The Contractor shall clean all spilled dirt, gravel, or other foreign material caused by the construction operations from all streets and roads at the conclusion of daily operation. Cleaning shall include

washing with water, power brushing, and use of manual labor as necessary to achieve the necessary standard comparable with adjacent streets unaffected by the works.

### **Traffic Requirements**

Throughout the Contract Period, the Contractor shall co-operate with the relevant authorized institutions as the Road and Police Department concerning the traffic management works, previously coordinated with the Supervising Engineer and Project Manager.

## **EXCAVATION WORKS**

### **Humus Excavation**

These works include removing of humus in a wide range excavation along the route as well as under the embankments in various thicknesses and its loading and transportation to a landfill, all in accordance with designs and/or the Supervisor's request.

### **Soil Excavation**

These works include mechanical and manual excavations of all kinds of soil material that are given in the designs, including dislocation, i.e. use of the excavated material for backfilling if appropriate, including loading and transportation of the remaining material to landfills. These works include all excavations for cuts, fills, borrow pits, watercourse regulation, road deviation as well as wide excavations during construction of facilities. All the excavations should be performed in accordance with the designed profiles, elevations, and inclinations taking into consideration the geotechnical characteristics of the excavated material, as well as the required properties for the intended uses of the excavated material, in compliance with these technical specifications.

In principle, the excavation shall be done by mechanical equipment and other means, thus limiting manual work only to the necessary minimum. Excavation of hard rock material should be performed by mechanical drilling or sapping. Also, the mechanical pushing, i.e., loading of the material and its transportation to the place of use should be considered. The material should also be classified by quality, if required.

Categorization of the excavated material shall be made together with a representative from the Contractor and the Supervising Engineer.

### **Soil Categorization:**

Soil category 1: Top soil, humus, roots zone; non-consolidated; cohesive or non-cohesive; different distribution of granulation (clay - bed load - sand - minor percent of gravel); usually with dark color.

Soil category 2: soils from medium to high plasticity; cohesive; with lower or higher humidity.

Soil category 3: sand, gravel, maximum 30% of stones, easy to excavate.

Soil category 4: clayey, bed load sand, gravel, maximum 30% of stones up to 0,01m<sup>3</sup> size; cohesive; medium conditions for excavation.

Soil category 5: clayey, bed load sand & gravel, more than 30% of stones with size above 63 mm., maximum 30% of stones, size up to 0,1 m<sup>3</sup>; hard conditions for excavation.

Soil category 6: Fractured rock or similar category with more than 30% of stones above 63 mm, with separated granulation and larger than 0,1m<sup>3</sup>; easy to medium hard conditions for excavation.

Soil category 7: Minor percent of fractured rock up to non – fractured hard rock; difficult conditions for excavation.

Classification of the granulation:

		Granulation of (mm)	Up to (mm)	Separated (BS) mm
Rock	coarse		>200	
	smaller	60	200	63
Gravel	coarse	20	60	20
	medium	6	20	6.3
	fine	2	6	2
Sand	coarse	0.6	2	0.6
	medium	0.2	0.6	0.212
	fine	0.06	0.2	0.063
Bed load	coarse	0.02	0.06	
	medium	0.006	0.02	
	fine	0.002	0.006	
Clay			< 0.002	

Internationally recognized common classification of granulation is used (DVGW& DIN, Germany; BS; UK; MIT; ASTM):

During the excavation, the necessary protection measures for safety performance of the work should be considered.

## CONSTRUCTION OF THE EMBANKMENTS AND THE ROAD BED

### Material supply

Prior to the start of the construction works the Contractor shall inform the Supervising Engineer in written about the quarry which will supply the material and get his approval in written. Also the Contractor shall submit to the Supervising Engineer certificate for the quality of the material and get his approval.

### Transport and placement of the material for the sub-base layer

After the Supervising Engineer agreed and approved that the sub-base layer has been constructed according to the standards, the Contractor can start with supply of material for the sub-base layer. The surface of the sub-base material that has been approved and accepted by the Supervising Engineer shall not be used for transport and storage of material. Additional extensions of the road shall be constructed for transport and storage of the material. In case the material is placed in layers, then every layer shall be compacted, prior to starting of the placement of the new layer.

The vehicles that transport the material shall not drive over the compacted layer in order to avoid dirt from the tires to be placed on this layer.

### Sub- base

The sub-base layer is natural soil upon which the required slope is constructed. The works include compacting, digging in order to dry or moisten the natural soil in a thickness as per designs, approximately 20-30cm. In case the soil composition is such that it is impossible to achieve the standard criteria prior to construction of the embankment it is necessary to prepare the sub base layer in line with designs or as determined by the Supervising Engineer. The quality control of the materials will be in line with the following standards: MKSU.B1.010/79; 012/79; 014/88; 016/92; 018/80; 020/80; 024/68; 038/68, MKSU.E1.010/8.

### Embankment

The works include backfilling, spreading, rough or fine planning, moistening or drying and compacting of the material into the embankment in accordance with the designed dimensions. For the embankment construction non-organic materials with the designated quality should be used. The embankments cannot include organic waste, roots, shrubs, i.e. material that would change its mechanical-physical features due to biochemical influence over time.

The standards for quality control of materials for construction of the embankments are MKSU.B1.010/79; MKSU.B1.012/79; MKSU.B1.014/88 etc.).

During testing of the suitability of materials for the construction of embankments tests should be performed for each cut and borrow pit and the same should be done for thereplacement of the material. Testing should be based on at least two samples for each type of material in accordance with the directions provided by the Supervising Engineer. The quality control should be based on the following standards: MKSU.B1.010/79; MKSU.B1.012/79; MKSU.B1.016/92.

Embankment from earth material considering the characteristics of the material from the excavations the embankments should be constructed in layers with layer thickness of maximum 30 cm in the additional sprinkling. Upon spreading and compaction each layer should be tested for its degree of course of layer construction each should be with a 4% inclination in order to achieve natural draining. The material should be with a natural humidity, and if necessary should be moistened through compaction. If the results are positive the next layer can be constructed. The testing should be done through extraction of cylinders or according to the calibrated sand procedure.

The embankments constructed up to 2m, measured from the leveling point should be constructed with 100% density from the laboratory density that will result from the Proctor standard test.

The quality control for the construction of embankments should be based on the following standards: MKSU.B.010/79; 012/79; 016/92; 018/80; 024/68; 038/68; MKSU.E1.010/81; MKSU.E8.010/81.

For all quality control of the embedded material, document shall be issued from the certified laboratory.

### **Construction of the road bed**

Depending on the load bearing capacity of the natural terrain an improved bed with CBR>20% is designed.

### **Construction of the road base**

The activities include supply, embedding and compacting of the relevant material. The road-base layer should be constructed from a crushed aggregate in a single layer of 30 cm. The same should be compliant with all required criteria for quality construction of driveways, the quality control of the materials should be in accordance with the following standards: MKSB.BO.001/84; B.B8.012/87; B.B8.010/80; 030/86; 032/80;031/82; 036/82;039/82;047/87;035/84;MKSU.B1.018/80; 038/68;B.B3.050/64;MKSU.B1.046/68; MKSU.E9.020/66; B.B8.001/82; 044/82;045/78and MKSU.B1.042/69. The evenness should be controlled with a 4 m screed board and the deviations should not be bigger than 10 mm. the exactness in accordance with the leveling points should be within a  $\pm 10$  mm range.

### **Compaction of the material**

Compaction shall be done with vibratory rollers. Compaction shall be done from the lower to the higher elevation of the road. Places where the roller cannot access shall be compacted with other suitable equipment for rolling and compacting. This equipment shall be approved by the Supervising Engineer. After the compaction is finished the Contractor shall perform test of the Module of compressibility of the layer at 5 points on each 50-150m length of the road. The value of the Module

of compressibility is specified in the Bill of Quantities for each part of the works. Test shall be performed with circle plate diameter 30cm and the value of the Module of compressibility shall not be lower than 100MPa if no other value is specified in the design. Additionally following tests shall be performed:

- Testing of the compaction and moisture of the material shall be done on each 500m<sup>2</sup>
- Testing of the deformability of the layer on each 50-100m<sup>2</sup>
- Testing of the grain size distribution of the material on each 4000m<sup>2</sup>
- Testing of the material on ice resistance on each 4000m<sup>2</sup>

In case the Supervising Engineer requires additional test of the material the Contractor shall perform additional tests within the contract.

### **Humus spreading**

This position includes protection of the median belt, i.e. spreading humus soil and grassing in accordance with designs. Active humus material should be used, thus guaranteeing the lifespan of the plants. In the process of grassing it is necessary to spread 100 kg/ha artificial fertilizer. After sprouting of the grass, additional 100 kg/ha of the same fertilizer should be used. Sufficient dampness of soil should be provided for the entire time.

The humus spreading and vegetative protection should be performed immediately after completion of embankment and/or cuts construction.

## **CONCRETE AND REINFORCEMENT WORKS**

### **Ready mix concrete**

The concrete which will be used for construction of the retaining walls and the inspection manholes or their elements shall be ready mixed concrete. The Contractor shall obtain the Supervising Engineer approval of the source of production and shall confirm that the batching plant is approved by a third party accredited certification body. The Contractor shall submit for approval to the Supervising Engineer a Ready Mix Concrete Design.

The cement content of the concrete shall not exceed 400kg/m<sup>3</sup>. The maximum water cement ratio and the minimum water cementations content of the concrete mix shall be in accordance with the table below:

Exposure conditions	Nominal cover (mm)			
Mild	20	20	20	20
Moderate	35	30	25	20
Severe	-	40	30	25
Very severe	-	50	40	30
Max free water / cement ratio	0.60	0.55	0.50	0.45
Minimum cement content (kg / m)	300	325	350	400

The maximum size of aggregate in any structural member shall not exceed 25% of minimum thickness of the layer.

The Contractor shall provide agreement and approval from the Supervising Engineer for use of additives in concrete mixture.

Sampling shall be at the rate of 3 cubes taken from every 5m<sup>3</sup> of grout or 50m of grouted annulus, whichever is smaller. Cube molds shall be 70mm (nominal) or 100mm and all joints shall be sealed to



prevent leakage. The cubes shall be removed from the molds, marked and stored in water at temperature of  $20^{\circ}\text{C} \pm 1^{\circ}\text{C}$  until tested.

### **Steel bar – reinforcement**

The quality of the steel bars must be in accordance with the requirements set forth in the standard MKSC.K6.120 (reinforcing steel – shape and measures) and standard MKSC.K6.020 (technical conditions – yield strength, elasticity, elongation). Prior to the usage, the steel bars must be clean of dirt, rust, oil and other materials.

The steel bars must be cut, bent and set in full accordance with the reinforcing design. No changes are allowed without previous consent from the Supervising engineer.

For the upper slab of the manhole, minimum reinforcement bars of 10mm are installed at a distance of 150mm in both directions.

The concrete layer under or above the reinforcement must be a minimum of 2.5mm, otherwise that part of the structure shall be reconstructed at the Contractor’s expense.

Mesh reinforcement type Q and R in accordance with the following standards: MKSC.A4.002, MKSC.B6.013 and MKS U M1.091.

## **CONCRETE REINFORCEMENT WORK**

### **Concrete formwork**

Formwork is the area against which the concrete is set to form a whole together with the supports with a purpose to keep that position when concreting.

A formed facade is what is casted together with the formwork. Exposed facade is what remains seen after the completion of the construction.

### **Installation of formwork**

The formwork will be installed in a way that it will support all the weight of the fresh concrete together with the additional stress from the vibrating tools and the constructional traffic, and after the firming of the concrete, the formed facade will be in a position as shown in the drawing, within the allowed set in MKS U.C9.400.

The connections in the formwork for the exposed facade will be separated horizontally or vertically and they will be continuous or they will form a real scheme.

All the connections in the formwork, including all the constructional connections will be firm with a purpose to stop cement leaking. If reinforcement through the entire formwork is planned, then the form will be set around the bars.

The formwork will be projected so that it can easily be removed during the work without damaging the facade of the concrete. In this way it will also include some work in regard to doing small changes in the position if that is required with the purpose to achieve exact location of the concrete.

The horizontal formwork to the upper area of the concrete will be adequately ensured in case of elevation because of the pressure of the fresh concrete. In order to avoid empty spaces in the formwork, it will be firmed downwards or in another way.

The inner and outer angles of the concrete area will be formed with tracks and rounded edges with a size shown on the drawings if other instructions are not provided by the Engineer.

The supports for the formwork can be bolted on a previously set concrete, for which bolts the Engineer must give its approval. If metal tools are used through the concrete, the metal should not be closer than 50mm to the facade of the concrete.

At places where conditions prevent easy access to the formwork for cleaning and inspection, temporal openings are formed in the formwork for this purpose.

### Preparation of formwork

Before the reinforcement is set in a position of formwork, a thorough cleaning of the last part is performed which is also coated with tool for releasing. This tool will be either an appropriate oil in the event of an emulsion from the stopped water or oil with a low viscosity of chemical tools. The Contractor must not use an emulsion of oil or other tools for releasing which will cause discoloration of the concrete, the air openings in the surface.

In order to avoid the difference in color in comparison to the neighboring areas, in the section for Works only the type of tools for releasing will be used.

When it is required to fix the reinforcement bars before the setting of the formwork, the whole surface ready for formwork will be performed before it is set in the proper position.

Before the concrete works start, all the bolts and other adjustable tools will be protected from moving during the concrete setting and the Contractor will be obliged to pay attention to the formwork during the setting with a purpose to avoid any kind of movement.

The metal formwork will be sprinkled with cold water prior to the concreting.

### Formwork removal

The formwork will be carefully removed without damaging the concrete. The formwork must not be removed until the concrete reaches the necessary strength.

This minimal period between the installation of the concrete and the removing is given in Table 8.1.

As an alternative, the formwork can be removed after the concrete reaches the strength shown in table 8.1, and hereupon provided that the strength is confirmed by testing the concrete cubes and their curing during the same conditions as well as for the concrete to which they refer to.

The compatibility with these conditions and provisions does not relieve the Contractor from his obligations for removing delays until the removal is not completed without damaging the concrete.

Table 8.1

Position of the formwork	Minimum period for temp. above 10C	Strength which needs to be achieved
Vertical and close with vertical façade from a mass of concrete	24 hours	0.2 C
Vertical or close to vertical facade from reinforced walls, beams and columns	48 hours	0.3 C
Lower side from arch beams and slabs (only formwork)	4 days	0.5 C

Note: C is the nominal strength of the concrete class to be used

If the Contractor wants to dismantle the formwork on the lower side of the beams and the slabs before the expiration of the period for support stated above, that will be planned in a manner that will not disturb the supports. The Contractor will not remove the supports for the purpose of dismantling the formwork and consequently replace them.

After the removing of the formwork, the openings for the bolts which do not need any additional work will be filled with mortar dry enough to prevent any kind of slump of the front side. The mortar will be

mixed with the same scale as fine aggregate and cement into the surrounding concrete and the same materials.

### **Reparation works of the damaged area**

If during the dismantling of the formwork any damage in the surface area is discovered, the Contractor must not start reparation until an execution and inspection is made by the Engineer and after the Contractor receives proper instructions from the Engineer.

The damaged area will not be of quality if it is made of mortar.

The places with air gaps for which the Engineer has given consent to be repaired will be cut to the sound concrete or to 25mm clear distance behind the reinforcement or to 75mm. The empty gaps will have sides with angles to the facade of the concrete. After the cleaning with water and air under compression, a thin layer of cement will be put on the concrete surface in the cavity and will be filled with concrete of the same class.

After 7 days, the concrete is crushed and the concrete surface is smoothed.

Bigger damages are those which are previously mentioned and will be a subject to approval by the Engineer.

## **REINFORCEMENT FOR THE CONCRETE**

### **General**

This section covers all the smooth and ribbed reinforcement bars and fabric steel which needs to be poured in the concrete in every part of the work, but does not include cables or any other kind of embedded steel.

### **Materials**

The reinforcement will conform to the MKS standards shown in the Drawings. The entire reinforcement will be used in the Permanent works and will be tested in a lab approved by the Engineer and will be in accordance with the appropriate MKS standards and two copies of each certificate will be delivered to the Engineer. The tests shall be as determined according to the MKS standards.

As addition to the testing conditions described above, the Contractor will perform additional tests according to the instructions provided by the Engineer.

Each reinforcement which does not conform to the Specifications will be removed from the site.

### **Reinforcement bars storage**

The reinforcement bars will be stored on site in a mesh on shelves or hard surfaces so that they will remain straight and will not contaminate.

Each reinforcement which remains stored for a longer period of time will be protected from unstable weather conditions with the purpose to avoid corrosion. The reinforcement which is rusted according to the opinion of the Engineer will be removed from the site.

### **Bending of reinforcement bars**

( ) Schedule of the bars

The Contractor is obliged to prepare and submit to the Engineer a duplicate of the schedule of the bars, showing the cutting and bending of the bars presented in the drawings.

**(b) Cutting and bending of the reinforcement**

The Contractor will cut and bend the bars in the form shown in the schedule within tolerant frame. The bending of the bars will be done by a cold process using a low constant pressure. The hook bending or the right angle bending will be formed according to the schedule and sizes.

After the bending, the bars will be connected to one another in groups and will be labelled.

The reinforcement will be thoroughly cleaned from dirt, oil, rust and other contaminants, before it is put in the Permanent works.

**Fixing of the reinforcement**

The reinforcement bars will be fixed in a position within a tolerance of 25 mm in each parallel to the concrete face right angles, enabling the cover not to be reduced under the minimum as shown in the drawings.

If not otherwise arranged with the Engineer, all the bars will be firmed jointly with 1-6mm iron wire and the ends of the wire will be put in the body of the concrete or will be protected with a wire clip, the type of which is approved by the Engineer.

In order to make sure that the appropriate cover has stayed on the reinforcement, the Contractor will use distance tools which will be small and practical for the form and the Contractor will ask for permission from the Engineer not to move the reinforcement when concreting. A block of distance tools made of mortar won't be allowed in the Permanent works.

The reinforcement should be firmly fixed and should not allow any movements during the concreting. Each fixing of the formwork will not be within the space that should be taken by the embedded concrete.

The reinforcement must not be welded if that is not required within the Agreement or by the Engineer. The Contractor must confirm that the exposed reinforcement in the Permanent works will not be subject to distortion, movement or any other damages. When bending of the steel reinforcement bars that stick out on the side is needed, the bending radius must not be smaller than 4 times from the diameter of the smooth bars or 6 times from the diameter of the ribbed bars. These kinds of bending should be straightened before embedding them into the concrete, without leaving remains or damaging the concrete surface.

Before embedding the concrete into any section from the Permanent works which include reinforcement bars, it will be cleaned from contamination including the concrete which has been left from the previous works.

**CONCRETE****Definitions**

Structural concrete is any kind of concrete used in the reinforced or non-reinforced concrete construction. The unstructural concrete is composed of materials which are in accordance with the specifications but does not need conditions for stressing and is only used for filling empty gaps and similar works.

Formed surface is the face which is founded against the formwork.

Free surface is horizontal or similar surface constructed with a trowel to the required level and the required finishing.

The ratio of water/cement is the ratio which comes out of the weight of the free water in the mixer divided with the cement weight in the mixer. The free water in the mixer does not include water absorbed from the aggregates.

The concreting includes pouring of concrete in a mould or formwork to the volume which needs to be filled. The vertical pouring is considered as pouring with elevation.

**Materials for concrete****( ) General**

The Contractor is obliged to submit details for all the materials which it plans to use for the concrete to the Engineer. The concrete will not be applied in the Permanent works if it is not approved by the Engineer in the list of proposed materials. The approved materials will not be changed or replaced with other materials without their previous approval by the Engineer.

**(b) Cement**

The cement must be in accordance with the following standards

- KS B.C1.011 for a regular Portland cement
- KS B.C1.011 for a rapid formation Portland cement
- S B.C1.014 for sulfate resistant Portland cement
- S B.C1.009 for white and colored Portland cement
- S B.C1.013 low heating Portland cement

The cement must not leak and have slumps. It will be provided from the manufacturer in a sealed bag according to MKS B.C1.012.

The cement which is in bags must be transported in appropriate vehicles and must be protected from the weather conditions.

The cement which is in bags will be stored in waterproof areas with dry entrance and ventilation timely regulated. The floor will be elevated and concreted in a way so that it is dry.

Each delivery of the cement in bags will be stored on one place. The bags will be put one next to another but not put to the wall. If a pallet is used, they will be used so that the bags will not be damaged during the unloading and storage. Different types of cement will be differed with different labeling and they will be stored in different piles.

The cement in rended bags will not be used in the Permanent works. The cement from the bags will be used according to their goal of the delivery.

Most of the cement will be stored in waterproof silos which will have notification for the cement type. Different types of cement will not be mixed in the same silos.

The cement which has hardened or is not in accordance with the Specifications in any way will be removed from the site.

The cement which is used in the Permanent works will be tested by the manufacturer in a lab approved by the Engineer. The tests will be in accordance with the previously said standards and the Contractor will provide two copies of each testing certificate to the Engineer.

Each set of tests performed by the Contractor or the manufacturer will refer to one set of each cement base and samples will be taken from any cement brought to the site. As an alternative, subject to the Engineer's consent, one set of testing on every 20 tons of cement delivered to the site from each cement base will be preformed.

The cement which is stored for a longer period of time at the site (exceeding one month) will be tested again in a lab approved by the Engineer and this refers to one set on every 20 tons of cement on monthly intervals. The testing will be in accordance with the previously said standards for procurement of cement.

The cement which is not in accordance with the Specifications will not be used in the Permanent works.

The contractor will have full record about the production date, delivery, testing and usage of the cement in the Permanent works and will submit 2 copies to the Engineer.

**(c) Aggregates for concrete**

The aggregates for concrete should be in accordance with the conditions for fine and rough aggregate  
Aggregates for mortar

The aggregates for mortar will be in accordance with MKS.

- Aggregates testing

Acceptance of testing

The Contractor shall submit to the Engineer samples which contain no more than 50 kg of aggregates which it suggests to use in the Permanent works and will procure those samples as requested by the Engineer.

The accepted testing will be performed by the Contractor and will refer to three samples of fine and rough aggregate taken in the presence of the Engineer.

Routine testing

The contractor also needs to perform routine testing of the aggregates with a purpose to achieve accordance with the Specifications for the time period in which the concrete is produced for the Permanent works. The tests shown below will be performed on aggregates from each special source on the base of set of testing for each day and no more than 200 tons of fine aggregate and 500 tons of rough aggregate. If case the aggregate from any origin varies, the procedure for the testing will be in accordance with the instructions provided by the Engineer.

- |                            |            |
|----------------------------|------------|
| • degree                   | S U.M1.057 |
| • content of sand and clay | S U. 1.057 |
| • moisture                 | S U. 1.057 |

As addition to the abovementioned routine tests, the Contractor is obliged to perform tests in the following manner and order:

Moisture content: more frequently in order to control the water content according to the specifications.

Chlorite content: more frequently with a purpose to determine the scale of chlorite in the aggregate and that it does not pass the limit displayed in the Specifications.

-Submission and storage of aggregates

Aggregates will be delivered on site with appropriate vehicles. Different types and sizes of aggregates are not allowed on site.

Each type or size of the aggregate will be stored in separate areas in order to avoid any contamination of the aggregate.

If the Contractor plans to do concreting in low temperatures, it should store the aggregate so that it will prevent mixing of the aggregate with ice or snow.

If the Contractor suggests heating the aggregate in low temperatures, the Contractor should make sure to have constant and equal heating and it will not cause additional work.

(d) Water for concrete and mortar

The water for mixing the concrete or concrete or mortar curing must not contain more than the allowed concentration of dirt in accordance with MKS U.M1.058:

	Max.mg/liter
Amount of sulfate, alkaline carbonates and bicarbonates	1000
Chlorides	500
Suspended firm materials	2000
Other insoluble solids	2000

During the beginning of work, the Contractor shall submit a copy of the water proposed to be used for concrete and mortar to an accredited laboratory capable of performing complete analysis. The results of the analysis will be submitted to the engineer. The samples sent for analysis will be analyzed in the presence of the Engineers. If the water comes from appropriate water resources, the Contractor should provide a copy from the chemist who works in the water company. If the Engineer believes that this satisfies the testing, the abovementioned testing shall not be required.

The water used for mixing the concrete and mortar will be tested according to MKS U.M1.058 as well as the recommendations for Initial time for testing and testing of the strength characteristics. If the water source changes, then the testing will be in accordance with the presented above. If the water contains 80% of the maximum dirt concentration, then it will be retested at a two months interval.

#### ( ) Mixing (admixtures)

##### - General

The usage of mixtures in the concrete can be required under the Agreement in order to promote certain concrete characteristics or it can be proposed by the Contractor in order to conform with the specifications.

In all cases, the Contractor should submit to the engineer details regarding the suggested mixtures as well as the way of addition. The information should contain the following:

- Dosage and damage impact from surplus or deficiency in dosage
- Chemical name of the main ingredients in the mixture
- Whether the mixture contains chloride and if so then the chloride percentage should be shown by measuring the mixture.
- Short-term and long-term effects of the mixture on the concrete including the effect of different types of cement and aggregates
- Life span of storage.
- Security measures needed for operation.
- Compatibility with other additives.
- Compliance with standards.

The content of chlorine ions in any mixture should not exceed 2% of the mixture weight or 0.03% of the cement weight.

The mixture should not be mixed without prior permission from the Engineer.

#### (2) Super plasticizer

The super plasticizer should be in accordance with MKS U.M1.035.

As an addition to the normal test cubes, additional set will be made at 1.5 times of the predicted super plasticizer in order to assess the effect of overdosing the concrete.

If the super plasticizer is not specified, but the Contractor has received a license to use it, the Engineer will not give its consent unless the chemical composition is submitted for consideration as well as the additional test compounds mentioned above.

The Engineer reserves the right to refuse the usage of the super plasticizer in the concrete needed for special structures.

#### (3) Air agents

As addition to the general terms and conditions, the air agents will be in a function to produce air in the concrete mixture in the allowed limits and without tendency to produce excess air content in conditions of prolonged mixing time.

The effects from the proposed air agents will be tested by the Contractor during the tests which are proposed to be used in the Permanent works.

All the air agents should be in accordance with MKS U.M1.035.

#### (4) Working agents

As a subject of agreement with the Engineer, the mixtures can be used by the Contractor in order to comply with the conditions in the Specifications or to help when embedding them into the concrete. The working agents should be in accordance with MKS U.M1.035 and must not have any adverse effects on the concrete mixture. If lowering of the strength appears, the Contractor needs to respond by lowering the ratio of the water in the cement or by increasing of the content of cement.

### **Design for the concrete i.e. preparation of structural concrete**

#### ( ) Classes of concrete

The classes of construction concrete which need to be used in the Permanent works will be the ones shown on the charts. The classes are marked in Table 8.3.

Table 8.3

Concrete class	Minimal content of cement kg/m <sup>3</sup>	Maximum proportion of water/cement W/C		150 mm <sup>3</sup> request for a minimum average of 28 days strength (MAC) N/mm <sup>2</sup>
		from	to	
B 10	200	0.59		
B 15	250	0.57		27.0
MB 20	300	0.53	0.62	28.5
MB 25	320	0.51		30.0
MB 30	360	0.49	0.52	31.5
MB 35	380	0.45		33.0

Note: C = Minimum average requested of 28 days strength

#### (b) Preparation of proposed compounds

The Contractor shall project mixtures that it proposes to be used for permanent works in order to achieve acceptable workability and resistance to segregation during handling and installation. The mixtures will also be in accordance with the following requirements:

- (1) The summary section will be graded by the nominal maximum size of the stone to the size of 150 microns.
- (2) The cement content will be noted in Table 8.3, unless higher cement content is required to meet the strength demands.
- (3) The ratio of water/cement will be minimum consistent with adequate workability but in any case greater than that shown in Table 8.3 duly taking into account the water contained in the aggregates. The contractor shall take into consideration that this may require inclusion of means of workability in the mixture.
- (4) The workability shall be consistent with the releasing of the setting and correct compaction, keeping in mind the presence of reinforcement and embedded elements.
- (5) The strength of breaking after 28 days shall not be smaller than the minimal average strength presented in Table 8.3 plus 2 N/mm<sup>2</sup>.
- (6) Shrinking at drying confirmed in accordance with MKS U.M1.004 shall not exceed 0.05 percent.



The Contractor shall submit full details for all the mixtures which it proposes to the Engineer to use.

(c) Trial mixtures with testing cubes of 150 mm.

For each mixture of concrete, the Contractor shall prepare three special parties of concrete using materials which were approved for the Permanent works, in the presence of the Engineer’s representatives.

Marking, hardening and testing of all the cubes will be in accordance with MKS U.M1.004. The subsidence of the concrete performed in accordance with MKS U.M1.004 will be recorded.

Three cubes from each party will be tested for compressive strength every seven days, and the remained three every 28 days.

The consistence of all the cubes will be confirmed before the cubes break. The average value of the strength of nine cubes tested every 28 days reduced by  $2\text{N/mm}^2$  will be higher than the minimum average strength provided in Table 8.3 or the class of tested concrete.

If the strength at the 28 days confirmed above is smaller than the minimal average strength shown in Table 8.3 plus  $2\text{N/mm}^2$ , the mixture will be adjusted with the purpose to be compliant.

If the setting of the proportions of the aggregate does not increase the strength, the ratio of water/cement will be reduced.

If that is needed to increase the workability, the usage of additive for plasticity will be accepted.

Increasing the content of cement usually will not be accepted.

The Contractor will perform testing to confirm the shrinking during the concrete drying.

If the Engineer does not agree with the proposed mixture of concrete due to any reason, the Contractor will supplement his proposals and will make other test mixtures. None of the mixtures will be used for permanent works without the Engineer’s consent.

Based on the results from the tests done on the testing mixtures, the Contractor will submit details regarding its suggestions for mixture design to the Engineer, as well as the type and source for each ingredient, proposed proportions on each mixture and results from these tests on the trial mixtures.

(d) Control of the quality of concrete production

During the mixing and pouring of the concrete, samples will be taken according to the Engineer’s instructions, with Engineer’s representatives present, in accordance with the procedures of sampling described in MKS U.M1.004.

The slump of each sample carried out in accordance with MKS U.M1.004 will be determined at the time of sampling.

Samples will be taken for every  $20\text{ m}^3$  concrete, but not less than one sample per day or one sample for every pouring of concrete, whichever is more frequent.

Three test cubes of 150 mm will be poured from each sample, hardened and tested as confirmed in MKS U.M1.004.

One cube will be tested every seven days and two more every 28 days.

The average strength of two broken cubes on 28 days will be considered as one result for a test.

( ) Failure to meet the requirements

The Contractor shall take action according to the instructions of the Engineer to repair the concrete that does not meet the specifications. Such action may include, but it is not necessarily limited to the following:

- (1) Adjusting of the mixture proportions until the concrete is again consistent with the specification.
- (2) Drilling of cores for testing of the failed concrete and testing.
- (3) Execution of additional work to overcome the impact of the failed concrete.
- (4) Removal of the failed concrete.
- (5) Increasing of the frequency of sampling until re-establishment of control.

### Mixing the concrete

Before a construction plant for dosing, mixing, transporting, placing, compaction and finishing is ordered or delivered to the construction site, the Contractor will submit detailed drawings of the plant proposed to be used to the Engineer and the preparations it proposes.

The concrete for permanent works will be dosed and mixed in one or more central concrete plants unless the Engineer has agreed to another way of preparation.

The dosing and mixing plants will be modern efficient equipment in accordance with the request of MKS U.M1.045 and capable to produce equal distribution of ingredients through the whole mass. The mixer trucks will be used in accordance with the Engineer. If the plant proposed by the Contractor does comply with MKS U.M1.045, it shall be tested and it shall have performances within MKS U.M1.045.

All the mixing operations will be under the control of an experienced supervisor.

The cement and aggregates will be dosed according to weight. The water can be measured by weight or by volume.

The weight of the cement and each aggregate size indicated by the used mechanisms shall be within the tolerance limit of two percentage of the appropriate weight on party arranged by the Engineer.

The Contractor will provide standard weight test at least equal to the maximum work filling used on the heaviest loaded scale and other additional equipment which is required for checking of the satisfactory work of each scale or another measuring device. The tests will be performed by the Contractor in intervals which need to be confirmed by the Engineer and will be contributed in his presence. For the goal of performing these tests, the personnel will have an easy access to the measuring funnels. The Contractor will provide the Engineer with copies of the complete results of all the tests for checking and will perform adjustments, fixing and needed replacements just to guarantee satisfactory performance.

The nominal capacity of the container of the mixer will not be surpassed. The speed of rotation and time of mixing shall be as recommended by the manufacturer, but in addition, when the water is the last ingredient to be added, the mixing is continued for at least one more minute after the water is added to the drum or the container.

The blades of the mixers in the container will be maintained within tolerances determined by the manufacturer of the mixer and the blades will be replaces when they can no longer be maintained within tolerances with adjusting.

The water which needs to be added to the mixture will be reduced for the quantity of free water with the content of rough and fine aggregates. This quantity will be confirmed by the Contractor by a method arranged by the Engineer prior to the mixing every day and according to the Engineer's guidelines. When the exact quantity of water, determined in the specification, is added to the mixture, other water will not be added, whether during the mixing or after that.

After mixing for the required time, each party will be fully emptied from the mixture before any materials for the next party are put.

The truck mixers which have been out of use for more than 30 minutes will be thoroughly cleaned before any kind of fresh concrete is mixed.

### *Transport of the concrete*

The concrete will be poured from the mixer and will be transported with means which will prevent worsening, segregation or losing of ingredients and which will guarantee that the concrete has the requested workability.

The time between the mixing and pouring of concrete should be as short as possible and in any event not longer than to allow completion, placement and compaction of the concrete.

### ***Concreting***

Concreting will not be performed in any part of the permanent activities until a written consent from the Engineer is provided and the Contractor shall give a minimum 18 hours notice of its intention to perform concreting.

If the concreting does not start within 24 hours after receiving the Engineer’s consent, the Contractor shall request a written consent again as determined above.

#### **( ) Preparation of surfaces for receiving of concrete**

Before placing the concrete, surfaces should be clean, hard and strong and if required by the Engineer, wet but without any free water on them.

Each flow of water into the excavation will be diverted through side drains to tank drain, or removed through appropriate methods to avoid washing of the freshly applied concrete or its components.

#### **b) Placing procedures**

The concrete will be placed as close as possible to its final position. It will be set to avoid segregation of the concrete and moving of the reinforcement, other embedded elements or the formwork. It will be elevated in layers parallel to the connected planes and will not be above 500 mm in compacted thickness, unless otherwise approved or directed by the Engineer.

The concrete will be placed in formwork and carefully arranged around all the openings or embedded steel elements and reinforcement. All parts should be well-compacted so there are no segregations or air bubbles.

The concrete that has partially hardened during the transit to the permanent works will not be used and the transportation of the concrete from the mixer to the pouring point will be such to respect this requirement.

The concrete will not be placed during a long lasting rain because it may wash the cement from the rough aggregate from the exposed sides of the fresh concrete. Accessories will be provided for removing of the water which is accumulated on the surface of the placed concrete. Concrete shall not be placed over such accumulated water.

On a dry weather, the surface of fresh concrete, which are not worked on, will be covered. Water will not be added to the concrete without any reason.

When the concrete falls out of its place for the final placing, the segregation will be stopped by using appropriate canals, pipes, walls and other appropriate devices.

The forms for walls, columns and other thin parts with a significant height will have openings in the formwork which will enable placing of the concrete in a way that will stop the segregation and accumulation of the hardened concrete in the formwork.

#### **(c) Disruptions within concreting**

If the concreting is interrupted for any reason and the disruption length cannot be predicted or it is possible that it is extended, the Contractor shall immediately take action to form a construction joint to eliminate as much as possible all sharp edges and upper surfaces and will fully compress the concrete.

All the work on the concrete will be finished until it is still plastic and then it will not be disturbed until it has hardened enough to be resistant to damage.

Before the concreting continues after this interruption, the Contractor shall cut and remove the damaged and uncompressed concrete, sharp edges or other undesirable characters and will leave a clean hard surface on which fresh concrete can be applied.

### ***Compaction of the concrete***

The concrete will be fully compacted through the full length of the applied layer. It will be fundamentally processed on the frame around each reinforcement.

The concrete will be compacted with the help of mechanical vibrators for immersion, unless the Engineer agrees for another method.

The vibrators with immersion will work on a frequency between 7000 and 10000 cycles per minute. The vibration will be continued in each point until the concrete compaction has ended, i.e a thin layer of cement grouting appears on the surface and there are no more air bubbles appearing.

The vibrators will be embedded vertically in the concrete to enter the lower layer on an equal distance which will not exceed the distance of the vibrator above which the vibration is highly efficient.

### ***Concrete curing***

The concrete will be protected during the first phase of firming from losing moisture and differences in temperature in the concrete which might result in cracking.

The overall exposed horizontal surfaces will be closely covered with polyethylene sheet immediately after the concrete is completed. The polyethylene joints in sheet will be overlapped at least 300 mm and fixed with tape. This cover will be properly fixed to prevent its removal from the wind and create an air space below it. Care should be taken during all the stages to prevent damaging of the polyethylene cover that will be left at least 7 days.

### ***Protection of fresh concrete***

The fresh set concrete will be protected from rain and water flowing on the surface until it is strong enough to be resistant to this kind of damages.

No traffic will be allowed on the concrete surface until it becomes strong enough to be resistant to damages from such traffic.

## **CONSTRUCTION OF STORM WATER SYSTEM**

### ***Earthworks***

Before starting with trench excavation, the existing road surface and organic soli shall be removed. Safety measures shall be undertaken to stabilize the excavated trenches or pits with trench shoring if it is found that the slopes are unstable.

### ***Excavation***

Unless otherwise specified, the excavated material is classified and measured as cording to the soil category. The categorization of the excavated material is determined between the Contractor and the Supervising engineer.

### ***Stabilization***

In order to prevent collapse of trench sides, shoring should be made as follows:

-at solid and dry soil with horizontal timbering.

-at loose (soft) soil with/without the occurrence of underground water with vertical" sheet pile walls" trench shoring.

The open trench shall be secured in accordance with the regulations, with appropriate marking tapes fixed on stable supports or hard barriers. Trench shoring shall be removed upon prior permissions by the Supervising Engineer. Also the Contractor shall provide approval and agreement from the Supervising Engineer for using of 'sheet pile walls" trench shoring. The width and depth of the trenches shall be determined according to the diameter of the pipe. Trenches for pipes shall be vertical. Excavation for the manholes shall be done with widening of the trench at the designed location. When the excavation is done in coherent rocks and where slopes are required, they will be of 1:0.5.

The Contractor should provide the necessary shoring in order to ensure trench sides for depths over than 1.5m. Removal of trench shoring shall be performed under the supervision of a Supervising Engineer.

All temporary trench supports around the excavation should be removed before the back filling/rein statement of the trench unless prior approval is given by the Supervising engineer.

The Contractor shall submit a Method of statement for construction of the trench shoring at least 7days before starting of any excavation activity. The Method Statements should include data on the depth, characteristics of ground that should be excavated, table data for the groundwater level and the location of nearby buildings and roads.

Protection with steel or wood entrench shoring should be proposed by the Contractor in accordance with MKS standards. This trench shoring shall be paid and are specified in the bill of quantities.

#### *Dewatering*

During construction, places with high inflow of underground water may occur. In order to perform works without being disturbed by ground water or storm water, the Contractor shall build and maintain embankments, drainage canals, and other works for change of the water direction as well as, to ensure, install, maintain and operate the necessary equipment for pumping and other equipment, in order to remove the water from various parts of the construction. The Contractor is fully responsible for proper trench shoring and appropriate drainage of the trenches or pits. All excavations shall be maintained dry without the presence of water until completion of construction work and the period which is considered necessary to protect ongoing works. The Contractor shall be prepared to deal with this kind of situations and safely remove the water from the trench. The activities that follow: planning of the bottom of the trench, bedding for the pipeline, installation of the pipes and others, should be performed in a dry trench. For this purpose, the Contractor shall perform drainage in the trench with performance of sufficient number of pits with set of pumps for pumping of the underground water i.e.in any other way shall maintain the level of underground water on min 0.5m under the lowest level of the bottom of the trench. The period of maintaining this underground level will last until all activities related to the installation and testing of the pipeline are completed i.e until the start of the second phase –backfilling. If for any reason the surface water enters the trench which can cause erosion and sloping on the sides of the trench, the Contractor is obliged to redirect it from the trench to an appropriate recipient.

#### **Disposal of excavated material**

Depositing of the excavated material will be done on temporary or permanent landfills defined in the text or drawings, or defined by the Supervising Engineer in cooperation with the Project Manager. Landfills (temporary or permanent) must be able, with well-formed slopes as given in the projector according to the instructions provided by the Supervising engineer. Landfills shall be well cleaned before depositing of the material i.e. the necessary area for continuous disposal.

The cost for the preparation, arrangement and maintenance of the land fill will not be paid separately and shall be calculated in unit prices for transport and disposal of the material.

### *Leveling of the trench bottom*

After the excavation of the trench (before installation of the pipes) planning and leveling of the trench bottom shall be done, according to the designed level with an accuracy of  $\pm 1\text{cm}$  and compaction of the trench bottom. Leveling and compaction of the trench bottom can be done mechanically or manually. If during excavation of the trench the Contractor has wrong i.e. on some places has performed excavation of the trench bottom below the designed level then on such places the Contractor is obliged to repair them with compacted gravel or loose concrete up to the designed level of the trench bottom. All costs resulting from these repairs shall be borne by the Contractor.

### *Bedding of the trench bottom*

Following the fine planning and compaction of the trench bottom (before installing the pipes) placement of a bed of sand is done at the trench bottom. The purpose of the trench bottom bedding is to raise the bottom of the trench to the required (designed) elevation and enable the designed slope of the pipes as well as to ensure stable and equal bedding of the pipe at an angle of  $90^\circ$ . Under the pipe at the bottom of the trench a layer of sand with grain size from 4 to 8.0 mm will be placed in a 10 cm layer of natural non-separated or separated material or any other type of material. The bedding of the pipe should be done with placing of a sand layer leveled with an accuracy of  $1.0 \pm \text{cm}$ . The compaction of the material will be mechanical in layers with a roller 95% compaction determined by the standard Proctor test for optimum humidity. Measuring of the sand layer shall be done in approved limits of excavation and will be paid for a unit price per  $\text{m}^3$  of the embankment. The proposed unit prices for embankments shall incorporate the cost of operation of machinery and labor used loading, transportation and installation with spreading, planning and compaction.

### *Back filling of the trench*

After the installation of pipes in the trench, the next step is backfilling of the trench for which the excavated material can be used if defined as the required characteristics or with material from a borrow site previously approved by the Supervising Engineer and the Project Manager.

The backfilling of the trench should be performed in three phases:

#### **Phase I: backfilling of trench from sides and above the top of the pipe**

In the 1-st phase the backfilling of the trench is done from sides around pipes and above the top of the pipe over the pipes. At this phase the backfilling should be carried out with fine sand or selected material from the excavation. This backfilling is performed immediately after installation of pipes and it protects the pipes from mechanical damage, as well as a conditional backfilling upon the testing phase. At this phase filling is not done over the joints. Backfilling of the trench should be done on dry soil, with tiny granulation cleaned from sharp elements, rocks, roots, litter, organic material sand clay at least in the parts that touches the pipe and another 30cm above the top of the pipe. The backfilling material should be incoherent soil, not frozen without presence of stones (max. size of grains of 31.5mm), must not contain snow, ice or lumps of soil. Anyway the stones with sharp edges shall be removed. Before use, the backfilling material must be approved by the Supervising Engineer. The backfilling material shall be applied manually with side filling and manual compaction. In the area of the pipe, the required compaction of the material must be at least 90% compaction as determined by the Standard Proctor test of optimum humidity. If the excavated material does not meet above mentioned criteria after prior approval by the Supervising Engineer, the material shall be brought from previously tested explored site (borrow pit). All costs that will arise for providing of the material to be brought from the site (borrow pit) shall be borne by the Contractor and paid according to the price indicated in the Bill of Quantities. In this phase of filling a special attention should be paid not to damage the pipeline, otherwise all costs of repairing or replacing of damaged pipes shall be

borne by the Contractor. Parts of the zone of joints shall be filled as described above after the successful testing.

### **Phase II: Main backfilling of the trench**

In the second stage the main backfilling of the trench is done. At this phase filling should be carried out with the excavated material, if the same is appropriate to achieve the required compaction and if the grains are maximum 200mm. Granulation of such material should not be less than 0.4mm and it must not contain particles of clay. On pipes with diameter of DN<400 mm and a backfilling above the top of the pipe with the thickness of a 15cm material for main backfilling must not contain grain size>60mm. The main backfilling i.e fulfillment of the trench is performed mechanically with material from the excavation. Material intended for the main backfilling should be compacted in layers with a thickness of 10 to 30 cm up to the required compaction. Each layer should be compacted mechanically or manually. For high traffic areas, the required compaction of the material used for the backfilling of the trench should be at least 90%, determined with the Standard Proctor test for optimum soil humidity. Outside the high traffic areas, the required compaction of the material used for the main backfilling of the trench should be at least 85% determined with the Standard Proctor test for optimum humidity, if the thickness of the top layer is >4.00m, i.e must be at least 90% compaction determined with the Standard Proctor test for optimum humidity, if thickness of upper layer is <4.00 m. The contractor shall provide an optimal percentage of humidity of the materials used for the main backfilling of the trench. All costs which will arise for providing of this optimal humidity shall be borne by the Contractor. At this phase the excavated trenches are completely backfilled.

### **III Phase Complete backfilling of the trench / reinstatement of the cultivated soil**

In the 3-rd phase a complete backfilling of the trench/reinstatement of the cultivated soil shall be done in the trench mechanically or manually. Planning and leveling of the surface shall not exceed 5 cm over the terrain, without compaction.

#### **Reinstatement of the route of the pipeline on roads and streets**

After installation of the pipes and after the backfilling of the trench up to the designed level, the street surface layer will be returned to its original condition and quality in which the same were found. In order to ensure adequate quality of the street surface layer and to avoid the collapse of the roads, it is necessary to set and compact the layers with materials of sand, gravel, soil, etc. up to the necessary compaction of material equal to the material compaction of the original ground, if compaction was determinate previously. For achieving the required compaction of the material, compacting shall be done mechanically i.e with the appropriate equipment for compaction as fast as possible.

#### **Setting of a road base layer**

Before setting of the road base layer, the backfilling soil should be well leveled and compacted according to the Proctor compaction up to 98%. The required percentage of moisture in the ground/soil humidity should be kept. During placement of each layer, the Contractor shall take care for adequate drainage of the road surface. The new material for base layer should be done with the following specifications: mixture of sand / gravel granulation 0/32 mm; fraction (crushed stone) <0.06 less than 3% compaction up to 98% Proctor compaction and E module 120 MN/m<sup>2</sup>.

The material should be placed in accordance with the existing road base thickness with a minimum thickness of 30 cm for the street base, and 15 cm for the sidewalk base. Before installation the Contractor shall submit samples of materials and test results to the Supervisory Engineer for prior approval of the installation of the proposed material. The Supervisory Engineer may order to repeat

the testing in order to verify the quality of purchased materials. Approval for installation of the proposed material shall be noted in the construction diary.

### **PE corrugated pipes for Storm Sewer SN8**

PE corrugated pipes SN8 shall be produced according to the Macedonian Standard MKS EN ISO 9969 as well as to meet the European Standard EN 13467-3 for coupling fittings. Pipes should have quality certificate from EU Institute. Nominal rigidity of the ring of pipe shall be tested and quality certificate shall be issued by the laboratory that performed the testing. Quality certificates shall be issued for all pipe diameters foreseen in the design. All these quality certificates will be included in the final document issued after the construction works are finished.

#### **-Transport and storage**

The pipes manufacturer shall provide a document for safe transport of the PE corrugated pipes. This document will also be part of the final document issued after the construction works. Loading and unloading of the pipes shall be manually. If Supervising Engineer identifies any deformation or damage on the pipes on site, the Contractor is obligated to remove that pipe from site on instruction of the Supervising Engineer.

Providing of place for storage of the pipes is Contractor's responsibility and therefore all costs concerning storage of the pipes shall be included in the price for installation of the pipes. The pipes manufacturer shall provide a document for the safe storage conditions of the PE corrugated pipes. This document will be also part of the final document issued after the construction works. The surface where pipes are stored shall be flat, clean and protected from freezing during winter. The joints of the pipes shall be protected from dirt. Pipes shall be also protected from sun and therefore shall be covered when stored on site.

#### **-Installation**

For proper installation of the PE corrugated pipes outside temperature shall be in a range from  $-5^{\circ}\text{C}$  up to  $+40^{\circ}\text{C}$ . The trench for installation of the pipe shall be prepared including placement of pipe bedding material. At completion of the works at the end of the day the Contractor is obligated to close the open endings of the pipeline with end caps. All dirt from inside the pipe should be cleaned. Installation of the pipes shall be according to the Macedonian Standard MKS EN 1610. Compaction of the backfill material shall be in layers of 30cm. Vibrating plate shall be used for compaction. The backfill material shall be agreed and approved by the Supervising Engineer. If the Supervising Engineer does not agree the excavated material to be used for backfilling, the Contractor shall propose backfilling material from a borrow pit. The quality certificate for the backfilling material shall be also issued for agreement and approval to the Supervising Engineer. Depend from the outside diameter of the pipes, the backfilling material shall not have fractions with diameter bigger than 22mm for diameter of pipes 200mm, for pipes with diameter 200 D 630mm, material with fractions not bigger than 40mm. All surplus material shall be removed from the site at the finishing of the works at the end of the day.

#### **-Testing**

Prior acceptance and approval of each section of the storm water system, testing of the pipeline shall be performed. The Contractor shall prepare a separate Work Program for testing of the storm water system as well as a method statement for testing works which shall be agreed and approved by the Supervising Engineer. Testing of the pipeline shall be all according to the Macedonian Standard MKS EN 1610. Prior backfilling of the pipeline test for infiltration and/or leakage shall be performed successfully. The Supervising Engineer will determinate which of the tests will be performed. Pipeline shall be cleaned with water before starting of the test. Person who will operate with the measurement



equipment shall be elected by the Supervising Engineer. Using of the underground water for testing of the pipeline will not be allowed. All costs for provision of clean water for testing of the pipelines will be born by the Contractor. If damages occurred during performance of the test, the Contractor is obligated to repair it at its own costs. Testing will be performed in sections. Minimum length of the section will be between two manholes and maximum length will be section with three subsequent manholes. The ends of the testing section shall be covered with waterproof end caps. Before start of the test, pipeline shall be filled with water for 24hours. Water flow on the pump for water shall be calibrated with accuracy up to 1l. The manometer which will be used for testing will be calibrated with accuracy of 0.1 bar.

- Testing for leakages (water test) - the test pressure for non pressure pipeline up to and including 750mm nominal bore shall be not less than 1.2m head of water above the invert level of the pipe or ground water level, whichever is the higher at the highest point, and not greater than 6m heard at the lowest point of the section. The pipeline shall be filled with water and a minimum period of 2hours shall be allowed for absorption, following which the original water level shall be restored. Water shall than be added from the measuring vessel at intervals of 5 minutes over a 30 minute period and the quality required to maintain original water level noted. Unless otherwise specified, the length of pipeline shall be accepted if the quantity of water added over a 30minute period is less than 0.5 liter per linear meter per meter of nominal bore.
- Testing for leakage (air test) - non pressure pipelines to be air tested shall have air pumped in by suitable means until a pressure of 100mm head of water is indicated in a U-tube connected to the system. The pipeline shall be accepted if the air pressure remains above 75mm head of water after a period of 5minutes without further pumping, following a period for stabilization. Failure to pass the test shall not preclude acceptance of the pipeline if a successful water test can subsequently be carried out.
- Testing of infiltration - in areas with high level of underground water test of infiltration will be obligatory for the Contractor. Non pressure pipelines and manholes shall be tested for infiltration after backfilling. All inlets to the system shall be effectively closed, and any residual flow shall be deemed to be infiltration. The pipeline, including manholes, shall be accepted as satisfactory if the infiltration, including infiltration into manholes, in 30minutes does not exceed 0.5litre per linear meter per meter of nominal bore.
- Notwithstanding the satisfactory completion of the above test, if there is any discernible flow of water entering the pipeline at a point which can be located either by visual or CCTV inspection, the Contractor shall take measures as are necessary to stop such infiltration.

### **Inspection manholes**

Inspection manholes are foreseen on the storm water section constructed of concrete reinforced pipes. Precast concrete manhole units shall be manufactured with SulphateResistant Cement to BS4027 or equivalent EN or ISO Standards. According to the design these manholes are constructed of pre cast concrete elements with diameter of 1000mm. The joints of the prefabricated concrete elements shall be done with cement mortar all according to the Macedonian Standards MKS EN 1917. Each of the inspection manholes shall be constructed of following parts:

E1 - bottom of the manhole

E2 - concrete reinforced pipe section with diameter 1000mm, height1000mm

E3 - concrete reinforced pipe section with diameter 1000mm, height500mm

E4 - cone concrete reinforced pipe section, diameter 1000mm at the bottom and 670mm at the top, with height of 670mm.

### **Manhole covers**

All inspection manholes should have cast iron covers with a pin joint for connection with the bottom part and opening  $\varnothing$  1000 mm, heavy type 400KN, 610mm, adequate to the load bearing from the vehicles. The manhole covers should provide automatic closing with cast iron protector including suspension. Manhole cover shall be ventilated type and the manhole frame shall be optimized in order to enable one end fixing.

All should be performed in accordance with the EN 124 standard.

### **Street gullies**

Against each manhole, a horizontal gully is forecasted as is provide in the type annex. The gullies should be performed from reinforced concrete pipes 400 mm, concrete class MB 35 and cast iron double gratings heavy type 400KN. The storm water captured by the gullies shall be lead to the manholes with PE(PVC) pipes 200 mm and two 200mm bends ( $45^0$  and  $90^0$ ) The accurate levels of manhole covers/lids and gullies should be adjusted to the ground level (asphalt).

Rectangular street gully with round opening; RP 511; NP 400 KN

It should be performed in accordance with the EN 124 standard.

### ***Drainage Dewatering***

Under-drain consists of perforated pipe placed in permeable granulated material. Single installations, in which a pipe and filter material are placed in a narrow trench.

### **Excavation**

Where pipe is to be laid below the existing ground line, a trench shall be excavated to the required depth and to a width sufficient to allow for joining of the pipe and compaction of the bedding and backfill material under and around the pipe. The completed trench bottom shall be firm for its full length and width. Unsuitable foundation material or ledge rock, rocky or gravelly soil, hard pan, or other unyielding foundation material encountered below the normal grade of the pipe bed shall beremoved and replaced with Granular Backfill. All dimensions of the excavation is performed by default elevations of the project in all the European standard EN 1610 1997.

Deviation of elevations of the trenchbottom can be permitted locally  $\pm$  3 cm from the designed elevation.

### **Placement**

The trench bottom shall be shaped with compacted concrete layer, concrete class MB20 to fit the pipe 110mm for a depth of not less than 10 percent of its total height. No pipe shall be placed until the trench and the prepared foundation have been approved by the Engineer. Placement shall begin at the outlet end. The lower segment of the pipe shall be in contact with the shaped bedding throughout its full length. Bell or grooved ends of PE (PVC) pipes shall be with flap valve. Placing of drain pipe should all match European standard EN 1610:1997.

The filter layers with different granulation should be laid as specified in a design.

### **Flap valve**

Flap valve shall be round or rectangular, single door bitumen coated, cast iron double hung tidal type flap valves, with the clear opening dimensions designed to pass the required discharge. Flap valve shall be fitted with phosphate or bronze or stainless steel or similar approved corrosion resistant metal faces and hinge pins and shall have a galvanized mild steel lifting eye.

Flap valve shall be designed to withstand a working pressure equivalent to 8.0m of water and shall be tested after installation with a feeler gauge to a non-acceptance of 0.05m/mm between sealing faces when closed.

## **CONSTRUCTION OF WATER SUPPLY SYSTEM**

### ***Earthworks, Excavation - General regulations***

The volume of the excavation of the pits will be determined in accordance with the designed profile resulting from the profile of the pipeline and the material for the performing of the works. The sides of the excavations for the pits are designed to be dug out vertically.

The excavation for the manholes represents a widening of the pits and its volume will be determined in accordance with the designed construction pit performed from loose rocks because of the impossibility of underpinning, and the sides of the construction pit should be performed with an inclination 1:0,5.

The augmented amount of excavation/surplus excavation will not be acknowledged except for the cases when the geo mechanical characteristics determined previously differ from those on the site. Surplus excavation will be determined by the Supervisor on the Constructor's proposal. No additional fees above the offered unit prices for excavation will be acknowledged because of the augmented humidity of some material. The excavations are determined for excavation in loose rocks.

#### ***Excavation in loose rocks and rocks***

The excavation in loose rocks comprises all the rocks in accordance with the conditions determined in the classification of materials, construction norm *GN 200*.

Excavation is implied in gravels with different granulation, sands, dust and clay in different form determined in accordance with the construction norms *GN 200*.

The excavation of these materials is performed with mechanization or manually, without the use of explosives. This excavation also comprises the excavation of materials which contain boulders and blocks that are unattached and can be removed manually or with mechanization, and have a volume smaller than 0,5 m<sup>3</sup>. (Part ARM 1)

According to the Supervisor's assessment, all or part of the dug out material can be used to fill the pit i.e. the construction pit around the manhole, which will result in disposal of the dug out material on one side of the pit i.e. construction pit, at 300.0 m distance, or the dug out material will be transported to a permanent dump yard distanced 10.0 km.

In Part ARM 2 we are expected to occur rocks and if it not be removed with a hammer stroke will have use explosives.

The category of the materials at the excavation site is in accordance with the conditions determined in the construction norms *GN 200*.

#### ***Planning of the bottom of the pit***

After the pit has been dug out, the bottom is levelled in accordance with the designed shape and slope with an accuracy of  $\pm 2$  cm. The levelling can be performed mechanically or manually. This position is calculated and paid in unit price per m<sup>2</sup>.

#### ***Embankment***

The embankments will be built in accordance with the technical conditions for building embankments from natural or processed material, standardized in MKS (JUS) U.C5.020.

#### ***General Regulations***

The building of an embankment comprises filling, rough and fine levelling, compression of the materials in accordance with the specific technical conditions and control of the compactness by the Constructor's laboratory.

The embankments will be built from natural or processed materials, the properties of which will guarantee stability during building and exploitation. The filling material will be exclusively from the excavation, and if there is a lack of material or its properties are not suitable, material from inspected and approved sites will be used.

The Supervisor will determine the materials that will be used for filling, the method of filling and compression, measures for protection of the built embankments during a longer break in the filling process. The inspection and testing of the embankment materials will not be paid for separately – they should be included in the unit price per m<sup>3</sup> of embankment.

The following materials will be used for filling:

- natural incoherent materials obtained from excavation of loose rocks;
- natural incoherent materials from a previously inspected site;
- processed natural incoherent materials (river – separated), gravel sands and sands will be used to make the foundation for the pipelines.

***Embankment – lying of the sand foundation***

Sand foundation will be placed under the pipe at the bottom of the pit or in other places (manholes) approved by the Supervisor.

- At the pipelines, it will be with grain size up to 4,0 mm in a 10 cm layer from natural not separated or separated material or other kind of material (soft soil as well) after a prior approval by the Supervisor. If the Supervisor thinks that some of the sections do not need a sand layer (it is already present in the pit), the pipes in that sections will be placed directly on the ground. The pressing of the pipe should be even, so the surface of the sand foundation should be planned with a precision of  $\pm 1,0$  cm.
- At the manholes, it will be with gravel with grain size up to 31,5 mm from natural not separated material in a 20,0 cm layer.

With both of the materials, the compression will be performed mechanically with a steamroller without vibrations, to 95% compactness determined with standard Proctor test at optimal humidity.

The measuring of the sand foundation will be performed within the approved boundaries of excavation and will be paid in unit price per m<sup>3</sup> of embankment.

The offered unit prices for embankment comprise the costs of the mechanization work and the man-labour, the loading, transport and building in with lying, levelling and compression.

***Embankment – filling of the pit after the pipes have been placed***

After the pipes have been placed in the pit, the pit is filled with material from the excavation or from another site.

***Phase I*** – filling of the pit around and above the pipe to a height of 30 cm above the top of the pipe. This filling is performed right after the montage of the pipes and represents means of protection of the pipes from damage, as well as conditioned filling necessary for the phase of hydraulic testing. There is no filling of the parts of the junctions in this phase. The filling material should be loose, not frozen and without rocks, with a maximal grain size 31, 5 mm. If the material from the excavation is used, it is built in mechanically and manually with side filling and manual compression up to 85 % compactness determined by standard Proctor test at optimal humidity. If the excavation material does not suit the above stated criteria, with a Supervisor's decision the material will be brought from a previously inspected test site. In this phase of filling, it is necessary to pay special attention not to damage the pipeline; otherwise, the Constructor will cover all the costs for repair or change of the damaged pipe.

The parts in the zone of the junctions will be filled after the hydraulic testing is performed, as described earlier. The payment for the performed filling works will be per m<sup>3</sup> built in material.

The offered unit price for embankment comprises the costs of the mechanization work, building, compressing, and if excavation material is used loading, and transport if material from an inspected site is used.

**Phase 2** – Filling of the pit with material from excavation dumped by the pit. The material is built in layers 20-30 cm thick, with compactness equal to the beforehand determined compactness of the material of the original ground. If material from site is used, the compression will be performed mechanically with a steamroller, up to 95% of the compactness determined with standard Proctor test at optimal humidity.

The payment for the performed embankment works will be per m<sup>3</sup> built in material.

The offered unit price for embankment comprises the costs of the mechanization work, building in of the excavation material, compression together with geo-mechanical control by the Constructor's laboratory.

### ***Transport***

The transport of the materials from the excavation or for the filling includes:

- transport to a permanent or temporary dump yard
- transport from a temporary dump yard to the building place
- transport from the site to the building place.

A kilometre cubic metre (km/m<sup>3</sup>) is defined as a cubic metre of material transported for one kilometre distance.

The payment for the transport will not be per kilometre, but it should be comprised in the unit price for dug out material, where the distance to the dump yard or the site for the material is quoted.

### ***Disposal***

The disposal of the material from the excavation will be right next to the excavation site, in temporary dump yards and permanent dump yards that are marked on the drawings or described in the text or will be determined by the Supervisor in cooperation with the Constructor.

The dump yards (temporary and permanent) must be stable, with shaped slopes and inclinations or designed as provided in the design or instructions of the Supervisor.

The terrain at the place where the material is to be dumped will be cleaned as much as it is necessary to allow undisturbed disposal.

The costs regarding the making, arranging and maintenance of the dump yard will not be paid separately, but should be comprised in the excavation unit price.

### ***Installation works -Polyethylene pipes***

#### ***Material***

The pipeline should be made of HDPE – polyethylene according to standards ISO 4427 / DIN 8074 / EN 12201, classified as PE-100 with working pressure of PN 10 bars with external diameter 160,110,90 and 32mm.

#### ***Testing of the hydrostatic pressure***

All of the pipes should be tested for hydrostatic pressure and the tester should issue a Certificate for each pipe. The quality attestations should be separate for each pipe in the Report, which will be incorporated in the technical documentation for the determined situation.

#### ***Delivery of the pipes to the construction site***

It is recommended that trucks perform the transport of the pipes from the manufacturer to the construction site. Specification of the pipes delivered to the construction site should be prepared and it should state the label and length of the pipe. All of the delivery material should be incorporated in the technical documentation for the determined situation.

If pipes with different diameters and series are loaded, the pipes with bigger diameters should be loaded at the bottom, and the pipes with smaller diameters should be loaded on top of them. Putting of one pipe inside another should be avoided, except when it is allowed in the transport. The ends of the pipes that are rounded and ready for welding should be protected.

### Storage

The pipes will be stored in temporary storage rooms (warehouses) if the dynamics does not plan unloading along the alignment of the place planned for their installation. The provision of the storage space/surface is obligation of the Constructor and it will not be paid for separately, but the cost will be included in the pipeline unit price.

The performed works will be paid for per m<sup>1</sup>.

The offered unit price comprises the pipe's manufacture costs, the costs for the testing for hydrostatic pressure, the costs for delivery and storage in temporary warehouses.

### ***Installation of the pipelines***

The installation of the pipeline will take place when the outside temperature will be from - 5°C to + 60°C, in previously prepared pit along the alignment in two ways:

- installation of the pipes outside the channel, following previously determined sections, where the pipes are lowered in the channel with the help of appropriate machines (pipe placer)
- installation of the pipes directly in the channel for connecting the sections where recesses have been prepared.

### Local transport

It is recommended to transport the pipes from the manufacturer to the construction site with trucks. Specification for the delivered pipes with the pipes' diameters and lengths should be received. All the documentation for the delivery of the pipes should be included in the detail design.

### Welding technology

Regarding the welding of the pipes during the installation of the pipeline, it should be frontal welding, pipe to pipe and pipe to fitting. The two ends of the parts are put under pressure on the heating plate. Then, they are heated to the point of melting with reduced pressure (pre-heating) and are bound under pressure after the heated element has been removed.

The specific heating pressure and the welding temperature are given in the welding parameters and for these pipes they should be  $P_s = 0.15 \text{ N/mm}^2$  and  $t=200/210^\circ\text{C}$ .

The frontal welding technology should be attested in accordance with the standards DVS 2207, parts one and two.

The welding technology and the results should be processed and given in the technical documentation for the determined situation.

### Welding machines

Machines, that meet the requirements given in the standard DLS 2208 part 1, will be used for the installation welds and for these machines, it is necessary to prepare and provide attestations for approval that will be included in the technical documentation for the determined situation.

### Welders

Attested welders, who possess suitable valid attestations for welding, will perform the welding of the pipes. Before the welding starts, it is necessary to make technological tests (test welds) and these should be controlled by the Super control. The welder’s attestations and the place where the welder has worked should also be included in the technical documentation for the determined situation.

#### Testing of the installation welds

The Engineer and the Super control, which consists of a visual inspection and dimension control will control all the frontal installation welds, where the welds should have equal height, determined in the welding parameters, everywhere and is directly dependent on the specific pressure of welding and the thickness of the pipe wall,. The visual control of the edge is performed inside and outside on the big profiles, only outside on the small profiles, and apart from the weld control, the smoothness of the weld surface is controlled.

In order to obtain quality welds, the welding parameters (thickness of the pipe wall, height of the weld, and the time of pre-heating, time of change, binding pressure, and cooling time) should be fully respected.

After the control of the welds a Report is prepared that will be incorporated in the technical documentation for the determined situation.

The payment for the performed works will be per m<sup>1</sup>.

The offered unit price comprises the costs for the welding, the testing of the installation welds, the isolation of the installation welds, transport from the welding line to the pit, and local transport from the temporary storeroom to the welding place.

#### **Fitting with couplings from ductile iron**

- The fitting with socket should be made of Ductile Iron.
- The connection should be on socket using standard rubber made of EPDM (certified for potable water).
- On the inside and on the outside the fitting should be protected by blue (light blue) epoxy protective layer.

#### **The fitting should be in accordance with the following standards:**

Specification and test methods:	EN 545; ISO 2531
Standard connection rubber (material):	EN 681-1, ISO 4633

#### **Fitting with rotary flanges made of ductile iron**

- The fitting should be made of Ductile Iron with rotary flanges
- On the inside and on the outside the fitting should be protected by blue (light blue) epoxy protective layer.

#### **The fitting should be in accordance with the following standards:**

Specification and test methods: EN 545; ISO 2531  
Flanges should be performed by: EN 1092-2

## **Oval / Flat Valves**

### **Characteristics of oval and flat valves**

- Built-in length in accordance with the standard EN 558-1 series F15 (oval closures) series F14 (flat closures) (DIN 3202, F4 and F5)
- Soft sealing in accordance to standard EN1171
- Hydraulic test according: EN 12266 (DIN 3230 part 4)
- Low force of spinning due to plastic slipping closures of the stem.

### **The valves should be made of:**

- Body, stem and the bonnet/cover should be made of nodular iron EN-JS 1030 (GGG-40);
- The stem should be completely vulcanized EPDM
- Spindle should be made from 13% chrome steel;
- Spindle matrix should be made of copper;
- Internal and external epoxy protection minimum 250 microns in accordance to RAL – regulation with GSK certificate for quality;
- Elastomer should be approved by KTW and W 270;
- Approved and registered from DVGW.

Suitable for water supply networks/water supply stations. Allowed working temperature for neutral fluids is set to 50°C.

## **Automatic air valve**

### **Characteristics of the Automatic air valve**

- One-chamber air valve, directly managed by the flow medium;
- Compact design, very few components;
- Two functions for air outlet;
- Broad ventilation part for outlet of huge quantities of air in the process of starting up or closing of the pumps;
- Minor ventilation part for outlet of small quantities of air when working in full internal pressure;
- High capacity of air outlet and sound frequency due to the stabilized float.

### **The air valves should be made of:**

- Body and the bonnet/cover should be made of cast iron EN-JS 1030 (GGG-40)
- All internal and external units such as float, coating etc. should be made of stainless steel
- Internal and external epoxy protection minimum 250 microns in accordance to RAL–regulation with GSK certificate for quality



Connection of flanges: in accordance with the standard EN 1092-2 and ISO 7005-2 PN16-25

### **Underground fire hydrant**

The underground hydrants should be intended for distribution of water/water supply.

#### **Characteristics of the underground hydrant**

- Model in accordance to DIN 3221, type A or AD;
- Safety closure in the internal part ;
- Automatic outlet and protection from high water pressure;
- Without necessity of additional maintenance of the seals with – rings.

#### **The underground hydrants should be made of:**

- Wrapper and bonnet/cover made of nodular iron EN-JS 1050 (GGG-50);
- Cone valves from EN-JS 1050 (GGG-50), vulcanized with EPDM;
- The valve seat should be made of copper;
- Internal layer from , external – epoxy;
- Internal and external epoxy protection minimum 250 microns in accordance to RAL– regulation with GSK certificate for quality;
- Elastomers approved in accordance to W 270;
- Approved and registered with DVGW.

With the underground hydrant, an oval street cap 30 kg should be delivered.

### **Service valves for house connections**

#### **Characteristics of the service valves**

- The service valves should be adequate for potable water and industrial water
- Maximum temperature of 50° and pressure up to 16 bar
- For non-aggressive liquids with allowed two-way flow
- Connection of thread in accordance with ISO 228-1

#### **Service valves should be made of:**

**Body:** cast-iron

**The mirror and the stem** should be made of copper;

The mirror **sealing** should be covered with EPDM certified rubber;

The **spindle** should be made of stainless steel 13% chrome;

Connection between the body and the stem should be protected with EPDM rubber;

Internal and external Epoxy protection minimum 250 microns in accordance to RAL – regulation with GSK certificate for quality.

The service valve should be delivered with UG-built-in garniture and street cap 7kg.

### ***Testing of the pipeline***

Before the pipeline is received and put in action, it should be tested for internal pressure.

The testing of the polyethylene pipes can be performed with water and air, although the practical rule is to perform it with water.

The testing is performed following standard norms BS 2210.

The pipelines are usually tested at sections not longer than 500 m, in accordance with a prior agreement and opinion of the Supervisor, and in exceptional cases the pipeline can be tested between two objects.

The pipeline is partially covered with earth, all the installation welds remain uncovered, and anchor blocks are placed at the ends and at the vertical and horizontal bends.

Before the pipeline is tested under pressure, it is washed with an amount of water equal to the volume of the pipeline.

The filling is with quality pure water, starting down and upwards, where the valves of the drains are closed and the air valves are open. In order to allow for evacuation of the air, the filling should be performed slowly and carefully, with quantities which depend on the pipe profile.

Ø 150 0.7 l/s

The ends of the section should be secured with adequate armour, at the filling end and at the end for air evacuation. The thus filled pipeline is left for 12 hours, and afterwards it is checked if the air has been removed.

***Pretesting*** – work pressure. The pretesting time is calculated roughly and should be  $t = 2\varnothing$  hours ( $\varnothing$  is the dimension in dm), for example for Ø150 mm the time is 3 hours, and during this time a check-control of the pipes and welds is performed and if everything is in order testing for trial pressure is performed.

***Main testing*** – it is performed with trial pressure which should be  $1,5 \times PN$  (work pressure), if not envisaged otherwise in the design. The section should have two manometers with reading sections of 0.1 bars.

During the testing, the change of the pressure during the main testing should be smaller than 0.5% and in that case the pipeline has been built with good quality. Otherwise, the defect should be detected and repaired.

A Record is produced from the testing, and it is prepared and signed by the Constructor and the Supervisor. The record comprises the following elements: number of registered tests, the section being tested, the material deliverer, the type of pipe, the junctions, the place where the manometer was installed, the type of manometer, certificate – attestation for the manometer not older than 6 months, time of testing, filling of the pipeline, air and water temperatures, notes, signatures of the Constructor and the Supervisor. A site plan and a vertical section are also included in the Record.

The payment for the performed works will be per  $m^1$ .

The offered unit price comprises the costs for the washing of the pipeline, its filling and testing.

***Fitting pieces – Fittings***

At some places along the pipeline, in order to ensure safe work and functioning of the pipeline, objects are planned (connections, manholes etc.) on which it is envisaged to use a certain number of fitting pieces (junction with one flange, junction with two flanges, T-piece with flange, etc.).

***Attesting***

The deliverer issues quality attestations for every fitting piece and these attestations are included in the technical documentation for the determined situation.

**STREET ELEMENTS****Curbstone**

Concrete curbs are positioned along the carriageway edges and they establish and form the road superstructure. They are installed onto a layer of lean concrete set into a road-base layer with previously determined levels. The leveling of the curbs provides an equal direction with the street alignment. The construction should be in accordance with design details. The concrete curbstones are to be prefabricated with concrete class MB40 with frost resistance M-100, embedded on a concrete base of concrete class MB20. The curbstones are placed at a mutual distance of 10-15 mm that should be filled with cement mortar. The Contractor should provide a quality certificate before they are delivered at the construction site.

**Interlock tiles**

The interlock tiles must be well-shaped, with smooth surfaces and they must be in accordance with the specified sizes, having a tolerance of plus/minus 2mm. The interlock tiles should be resistant to frost, wearing and pressure as determined by the manufacturer, they must not have cracks, damages or any other defects. The tiles with a length of 200mm must not have a breaking module under 6N/mm<sup>2</sup> which shall be provided by their testing 28 days after molding and placing them immediately into water at room temperature during a period of 48 hours. The interlock tiles are placed onto a layer of fine sand, they are mechanically compacted to achieve the required flatness and the joints are filled with fine crushed stone filler.

The construction should be in accordance with design details, the prefabricated concrete paver elements should be constructed with a thickness of 6 cm placed on fine sand with a thickness of 3-5 cm and road-base layer of crushed stone material with thickness of 15.0 cm.

**ASPHALTING WORKS****Capacity of the asphalt production plant**

According to the traffic loads of roads foreseen to be rehabilitated, the production plant shall be automatic type. The capacity of the asphalt production plant for the works foreseen in the projects shall be minimum 100t/h. The Contractor is obligated to do a service of all important parts of the asphalt production plant 15 days prior to the start of the asphalt works. The Contractor is obligated to prepare a prescription of the asphalt mixture in order to schedule the production of all important ingredients of the prior approved asphalt mixture at the production plant.

**Preparation of the base with cleaning**

Preparation of the base, before placement of the new asphalt layer consists of mechanical cleaning, dusting and washing if necessary.

**Preparation of the base with spraying with bituminous emulsion**

The preparation of the previously cleaned base before overlaying with a new asphalt layer consists of mechanical uniform spraying of the dry surface with bituminous emulsion in order to provide permanent connection of the base with the new asphalt layer. Bitumen distributor (sprayer) with automatic feeding of the planned quantity of emulsion per m<sup>2</sup> should be used for spraying with bituminous emulsion. Cleaning of the base (with washing if necessary) with dusting, if necessary should be done before construction of each next asphalt layer.

The temperature of the base during spraying must be over +10°C, having dry weather, without any rain.

All visible structural elements of the roadway structure (lifted curbs, gutters etc.) must be protected during spraying.

Hand spraying is forbidden. The Supervising engineer decides about the way of spraying with bituminous emulsion at places inaccessible for mechanical spraying with the distributor.

The asphaltting of the new layer shall be done after breakdown of emulsion and evaporation of the water, when the surface is "dry" and the bitumen properly "connected" to the base.

**Bituminous emulsion**

Bituminous emulsions represent dispersed bitumen in water containing emulsion. These are applied to provide intercourse adhesion while incorporating individual bases of the roadway structures during the construction of BNS, BNHS and AC. They insure safe, homogeneous and permanent adhesion of all the courses of roadway pavement structure into a compact unit.

Depending on the fine aggregate used for the asphalt course, the following emulsions are applied:

- Anion bitumen emulsion made of fine aggregate of a predominantly carbonate origin. The quality of these emulsions is defined by MKS.U.M3.022.
- Cation bitumen emulsion made of fine aggregate of predominantly silicate origin. The quality of these emulsions is defined by MKS.U.M3.024.

The required properties of bitumen emulsions are the following:

- The quality is controlled by the manufacturer in the course of production and by the Standardization institute that performs control tests on the basis of which the manufacturer of bitumen emulsion submits an attest on quality when delivering the material.
- Checking of quality of bituminous emulsion stored at a construction site.

**Diluted bitumen (DB)**

Diluted bitumen is produced in plants by dilution of normal distilled bitumen with adding of corresponding oils that partially evaporate after the incorporation of the asphalt mixture.

**Treatment of the longitudinal and cross-sectional asphalt joints**

The longitudinal asphalt joints should be hand coated with DB 200 M (diluted bitumen). This should be done before lying of the second (next) strip.

The cross-sectional joints should be cut vertically on the designed depth and should be hand coated with DB 200 M.

**Cutting of the total thickness of the existing roadway structure**

It is done in the sections as planned within the design, using mechanical equipment (without vibrations and strokes).

## **BITUMINOUS AND ASPHALT CONCRETE MIXTURES**

### **Upper bearing courses composed of bituminous granular rock material produced with hot procedure (BNS and BNHS)**

The present upper bearing courses of bituminous granular rock material produced at asphalt production plant applying a hot procedure are defined with MKS.U.E9.021/86 standard.

In this technical specification, the upper bearing courses are referred to as bituminous bearing courses and are marked with the abbreviation BNS.

Under permanent road exploitation, the bituminous bearing courses serve as wearing courses, in which case they are referred to as bituminous bearing and wearing courses and are marked with the abbreviation BNHS.

According to the greatest grain diameter in the stone material, the following types of asphalt BNS are distinguished:

- BNHS 16 with grains from 0 - 16 mm;
- BNS 22 with grains from 0 - 22 mm;
- BNS 32 with grains from 0 - 32 mm;
- BNS 45 with grains from 0 - 45 mm.

The main materials used for production of asphalt road mixes for BNS and BNHS are standardized rock aggregates, sand, filler and binder - bitumen.

<b>Traffic load of the road</b>	<b>Type of asphalt mixture (BNS and BNHS)</b>	<b>Type of bitumen Used</b>	<b>Thickness of the asphalt layer (compacted) in cm</b>
Middle	BNS 22 A	60	6 -10cm
Light	BNHS 16 A	90	4.5 - 6.5cm
	BNHS 22 A	130	5 -10cm

The layer evenness is measured with a 4m screed board and should not deviate more than 10 mm and the leveling points deviation should be within a  $\pm 10$  mm range. The deviation of the cross-cut inclination may be maximum 0.4%. The layer thickness deviation is regulated in point 10.4 of MKSU.E9.021.

### **Preparation and incorporation**

The preparation of BNS and BNHS involves procurement of standardized fine aggregate and binder (bitumen), production of asphalt road mixtures for BNS and BNHS and incorporation of asphalt mixes for BNS and BNHS, according to the MKS.U.E9.021/86 and the design conditions for the roadway structure.

Production and incorporation of asphalt road mixtures for BNS and BNHS are done under favorable weather conditions, with no precipitation and when the base and air temperature (without wind) is above  $+5^{\circ}\text{C}$ .

Depending on the type of layer (BNS and BNHS), the bituminous upper bearing courses are applied adequately, in accordance with the traffic load (from very heavy to light). As a rule, they are

incorporated above the lower bearing course, with the exception of BNHS, which also serves as a finishing layer - wearing course and is, as a rule, incorporated over the upper bearing course (BNS).

### **Asphalt concrete mixture AB**

#### **Transportation of asphalt concrete mixtures for AB**

The Contractor may start with transportation of the asphalt concrete mixture after preparation of the site for its incorporation. The preparation involves:

- Prepared base
- Finisher brought to the site and ready-for-work with electronic control set onto the screed.
- The transport is carried out by dump trucks with clean loading space (which should be sprinkled with liquid preventing gluing of the mixture to the bottom and the sides of the bin at each batch) provided with tarpaulins for protection of the asphalt mixture against dust, wind and cooling.
- The number of the necessary trucks must be in accordance with the capacity of the finisher and the compaction devices.

#### **Incorporation of asphalt concrete mixture AB**

The surface of the base on which the asphalt concrete layer is to be incorporated must be timely prepared. It must be dry, clean and sprinkled with anion emulsion or diluted bitumen - DB, i.e. suitable agent for adhesive intercourse permanent binding.

The surface which is directly smoothed by the finisher must be dry (the water from the anion emulsion should have evaporated).

The amount of necessary anion emulsion should be approximately  $0.3 - 0.5 \text{ kg/m}^2$ . The incorporation is done mechanically and with a finisher which has at least one vibration-compaction screed, with a capacity of at least 85% compaction of a course with a thickness of 6.0 cm.

Manual incorporation is forbidden. However the Supervising engineer may approve manual incorporation at inaccessible places. In that case, the compaction shall be done with appropriate compaction devices.

The temperature of the asphalt concrete mixture in the finisher during the incorporation depends on the type of used bitumen as follows:

Type of bitumen	Recommended temperature °C	*Minimum temperature °C
BIT 200	$130 \pm 10$	110
BIT 130	$135 \pm 10$	115
BIT 90	$140 \pm 10$	120
BIT 160	$150 \pm 10$	130

*\*Minimum temperature of incorporated layer*

Asphalting should be done along the whole width of the surface with one finisher.

As a rule, the asphalt concrete course is incorporated in one layer and along the whole width of the road surface in the case of a two-lane road.

When two layers are incorporated, the longitudinal joints are separated from each other for at least 20 cm, while the transversal (operational) joints, for at least 50 cm.

Each stoppage of work should be done along the whole width of the formation. The resulting transversal joint should be normal to the road axis and vertically cut. When continuing the incorporation works, the "operational" joint must be uniformly coated with bituminous emulsion or diluted bitumen, while the surrounding of the “operational” joint should be indirectly heated.

The rollers for the compaction of the layer must provide gradual compaction to the required level of compaction along the whole designed width of the road surface. Rolling always starts from the lower to the higher part of the road surface.

Places which are inaccessible for rollers must be compacted to the required level of compaction mechanically, using appropriate compaction devices.

Incorporation of a new layer or allowing traffic along the constructed asphalt concrete layer may start when the temperature along the whole layer is about 20°C.

- allowed deviation for bitumen- 5% from the job mix (final recipe) formula
  - evenness deviation measured with a 4m screed board is maximum 4 mm.
  - deviation of cross-cut inclination is max 0.3% from the designed
  - leveling deviation  $\pm 10$  mm
  - thickness deviation 10% from the designed

The construction should be performed in a single layer.

The type of bitumen used for preparation of the finishing asphalt layer AB depends of the type of traffic load and is shown in the following table:

Type of asphalt concrete	Type of bitumen used for preparation of asphalt mixtures			
	BIT 200	BIT 130	BIT 90	BIT 60
AB	BIT 200	BIT 130	BIT 90	BIT 60
AB 11	No	yes	yesyes	
AB11s	No	yes	yesyes	
AB 16	No	yes	yesyes	
AB16s	No	yes	yesyes	

### Conditions for quality of construction (of asphalt concrete layers)

To achieve the required quality of asphalt concrete layers, the Contractor must provide an equipped laboratory and professional personnel for asphalt testing within the asphalt production plant.

**Preliminary (trial) tests of asphalt concrete layers (trial mixture - preliminary recipe)**

The Contractor is obliged to submit to the Supervising Engineer a preliminary recipe of the asphalt mixture to be used for the asphalt concrete layer, prepared under laboratory conditions, at least 15 days prior to the start of asphalting works.

Attests on all main materials used to prepare the trial mixture (fine aggregates per fractions, sand, filler, bitumen, as well as properties of stone used to produce the fine aggregates and the crushed sand) are also submitted with the preliminary recipe in accordance with these technical conditions.

Content of the preliminary recipe:

- Participation of individual fractions of fine aggregates, expressed in percent of the total mass [%].
- Types and participation of bitumen expressed in percent of fine aggregates [%].
- Type and quantities of additives in the bitumen.
- Required properties of the asphalt mixture.

The preliminary recipe must be verified as to whether the planned main materials enable achieving the required properties for the asphalt concrete mixture.

**Report on the procedure for approval of the mixture for the asphalt concrete layer**

Presented in the report are the conditions, mode and dynamics of production. The report contains particularly data on the asphalt production plant, main materials, transportation vehicles, finishers, rollers, equipment for emulsion spraying etc..

All the results from the performed tests are entered into this report which serves as a proof that the final mixture, the equipment and the technology of production, transport and incorporation correspond to the quality requirements specified in the design, the technical conditions regarding asphalt concrete for wearing courses prepared with a hot procedure (MKS.U.M4.014/90) and these technical conditions.

The report is signed by the Supervising engineer and the Contractor.

The beginning of asphalt works is approved by the Supervising engineer after the approval of the base on which the asphalt concrete layer will be incorporated.

**Quality control**

Quality control involves:

- Preliminary tests on main materials;
- Parallel tests on main materials, produced asphalt mixture, tests during incorporation and tests on the incorporated layer;
- Control tests on main materials, produced asphalt mixture of incorporated layer and tests on samples from incorporated layer.

**Preliminary tests on main materials to be used for preparation of the trial mixture**

The scope of these tests and their type is defined according to MKSU.E4.014/90.

**Parallel tests on main materials**

Testing of stone powder, sand and fine aggregate is done at least once at each 3000t of produced asphalt mixture;



Testing of bitumen, at each 500 t of delivered bitumen.

The following properties are tested:

- Stone powder - grain size distribution;
- Sand and fine aggregate particles - grain size distribution and content of grains smaller than 0.09 mm;
- Bitumen - penetration at 25°C, softening point at 25°C, penetration index.

#### **Parallel tests on produced asphalt mixture**

These tests involve laboratory determination of the composition and the physical-mechanical properties of the asphalt mixture. They are done at each 4000m<sup>2</sup> at the most, or once daily during asphaltting. The temperature of the bitumen and the asphalt mixture is controlled daily.

#### **Control tests on materials for asphalt works**

One test at each 5000t of produced asphalt mixture for: stone filler, sand, fine aggregate and bitumen.

#### **Control tests on produced asphalt mixture**

One test at each 1000t of produced asphalt mixture. The composition and the physical-mechanical properties of the asphalt mixture are tested.

One test at each 5000t of produced asphalt mixture for determination of the properties of extracted bitumen.

#### **Control tests on incorporated layer**

One test at each 6000m<sup>2</sup> of incorporated asphalt layer. The samples taken from the incorporated layer are tested for the following:

- Total voids content in the asphalt layer;
- Layer thickness;
- Layer smoothness (in situ);
- Compaction level;
- Roughness and skid resistance (in situ);
- Inter-course adhesion;
- Grain size distribution of fine aggregate and sand;
- Filler content;
- Bitumen content.

#### **Measurement**

Allowable deviations:

- Bitumen content,  $\pm 0,5\%$  of the mixture;
- Smoothness deviation,  $\pm 4$  mm at 4m<sup>1</sup>;
- Cross-sectional inclination,  $\pm 0,3\%$  in respect to the designed one;
- Elevations,  $\pm 10$  mm in respect to the designed ones;
- Layer thickness, max. 10% of the designed thickness.

The measurement is done for an asphalt layer expressed in m<sup>2</sup> which has been approved by the Supervising Engineer

#### **ELECTRIC INSTALLATION FOR STREET LIGHTING OF ARM-1 –IN BITOLA the streets SRU2, SRU3, SRU4 STU5b7.**

According to constructive and traffic solution it is designed a technical solution of lighting of access streets and the parking area. The lighting is designed according to the most modern requirements of

any kind of communication in the urban area with greater frequency of vehicles and people considering that the location is near a densely inhabited area and the university in Bitola.

### **POINTS OF POWER SUPPLY UNITS**

It is provided to carry the power supply from new substations that are about to be built. Some other sections from the new infrastructural solution of the complex ARM-1 are going to be supplied from them, lighting of the streets SRU-2, SRU-3, SRU-4, STU-5<sup>b</sup> and parks provided.

### **COMMAND AND DISTRIBUTION CABINETS**

There are provided command and distribution cabinets of type A from EVN Macedonia. Inside there is measuring for the pedestal places for the parking, and later the pedestal places provided in this documentation. Inside the cabinets it is going to be set one three-phase single-rate meter to measure the consumed electricity of public lighting. In the cabinet here is complete electrical equipment with photo-relay and timer for propulsion and management of the lighting with two regimes in the night, the first is with 50% of the power of the light and the second is 100%.

### **CABLING**

From substation 10/0,4Kv to the distribution cabinet in an earth trench it is going to be laid underground cable with dimensions according to the consumption.

As feeder it is used a cable dimensioned according to the consumption that comes out of the command cabinet and by the system INPUT-OUTPUT through the concrete foundation goes through the service box of each post where it is connected to an automatic fuse of 16A, and the second fuse is used for the command cable.

In the same trench also it is laid a command cable PPOO-Al 2x2.5 that allows the light with integrated ballast to work in two regimes of electricity 50% and 100 of 250W of the light power. This command cable is laid next to each light bulb right next to the service box of the post. From its service box that has two automatic fuses of 16A there is a wired post to the connection place in the light fitting.

In the same trench with these two types of cables from the substation there is also set galvanized band that has the role of earth lead from too high dangerous voltage. This band is connected to the anchor plate of each post.

### **EQUIPMENT**

For a light place it is used a metal post erected 8m. high above the ground that based on a concrete base that is made on the spot. The post is made in the shape of telescope in three different round sections given in the graphic part of the project. The post is straight and on it it is placed lyre 1m. long. All metal parts have to be painted with waterproof gray color. It has a service box at 1.5m. above the floor and inside there are two automatic fuses of 16A and connection service drop with 8 places and the anchor plate has bolt with wind to be hold at the galvanized band.

### **FOUNDATION**

The foundation is shown at the graphic part of this project and for that a mechanical calculation it is presented. The foundation is made on the spot with dimensions 0.9x0.9x1m and it is made of concrete class 30. In the foundation it is set hard PVC pipe with D=70mm so that inside are placed the main supply cable and the command cable.

During the performance of the foundation an anchor basket is fitted with anchors of 800mm long and section with d=20mm from reinforcing bar. They should have thread for screw that is going to tighten the the anchor reverse plate that is being welded in the lower part of the metal post.

### **LIGHT LINE BARRETTE**

It is provided to have a compact light barrette out of light aluminum shell with high quality refractor with an angle of 50°. The body is set with the necessary equipment for run up of high-pressured sodium bulb with power of 150-250W that gives light flux of 15000Lm. Except the cap in the body of the light there will be a ballast with separate value of the resistance that can allow the power to be divided into 100% and 50%. In the lower part of the body of there will be a glass and the whole body is going to have an increased degree of protection IP65.

### **CHANNELS**

It is going to be dug a channel 0,8m deep and 0.4m wide. Prior to the laying of the cables in the bottom soft sand of 0,10cm layer has to be laid. When the cables are laid, a plastic GAL protection shield is placed, one for the both cables and afterwards one more layer of 10cm sand.

### **ELECTRIC INSTALLATION FOR STREET LIGHTING OF ARM-2 –IN BITOLA the streets SRU4, STU7, STU12**

According to architectonic and traffic solution it is designed a technical solution of lighting of access streets and the parking area. The lighting is designed according to the most modern requirements of any kind of communication in the urban area with greater frequency of vehicles and people considering that the location is near a densely inhabited area and the university in Bitola.

### **POINTS OF LIGHTING SUPPLY**

It is provided to carry the power supply from new substations that are about to be built. Some other sections from the new infrastructural solution of the complex ARM-2 are going to be supplied from them.

### **COMMAND AND DISTRIBUTION CABINETS**

There are provided distribution cabinets of type A from EVN Macedonia. Inside there is measuring for the lights from the outlets of this cabinet. Inside each cabinet it is going to be set one 40A three-phase single-rate meter to measure the consumed electricity. In each cabinet there will be six outlets.

Inside the cabinets there is complete electrical equipment with photo-relay and timer for propulsion and management of the lighting with two regimes in the night, the first is with 50% of the power of the light and the second is 100%.

### **CABLING**

In a dug trench it is going to be laid dimensioned underground cable 0,8m deep and 0,4m wide that is going to feed the lighting.

In the same trench also it is laid a command cable PPOO-Al 2x2.5mm<sup>2</sup> that allows the light with integrated ballast to work in two regimes of electricity 50% and 100% of 250W of the light power. This command cable is laid next to each light bulb right next to the service box of the post. From its service box that has two automatic fuses of 16A there is a wired post to the connection place in the light fitting.

In the same trench with these two types of cables from the substation there is also set galvanized band that has the role of earth lead from too high dangerous voltage. This band is connected to the anchor plate of each post.

### **EQUIPMENT**

For a light place it is used a metal post 8m. high (SRU 4- 19 post places and 19 light bulbs, SRU5-29 post places and 39 light bulbs, STU7- 21 post places and 26 light bulbs, STU12- 12 post places and 12 light bulbs, total of 81 posts and 96 light bulbs) above the ground that based on a concrete base that is made on the spot. The post is made in the shape of telescope in three different round sections given in the graphic part of the project. The post is straight and on it it is placed lyre 1m. long, at some points there are double and triple lyre. All metal parts are colored with waterproof gray color. It has a service

box at 1.5m. above the floor and inside there are two automatic fuses of 16A and connection service drop with 8 places and the anchor plate has bolt with wind to be hold at the galvanized band.

### **FOUNDATION**

The foundation is made on the spot with dimensions 0.9x0.9x1m and it is made of concrete MB30. In the foundation it is set hard PVC pipe with D=70mm so that inside are placed the main supply cable and the command cable.

During the performance of the foundation an anchor basket is fitted with anchors of 800mm long and section with d=20mm from reinforcing bar. They should have thread for screw that is going to tighten the the anchor reverse plate that is being welded in the lower part of the metal post. For the post that is 5m high a smaller foundation of 0,6 x 0,6 x 0,8m it is going to be made

### **LIGHT LINE BARRETTE**

It is provided to have a compact light barrette out of light aluminum shell with high quality refractor with an angle of 50°. The body is set with the necessary equipment for run up of high-pressured sodium bulb with power of 250W. Except the cap in the body of the light there will be a ballast with separate value of the resistance that can allow the power to be divided into 100% and 50%. In the lower part of the body of there will be a glass and the whole body is going to have an increased degree of protection IP65.

### **CHANNELS**

It is going to be dug a channel 0,8m deep and 0.4m wide. Prior to the laying of the cables in the bottom soft sand of 0,10cm layer has to be laid. When the cables are laid, a plastic GAL protection shield is placed, one for the both cables and afterwards one more layer of 10cm sand. Afterwards a galvanized band of 30x4mm is laid over and in 20cm before the trench is closed there is a plastic band for warning.

## **PARAMETERS USED FOR STREET AND TECHNICAL LIGHTING CLASSES FOR DESIGN THE AIRPLANE MAPPING OF THE WHOLE COMPLEX OF ARM**

The technical lighting classes for roads of motor-vehicular and mixed traffic are designed of according to CIE 115 (1) and EN13201 where the roads are divided into 5 technical lighting classes from M1 to M5. In this documentation there are going to be applied separate charts for easier definition of the requested parameters that are the base for designing the airplane mapping. According to the urban solution the streets are divided in different areas –RELEVANT- from which the levels come from for the requested lighting of the surface of the road and the average horizontal lighting. Since the surface's purpose is different and it is situated in different zones the whole airplane mapping is done separately for each street. In the final part when the communications are going to be finished it might have to be added additional post places to satisfy the continuance of the feeding and lighting lines as well as the symmetry of separate lot such as parking lots and exit lines. These are going to be separate cases or with minimum presence in the Basic project for street lighting. For open parking spaces and out of the communication roads an average horizontal lighting is defined of  $E(lx)=20$ . The scale of  $E_{min}/E=0,25$ . The selection of technical light class according to EN13201 is in chart 7- Road lighting. A situation appropriate to the provided traffic is being chosen for lighting. The situation of the lighting is in group B2- slow vehicles with speed from 5 to 60km/h. Then the specific parameters are chosen which are relevant for this part of the street SRU-5. This gives the opportunity of choosing adequate light technical class that allows saving of electricity that is considered in this project by defining of the Relevant area. For the complete documentation for all the streets in ARM-1 as main factor it is taken the relevant area with defined level of traffic – participants and the speed of the vehicles. The defined situation B2 allows us to choose the technical light class from the department M (sub group ME4a).

The ME class is designed for communications in risky areas where there are pedestrians, bikers, parking lots and school yards which here it is 100% present.

The technical light class M4 and the sub group ME4-a defines the bordering relevant parameters that allow good visibility and good visible comfort. From this selection it is made the following selection of bordering parameters with which further I am going to calculate all the streets in ARM-5: Partizanska street and the service streets SRU-4 and SRU-5. For the service streets since they have the same features it will be taken the same calculation and I am going to give one technical light calculation so that I won’t overload the project with unnecessary appendixes. The specification for electronic equipment is going to be separate for each street and parking.

Defined average drive luster  $L_{sr}=0,75(\text{cd/m}^2)$

General luster  $U_o=0,4$

Longitudinal luster for road with small number of crossroads  $U_1=0,5-0,6$

Relevant increasing of the threshold  $T_i\%=15$  can be increased for 5% if the situation requires depending on the environment  $S_r=0,5$  and the luster of the road surface and the type of the light.

From the sum of T-7 of different situations and according to the situation of the load it is defined a group for situation if lighting B-2 and I choose technical light class ME as an average luster  $L_{sr}=0,75(\text{cd/m}^2)$

$U_o=0,4; \quad U_1=0,5-0,6 \quad : \quad T_i=15\% \quad S_r=0,5 \quad E_{min}/E_{sr}=0,25.$

From these comes the calculation for necessary electric power of each light and the total necessary flux so the requirements to be satisfied.

## Excavation and earth works

- **Trench excavation**

The laying of power cable for street lighting is planned in trench with sizes 80cm. depth and 40cm. width. The excavation is in soil of III and IV category.

Unless otherwise specified, the material which should be excavated or the excavated material, shall be classified and measured according to the soil category, in compliance with the data provided in the Drawings and in terms of these Specifications.

Categorization of the excavated material shall be made together with a representative from the Contractor and the Supervisor.

Classification of the soil materials:

Category	Description
<b>I</b>	Mould, soft soil, sand, gravel, humus and other so-called incoherent soil.
<b>II</b>	Fertile soil, soft clay, soft sand clay, fine gravel
<b>III</b>	Solid soil, clay, rough gravel.
<b>IV-1</b>	Compact soil, strongly compacted soil, filled with stone, dry clay, dry plastic clay and other.

<b>IV-2</b>	Weak stones, soft limestone.
<b>V</b>	Soft stone, hard limestone, broken stone.
<b>VI</b>	Tough rough rock, massive limestone, marble.
<b>VII</b>	Tough rock, Volcanic rock, granite, basalt

- **Backfilling**

Backfilling of the trench up to 30cm height above the power cable, is performed with soft soil, without presence of humus or any organic materials. These layers are manually compacted. Soil material used for backfilling of the trench should be approved by the Supervisory authority before its usage. The remaining part of the trench is backfilled with excavated soil, free of big stones and is mechanically compacted (small rollers for trenches) in layers with a maximum thickness of 20cm. In the compacting process, an optimal percent of soil humidity should be provided.

### **Concrete works**

For concrete works, the concrete prepared in a concrete plant shall be mainly used. Only in exceptional cases, when very small quantities are in question especially for the non - girder concrete construction, the concrete can be prepared on the construction site with ingredients which meet the standards.

### **Cement**

Each shipment of cement should be accompanied with test certificate from the producer. The certificate should contain the following information:

- Average results of producer tests in the production branch including the chemical composition and physical features which are determined in accordance with the approved Cement Specification.
- Date and place of cement production.
- Date and place of loading and date of delivery to the final location.

### **Aggregates**

All materials which are used as aggregates shall be obtained from approved source well known for its production of concrete aggregates with the quality required, that is, from separating plant which should provide a certificate of aggregate quality.

### **Water for concrete**

The water necessary for preparation and mixing of the concrete should be clean without any soluble or insoluble particles, that is, it shall not contain more than the following concentrations of purity in accordance with the standard MKS U.M1.058.

	Max. mg/liter
pH	4.5-9.5
Quantity of alkaline carbonates, bicarbonates	1000
Sulfates	2700
Chlorides	300

Insoluble particles	2000
Other soluble particles	2000

### **Concrete prepared in concrete plant**

The concrete prepared at the concrete producing plant should come from a specific recipe for the adequate class of concrete, that is, specific weight ratio of the components: cement, aggregate with certain fractions and water, that is, certain water cement factor W/C which should be in range from 0,5 to 0,55. Concrete additives, such are for instance plasticizers, accelerators or retarders of concrete setting, may be used upon need. Concrete producing plant is obliged to take sample cubes of each prepared and delivered mixer and after examination executed to provide report for the concrete quality. On the construction site, prior concrete pouring a sample cubes for laboratory texting should be taken as well.

### **Materials for street lighting**

#### **Cables**

- Electric installations for low voltage. Requirements for security, protection from indirect contact - MAS N.B2.741.
- Color marking and labeling systems for cables and wires of isolated lines with nominal voltage. 1 KW - MAS N.C0.010.
- Nominal diameters and structures for conductors in insulated cables - MAS N.C0.015.
- Low-voltage fuses with heat insert and dismantle large power applications in industry and similar purposes. General technical requirements - MAS N.E5.205.

Power cables shall be buried at a depth of 800mm to the cable centre. The depth of laying shall only be varied because of the presence of other cables or services. The laying of cables at excessive depth will not be accepted. Unless unavoidable, cables shall not be routed below pipes.

The bottom of excavated trenches shall be free of sharp stones and other obstacles and shall be covered with sand or fine sifted soil compacted to a depth of 50mm.

Cables shall be laid into the trenches to avoid damages from sharp materials or stones. After lying of cables shall be covered to a minimum depth of 50mm of compacted sand or sifted soil.

#### **Technical requirements for laying power cable**

The cable is placed at the bottom of the trench.

The bottom of the trench should be cleaned from stones and other sharp materials that can damage the cable.

- The depth for placing the cable is 0.8 meters. Deviations are possible at a low depth while crossing with other installations and adverse conditions, stony routes and so on.
- For the street crossings the depth of the cable should be at least 1 meter.
- The cable trench is excavated as an open one and the excavated soil is set only on one side.
- On the street crossings the cable is set in plastic pipes.
- The bottom of the excavated trenches leveled and cleaned from stones and other sharp materials that can damage the cable. Otherwise on the bottom of the trench, fine soil will be set at the depth of 0.2 meters.
- The laying is in a shape of a snake and the length of the cable is 2% more than the length of the route.
- The backfilling of the cable is made firstly by a fine soil and then excavated soil is placed and compressed by manual compressors in layers of 20cm.

- During the backfilling of the cable, a gal protector is placed at a depth of 0.2 m. above the cable, and a warning tape is placed at a depth of 0.4 m. above the cable.
  - The warning tape is plastic and red with a pressed inscription that there is a power cable with a level of voltage and width of 0.1m.
  - At a street crossing and at crossings of other utilities, the cable is placed in a cable pipes.
  - The cable pipes that are used are going to be concrete, plastic, concrete or concrete fabricated materials.
  - The minimal inner diameter of the pipe that is used, it is going to be 1.5 times bigger than the outer diameter of the cable to be placed.
  - It is not recommended to lay cables if the temperature outside is lower than + 5° C. The minimal temperatures for a PVC material cable is + 5° C, and for a cable with thermoplastic isolation and polyethylene, it is - 10° C. If it is necessary to lay a cable at a temperature lower than what it is allowed, the coil of cable is previously put in a heated room for 48 hours.
  - After the cable is being set, before it is backfilled, it is necessary to survey the exact cable route, to mark the crossings with other cables, other installations, joint points and the exact length of the cable and so on.
  - The ends of the placed cable are marked with cable tags for the basic data of the route. Along the route a sign is placed with a warning about the level voltage and so on.
  - The crossing of power and telecommunications cables are made at a distance of 0.5 m. The crossing angle is 90° but not smaller than 45°. The power cable is placed under the telecommunication cable. The vertical distance of the closest power cable and the closest telecommunication cable is:
    - a) 30 cm. for cables to 250 W
    - b) 50 cm. for cables bigger than 250 W.
  - In a case in which the minimal distance cannot be achieved, then the power cables and the telecommunication cables are placed in protective pipes at a length of 2 – 3 m.
  - For joining and finishing the power cables, cable joints and ends are used.
  - The joint of aluminum conductors with aluminum or copper the pressing procedure is recommended.
  - After the placement of the cable, preparation of joints and ends, testing of the cable follows, actually testing of its dielectric strength. For the testing one direction voltage of 6 KW is recommended.
  - Testing of the three wired cables is made on each wire separately and in a period of 5 minutes. It is allowed to examine all the three wires together after they are connected for a while in a period of 15 minutes according to the mass.
- Testing of the four wired cables is made in that way in which three wires are connected for a short period of time and they are grounded and on the fourth wire test voltage is connected for 5 minutes.
- Single- phase testing is permitted in the examination which is performed on each wire separately.
  - The power overloading of the cable can be limited in the way that the heat produced in the cable will be transferred in the environment and at the same time there will be no increase of the maximum temperature in the conductor.
  - The works that are going to be done will be according to the rules for protection at work.
  - The contractor is obliged to comply to rules and technical regulations mentioned above and which are valid from the day of execution of works.

### **Galvanized iron strip**

Galvanized Iron strips to be in accordance with standards MKS.NB 930, MKS.NB 936 and MKS.NB.4.901C.

### **Luminaries**

Luminaries for outdoor lighting standards shall be in accordance with: EN 60598 - CEI 32-21,



EN 60525 and UNI EN ISO 9002.

All external luminaries shall be of the totally enclosed fully weatherproof pattern with vandal-proof polycarbonate diffusers having a minimum degree of protection IP 55 unless otherwise noted. Security lighting systems shall be designed to be inaccessible to intruders.

Bulkhead luminaries shall have a cast aluminum alloy body, polycarbonate diffuser, gasket and porcelain lamp holder.

### **Grounding protection**

Galvanized steel track with labeled P 25x4 JUS.N.B.4. 901C on the classical foundations and trenches is placed on brackets. Vertically according the given detail.

Concreting of the track with MB 300 is necessary to protect the corrosion.

Tracks that are used to link grounding foundation and thunderbolt installation are welded each 0,8m in 1m distance.

Armatures also are weld in each 1m in order to achieve good galvanic connection.

Under grounding foundations must not have insulation moisture (condensation).

For proper execution of grounding there should be cooperation between the relevant structures of the performers at the facility.

Galvanized track P 25 JUS.N.B.4 901C is placed on concrete with thickness 5cm. In this way is achieved moisture corrosion of the foundations, and to be achieved this there should be used concrete brand MB 300.

Track bracket are placed in order to avoid failure of the track, and the same lies vertically.

### **AS-BUILT DRAWINGS**

The "as built" drawings should be on the basis of the works performed on site and in accordance with the Design, but if there are any changes on site approved by the Supervising engineer, the same should be implemented in the "as built" drawings.

The correct change and levels for pipe laying at the bottom and all other parameters of the constructed condition should be provided. All underground installations or possible facilities that appeared in the trenches during the construction should be implemented in the "as built" drawings.

The "as built" drawings documentation should be rendered in accordance with the legislation and norms for elaboration of such type of technical documentation and in accordance with the current applicable Construction Law from the Ministry of transport and communications of the Republic of Macedonia.

The "as built" drawings should be prepared in (3) three copies in written form and (1) one copy in electronic version and they should be submitted to the Employer - the Municipality of Bitola

### **Note**

**Until now the municipality of Bitola has built sewerage system in ARM 1 and most of the infrastructure on the street SRU1. For construction of sewerage system in ARM 2, municipality has a contract with the Public Utility Enterprise „Niskogradba”. It is**

**required to clear the site and form the routes of the streets in ARM2 in order to provide the necessary conditions for underground installations to be placed according to the design as well as the sewer system that will be constructed by the Public Utility Enterprise „Niskogradba”. Due to this the contractor should be in close cooperation with municipal authorities and Public Utility Enterprise „Niskogradba”**

**The contractor should concede the fact that the terrain at ARM 2 is hilly and rocky and might require useage of explosives.**

## **Drawings**

The actual drawings for this assignment are provided on a CD Rom which is an integral part of this ICB.



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**PART 3 – Conditions of Contract and Contract Forms**



**Section VIII. General Conditions of Contract**

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## General Conditions of Contract

### A. General

#### 1. Definitions

- 1.1 Boldface type is used to identify defined terms.
- (a) The Accepted Contract Amount means the amount accepted in the Letter of Acceptance for the execution and completion of the Works and the remedying of any defects.
  - (b) The Activity Schedule is a schedule of the activities comprising the construction, installation, testing, and commissioning of the Works in a lump sum contract. It includes a lump sum price for each activity, which is used for valuations and for assessing the effects of Variations and Compensation Events.
  - (c) The Adjudicator is the person appointed jointly by the Employer and the Contractor to resolve disputes in the first instance, as provided for in GCC 23.
  - (d) Bank means the financing institution **named in the PCC**.
  - (e) Bill of Quantities means the priced and completed Bill of Quantities forming part of the Bid.
  - (f) Compensation Events are those defined in GCC Clause 42 hereunder.
  - (g) The Completion Date is the date of completion of the Works as certified by the Project Manager, in accordance with GCC Sub-Clause 53.1.
  - (h) The Contract is the Contract between the Employer and the Contractor to execute, complete, and maintain the Works. It consists of the documents listed in GCC Sub-Clause 2.3 below.
  - (i) The Contractor is the party whose Bid to carry out the Works has been accepted by the Employer.
  - (j) The Contractor's Bid is the completed bidding document submitted by the Contractor to the Employer.
  - (k) The Contract Price is the Accepted Contract Amount stated in the Letter of Acceptance and thereafter as adjusted in accordance with the Contract.
  - (l) Days are calendar days; months are calendar months.
  - (m) Dayworks are varied work inputs subject to payment on a time basis for the Contractor's employees and

Equipment, in addition to payments for associated Materials and Plant.

- (n) A Defect is any part of the Works not completed in accordance with the Contract.
- (o) The Defects Liability Certificate is the certificate issued by Project Manager upon correction of defects by the Contractor.
- (p) The Defects Liability Period is the period **named in the PCC** pursuant to Sub-Clause 34.1 and calculated from the Completion Date.
- (q) Drawings means the drawings of the Works, as included in the Contract, and any additional and modified drawings issued by (or on behalf of) the Employer in accordance with the Contract, include calculations and other information provided or approved by the Project Manager for the execution of the Contract.
- (r) The Employer is the party who employs the Contractor to carry out the Works, **as specified in the PCC**.
- (s) Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.
- (t) "In writing" or "written" means hand-written, type-written, printed or electronically made, and resulting in a permanent record;
- (u) The Initial Contract Price is the Contract Price listed in the Employer's Letter of Acceptance.
- (v) The Intended Completion Date is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is **specified in the PCC**. The Intended Completion Date may be revised only by the Project Manager by issuing an extension of time or an acceleration order.
- (w) Materials are all supplies, including consumables, used by the Contractor for incorporation in the Works.
- (x) Plant is any integral part of the Works that shall have a mechanical, electrical, chemical, or biological function.
- (y) The Project Manager is the person **named in the PCC** (or any other competent person appointed by the Employer and notified to the Contractor, to act in replacement of the Project Manager) who is responsible for supervising the execution of the Works and

administering the Contract.

- (z) PCC means Particular Conditions of Contract.
- (aa) The Site is the area **defined as such in the PCC**.
- (bb) Site Investigation Reports are those that were included in the bidding documents and are factual and interpretative reports about the surface and subsurface conditions at the Site.
- (cc) Specification means the Specification of the Works included in the Contract and any modification or addition made or approved by the Project Manager.
- (dd) The Start Date is **given in the PCC**. It is the latest date when the Contractor shall commence execution of the Works. It does not necessarily coincide with any of the Site Possession Dates.
- (ee) A Subcontractor is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract, which includes work on the Site.
- (ff) Temporary Works are works designed, constructed, installed, and removed by the Contractor that are needed for construction or installation of the Works.
- (gg) A Variation is an instruction given by the Project Manager which varies the Works.
- (hh) The Works are what the Contract requires the Contractor to construct, install, and turn over to the Employer, **as defined in the PCC**.

## 2. Interpretation

- 2.1 In interpreting these GCC, words indicating one gender include all genders. Words indicating the singular also include the plural and words indicating the plural also include the singular. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Project Manager shall provide instructions clarifying queries about these GCC.
- 2.2 If sectional completion is **specified in the PCC**, references in the GCC to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion Date for the whole of the Works).
- 2.3 The documents forming the Contract shall be interpreted in the following order of priority:

- (a) Agreement,
  - (b) Letter of Acceptance,
  - (c) Contractor’s Bid,
  - (d) Particular Conditions of Contract,
  - (e) General Conditions of Contract, including Appendix,
  - (f) Specifications,
  - (g) Drawings,
  - (h) Bill of Quantities,<sup>14</sup> and
  - (i) any other document **listed in the PCC** as forming part of the Contract.
- 3. Language and Law**
- 3.1 The language of the Contract and the law governing the Contract are **stated in the PCC**.
- 3.2 Throughout the execution of the Contract, the Contractor shall comply with the import of goods and services prohibitions in the Employer’s country when
- (a) as a matter of law or official regulations, the Borrower’s country prohibits commercial relations with that country; or
  - (b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Borrower’s Country prohibits any import of goods from that country or any payments to any country, person, or entity in that country.
- 4. Project Manager’s Decisions**
- 4.1 Except where otherwise specifically stated, the Project Manager shall decide contractual matters between the Employer and the Contractor in the role representing the Employer.
- 5. Delegation**
- 5.1 Otherwise **specified in the PCC**, the Project Manager may delegate any of his duties and responsibilities to other people, except to the Adjudicator, after notifying the Contractor, and may revoke any delegation after notifying the Contractor.
- 6. Communications**
- 6.1 Communications between parties that are referred to in the Conditions shall be effective only when in writing. A notice shall be effective only when it is delivered.
- 7. Subcontracting**
- 7.1 The Contractor may subcontract with the approval of the Project Manager, but may not assign the Contract without the approval of the Employer in writing. Subcontracting shall not alter the

<sup>14</sup> In lump sum contracts, delete “Bill of Quantities” and replace with “Activity Schedule.”

Contractor's obligations.

- 8. Other Contractors**
- 8.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Employer between the dates given in the Schedule of Other Contractors, as **referred to in the PCC**. The Contractor shall also provide facilities and services for them as described in the Schedule. The Employer may modify the Schedule of Other Contractors, and shall notify the Contractor of any such modification.
- 9. Personnel and Equipment**
- 9.1 The Contractor shall employ the key personnel and use the equipment identified in its Bid, to carry out the Works or other personnel and equipment approved by the Project Manager. The Project Manager shall approve any proposed replacement of key personnel and equipment only if their relevant qualifications or characteristics are substantially equal to or better than those proposed in the Bid.
- 9.2 If the Project Manager asks the Contractor to remove a person who is a member of the Contractor's staff or work force, stating the reasons, the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.
- 9.3 If the Employer, Project Manager or Contractor determines, that any employee of the Contractor be determined to have engaged in corrupt, fraudulent, collusive, coercive, or obstructive practice during the execution of the Works, then that employee shall be removed in accordance with Clause 9.2 above.
- 10. Employer's and Contractor's Risks**
- 10.1 The Employer carries the risks which this Contract states are Employer's risks, and the Contractor carries the risks which this Contract states are Contractor's risks.
- 11. Employer's Risks**
- 11.1 From the Start Date until the Defects Liability Certificate has been issued, the following are Employer's risks:
- (a) The risk of personal injury, death, or loss of or damage to property (excluding the Works, Plant, Materials, and Equipment), which are due to
    - (i) use or occupation of the Site by the Works or for the purpose of the Works, which is the unavoidable result of the Works or
    - (ii) negligence, breach of statutory duty, or interference with any legal right by the Employer or by any person employed by or contracted to him except the

Contractor.

- (b) The risk of damage to the Works, Plant, Materials, and Equipment to the extent that it is due to a fault of the Employer or in the Employer's design, or due to war or radioactive contamination directly affecting the country where the Works are to be executed.

11.2 From the Completion Date until the Defects Liability Certificate has been issued, the risk of loss of or damage to the Works, Plant, and Materials is an Employer's risk except loss or damage due to

- (a) a Defect which existed on the Completion Date,
- (b) an event occurring before the Completion Date, which was not itself an Employer's risk, or
- (c) the activities of the Contractor on the Site after the Completion Date.

**12. Contractor's Risks**

12.1 From the Starting Date until the Defects Liability Certificate has been issued, the risks of personal injury, death, and loss of or damage to property (including, without limitation, the Works, Plant, Materials, and Equipment) which are not Employer's risks are Contractor's risks.

**13. Insurance**

13.1 The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles **stated in the PCC** for the following events which are due to the Contractor's risks:

- (a) loss of or damage to the Works, Plant, and Materials;
- (b) loss of or damage to Equipment;
- (c) loss of or damage to property (except the Works, Plant, Materials, and Equipment) in connection with the Contract; and
- (d) personal injury or death.

13.2 Policies and certificates for insurance shall be delivered by the Contractor to the Project Manager for the Project Manager's approval before the Start Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

13.3 If the Contractor does not provide any of the policies and



certificates required, the Employer may effect the insurance which the Contractor should have provided and recover the premiums the Employer has paid from payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due.

13.4 Alterations to the terms of an insurance shall not be made without the approval of the Project Manager.

13.5 Both parties shall comply with any conditions of the insurance policies.

**14. Site Data**

14.1 The Contractor shall be deemed to have examined any Site Data **referred to in the PCC**, supplemented by any information available to the Contractor.

**15. Contractor to Construct the Works**

15.1 The Contractor shall construct and install the Works in accordance with the Specifications and Drawings.

**16. The Works to Be Completed by the Intended Completion Date**

16.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the Program submitted by the Contractor, as updated with the approval of the Project Manager, and complete them by the Intended Completion Date.

**17. Approval by the Project Manager**

17.1 The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Project Manager, for his approval.

17.2 The Contractor shall be responsible for design of Temporary Works.

17.3 The Project Manager's approval shall not alter the Contractor's responsibility for design of the Temporary Works.

17.4 The Contractor shall obtain approval of third parties to the design of the Temporary Works, where required.

17.5 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Project Manager before this use.

**18. Safety**

18.1 The Contractor shall be responsible for the safety of all activities on the Site.

**19. Discoveries**

19.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site shall be the property of the Employer. The Contractor shall notify the Project Manager of

such discoveries and carry out the Project Manager's instructions for dealing with them.

- 20. Possession of the Site**
- 20.1 The Employer shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date **stated in the PCC**, the Employer shall be deemed to have delayed the start of the relevant activities, and this shall be a Compensation Event.
- 21. Access to the Site**
- 21.1 The Contractor shall allow the Project Manager and any person authorized by the Project Manager access to the Site and to any place where work in connection with the Contract is being carried out or is intended to be carried out.
- 22. Instructions, Inspections and Audits**
- 22.1 The Contractor shall carry out all instructions of the Project Manager which comply with the applicable laws where the Site is located.
- 22.2 The Contractor shall keep, and shall make all reasonable efforts to cause its Subcontractors and subconsultants to keep, accurate and systematic accounts and records in respect of the Works in such form and details as will clearly identify relevant time changes and costs.
- 22.3 The Contractor shall permit and shall cause its Subcontractors and subconsultants to permit, the Bank and/or persons appointed by the Bank to inspect the Site and/or the accounts and records relating to the performance of the Contract and the submission of the bid, and to have such accounts and records audited by auditors appointed by the Bank if requested by the Bank. The Contractor's and its Subcontractors' and subconsultants' attention is drawn to Sub-Clause 25.1 which provides, inter alia, that acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under Sub-Clause 22.2 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility pursuant to the Bank's prevailing sanctions procedures).
- 23. Appointment of the Adjudicator**
- 23.1 The Adjudicator shall be appointed jointly by the Employer and the Contractor, at the time of the Employer's issuance of the Letter of Acceptance. If, in the Letter of Acceptance, the Employer does not agree on the appointment of the Adjudicator, the Employer will request the Appointing Authority **designated in the PCC**, to appoint the Adjudicator within 14 days of receipt of such request.
- 23.2 Should the Adjudicator resign or die, or should the Employer and the Contractor agree that the Adjudicator is not functioning in accordance with the provisions of the Contract, a new

Adjudicator shall be jointly appointed by the Employer and the Contractor. In case of disagreement between the Employer and the Contractor, within 30 days, the Adjudicator shall be designated by the Appointing Authority **designated in the PCC** at the request of either party, within 14 days of receipt of such request.

#### **24. Procedure for Disputes**

- 24.1 If the Contractor believes that a decision taken by the Project Manager was either outside the authority given to the Project Manager by the Contract or that the decision was wrongly taken, the decision shall be referred to the Adjudicator within 14 days of the notification of the Project Manager's decision.
- 24.2 The Adjudicator shall give a decision in writing within 28 days of receipt of a notification of a dispute.
- 24.3 The Adjudicator shall be paid by the hour at the **rate specified in the PCC**, together with reimbursable expenses of the types **specified in the PCC**, and the cost shall be divided equally between the Employer and the Contractor, whatever decision is reached by the Adjudicator. Either party may refer a decision of the Adjudicator to an Arbitrator within 28 days of the Adjudicator's written decision. If neither party refers the dispute to arbitration within the above 28 days, the Adjudicator's decision shall be final and binding.
- 24.4 The arbitration shall be conducted in accordance with the arbitration procedures published by the institution named and in the place **specified in the PCC**.

#### **25. Corrupt and Fraudulent Practices**

- 25.1 The Bank requires compliance with its policy in regard to corrupt and fraudulent practices as set forth in Appendix to the GCC.
- 25.2 The Employer requires the Contractor to disclose any commissions or fees that may have been paid or are to be paid to agents or any other party with respect to the bidding process or execution of the Contract. The information disclosed must include at least the name and address of the agent or other party, the amount and currency, and the purpose of the commission, gratuity or fee.

### **B. Time Control**

#### **26. Program**

- 26.1 Within the time **stated in the PCC**, after the date of the Letter of Acceptance, the Contractor shall submit to the Project Manager for approval a Program showing the general methods, arrangements, order, and timing for all the activities in the Works. In the case of a lump sum contract, the activities in the

Program shall be consistent with those in the Activity Schedule.

- 26.2 An update of the Program shall be a program showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work, including any changes to the sequence of the activities.
- 26.3 The Contractor shall submit to the Project Manager for approval an updated Program at intervals no longer than the period **stated in the PCC**. If the Contractor does not submit an updated Program within this period, the Project Manager may withhold the amount **stated in the PCC** from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program has been submitted. In the case of a lump sum contract, the Contractor shall provide an updated Activity Schedule within 14 days of being instructed to by the Project Manager.
- 26.4 The Project Manager's approval of the Program shall not alter the Contractor's obligations. The Contractor may revise the Program and submit it to the Project Manager again at any time. A revised Program shall show the effect of Variations and Compensation Events.

**27. Extension of the Intended Completion Date**

- 27.1 The Project Manager shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining work, which would cause the Contractor to incur additional cost.
- 27.2 The Project Manager shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Project Manager for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.

**28. Acceleration**

- 28.1 When the Employer wants the Contractor to finish before the Intended Completion Date, the Project Manager shall obtain priced proposals for achieving the necessary acceleration from the Contractor. If the Employer accepts these proposals, the Intended Completion Date shall be adjusted accordingly and confirmed by both the Employer and the Contractor.
- 28.2 If the Contractor's priced proposals for an acceleration are

accepted by the Employer, they are incorporated in the Contract Price and treated as a Variation.

- 29. Delays Ordered by the Project Manager** 29.1 The Project Manager may instruct the Contractor to delay the start or progress of any activity within the Works.
- 30. Management Meetings** 30.1 Either the Project Manager or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.
- 30.2 The Project Manager shall record the business of management meetings and provide copies of the record to those attending the meeting and to the Employer. The responsibility of the parties for actions to be taken shall be decided by the Project Manager either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.
- 31. Early Warning** 31.1 The Contractor shall warn the Project Manager at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract Price, or delay the execution of the Works. The Project Manager may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate shall be provided by the Contractor as soon as reasonably possible.
- 31.2 The Contractor shall cooperate with the Project Manager in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Project Manager.

### C. Quality Control

- 32. Identifying Defects** 32.1 The Project Manager shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Project Manager may instruct the Contractor to search for a Defect and to uncover and test any work that the Project Manager considers may have a Defect.
- 33. Tests** 33.1 If the Project Manager instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay

for the test and any samples. If there is no Defect, the test shall be a Compensation Event.

- 34. Correction of Defects**
- 34.1 The Project Manager shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion, and is **defined in the PCC**. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.
- 34.2 Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Project Manager's notice.
- 35. Uncorrected Defects**
- 35.1 If the Contractor has not corrected a Defect within the time specified in the Project Manager's notice, the Project Manager shall assess the cost of having the Defect corrected, and the Contractor shall pay this amount.

#### **D. Cost Control**

- 36. Contract Price<sup>31</sup>**
- 36.1 The Bill of Quantities shall contain priced items for the Works to be performed by the Contractor. The Bill of Quantities is used to calculate the Contract Price. The Contractor will be paid for the quantity of the work accomplished at the rate in the Bill of Quantities for each item.
- 37. Changes in the Contract Price<sup>32</sup>**
- 37.1 If the final quantity of the work done differs from the quantity in the Bill of Quantities for the particular item by more than 25 percent, provided the change exceeds 1 percent of the Initial Contract Price, the Project Manager shall adjust the rate to allow for the change. The Project Manager shall not adjust rates from changes in quantities if thereby the Initial Contract Price is exceeded by more than 15 percent, except with the prior approval of the Employer.
- 37.2 If requested by the Project Manager, the Contractor shall provide the Project Manager with a detailed cost breakdown of any rate in the Bill of Quantities.

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<sup>31</sup> In lump sum contracts, replace GCC Sub-Clauses 36.1 as follows:

36.1 The Contractor shall provide updated Activity Schedules within 14 days of being instructed to by the Project Manager. The Activity Schedule shall contain the priced activities for the Works to be performed by the Contractor. The Activity Schedule is used to monitor and control the performance of activities on which basis the Contractor will be paid. If payment for materials on site shall be made separately, the Contractor shall show delivery of Materials to the Site separately on the Activity Schedule.

<sup>32</sup> In lump sum contracts, replace entire GCC Clause 37 with new GCC Sub-Clause 37.1, as follows:

37.1 The Activity Schedule shall be amended by the Contractor to accommodate changes of Program or method of working made at the Contractor's own discretion. Prices in the Activity Schedule shall not be altered when the Contractor makes such changes to the Activity Schedule.

- 38. Variations**
- 38.1 All Variations shall be included in updated Programs<sup>15</sup> produced by the Contractor.
- 38.2 The Contractor shall provide the Project Manager with a quotation for carrying out the Variation when requested to do so by the Project Manager. The Project Manager shall assess the quotation, which shall be given within seven (7) days of the request or within any longer period stated by the Project Manager and before the Variation is ordered.
- 38.3 If the Contractor's quotation is unreasonable, the Project Manager may order the Variation and make a change to the Contract Price, which shall be based on the Project Manager's own forecast of the effects of the Variation on the Contractor's costs.
- 38.4 If the Project Manager decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event.
- 38.5 The Contractor shall not be entitled to additional payment for costs that could have been avoided by giving early warning.
- 38.6 If the work in the Variation corresponds to an item description in the Bill of Quantities and if, in the opinion of the Project Manager, the quantity of work above the limit stated in Sub-Clause 39.1 or the timing of its execution do not cause the cost per unit of quantity to change, the rate in the Bill of Quantities shall be used to calculate the value of the Variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of work.<sup>16</sup>
- 39. Cash Flow Forecasts**
- 39.1 When the Program,<sup>17</sup> is updated, the Contractor shall provide the Project Manager with an updated cash flow forecast. The cash flow forecast shall include different currencies, as defined in the Contract, converted as necessary using the Contract exchange rates.
- 40. Payment Certificates**
- 40.1 The Contractor shall submit to the Project Manager monthly statements of the estimated value of the work executed less the cumulative amount certified previously.

<sup>15</sup> In lump sum contracts, add "and Activity Schedules" after "Programs."

<sup>16</sup> In lump sum contracts, delete this paragraph.

<sup>17</sup> In lump sum contracts, add "or Activity Schedule" after "Program."

- 40.2 The Project Manager shall check the Contractor's monthly statement and certify the amount to be paid to the Contractor.
- 40.3 The value of work executed shall be determined by the Project Manager.
- 40.4 The value of work executed shall comprise the value of the quantities of work in the Bill of Quantities that have been completed.<sup>18</sup>
- 40.5 The value of work executed shall include the valuation of Variations and Compensation Events.
- 40.6 The Project Manager may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

#### **41. Payments**

- 41.1 Payments shall be adjusted for deductions for advance payments and retention. The Employer shall pay the Contractor the amounts certified by the Project Manager within 28 days of the date of each certificate. If the Employer makes a late payment, the Contractor shall be paid interest on the late payment in the next payment. Interest shall be calculated from the date by which the payment should have been made up to the date when the late payment is made at the prevailing rate of interest for commercial borrowing for each of the currencies in which payments are made.
- 41.2 If an amount certified is increased in a later certificate or as a result of an award by the Adjudicator or an Arbitrator, the Contractor shall be paid interest upon the delayed payment as set out in this clause. Interest shall be calculated from the date upon which the increased amount would have been certified in the absence of dispute.
- 41.3 Unless otherwise stated, all payments and deductions shall be paid or charged in the proportions of currencies comprising the Contract Price.
- 41.4 Items of the Works for which no rate or price has been entered in shall not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

#### **42. Compensation Events**

- 42.1 The following shall be Compensation Events:

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<sup>18</sup> In lump sum contracts, replace this paragraph with the following: "The value of work executed shall comprise the value of completed activities in the Activity Schedule."



- (a) The Employer does not give access to a part of the Site by the Site Possession Date pursuant to GCC Sub-Clause 20.1.
- (b) The Employer modifies the Schedule of Other Contractors in a way that affects the work of the Contractor under the Contract.
- (c) The Project Manager orders a delay or does not issue Drawings, Specifications, or instructions required for execution of the Works on time.
- (d) The Project Manager instructs the Contractor to uncover or to carry out additional tests upon work, which is then found to have no Defects.
- (e) The Project Manager unreasonably does not approve a subcontract to be let.
- (f) Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of the Letter of Acceptance from the information issued to bidders (including the Site Investigation Reports), from information available publicly and from a visual inspection of the Site.
- (g) The Project Manager gives an instruction for dealing with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons.
- (h) Other contractors, public authorities, utilities, or the Employer does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor.
- (i) The advance payment is delayed.
- (j) The effects on the Contractor of any of the Employer's Risks.
- (k) The Project Manager unreasonably delays issuing a Certificate of Completion.

42.2 If a Compensation Event would cause additional cost or would prevent the work being completed before the Intended Completion Date, the Contract Price shall be increased and/or the Intended Completion Date shall be extended. The Project Manager shall decide whether and by how much the Contract Price shall be increased and whether and by how much the Intended Completion Date shall be extended.

42.3 As soon as information demonstrating the effect of each Compensation Event upon the Contractor's forecast cost has

been provided by the Contractor, it shall be assessed by the Project Manager, and the Contract Price shall be adjusted accordingly. If the Contractor's forecast is deemed unreasonable, the Project Manager shall adjust the Contract Price based on the Project Manager's own forecast. The Project Manager shall assume that the Contractor shall react competently and promptly to the event.

42.4 The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor's not having given early warning or not having cooperated with the Project Manager.

#### 43. Tax

43.1 The Project Manager shall adjust the Contract Price if taxes, duties, and other levies are changed between the date 28 days before the submission of bids for the Contract and the date of the last Completion certificate. The adjustment shall be the change in the amount of tax payable by the Contractor, provided such changes are not already reflected in the Contract Price or are a result of GCC Clause 44.

#### 44. Currencies

44.1 Where payments are made in currencies other than the currency of the Employer's country **specified in the PCC**, the exchange rates used for calculating the amounts to be paid shall be the exchange rates stated in the Contractor's Bid.

#### 45. Price Adjustment

45.1 Prices shall be adjusted for fluctuations in the cost of inputs only if **provided for in the PCC**. If so provided, the amounts certified in each payment certificate, before deducting for Advance Payment, shall be adjusted by applying the respective price adjustment factor to the payment amounts due in each currency. A separate formula of the type specified below applies to each Contract currency:

$$P_c = A_c + B_c \text{ Imc/Ioc}$$

where:

$P_c$  is the adjustment factor for the portion of the Contract Price payable in a specific currency "c."

$A_c$  and  $B_c$  are coefficients<sup>19</sup> **specified in the PCC**, representing the nonadjustable and adjustable portions, respectively, of the Contract Price payable in that specific

<sup>19</sup> The sum of the two coefficients  $A_c$  and  $B_c$  should be 1 (one) in the formula for each currency. Normally, both coefficients shall be the same in the formulae for all currencies, since coefficient A, for the nonadjustable portion of the payments, is a very approximate figure (usually 0.15) to take account of fixed cost elements or other nonadjustable components. The sum of the adjustments for each currency are added to the Contract Price.

currency “c;” and

Imc is the index prevailing at the end of the month being invoiced and Ioc is the index prevailing 28 days before Bid opening for inputs payable; both in the specific currency “c.”

45.2 If the value of the index is changed after it has been used in a calculation, the calculation shall be corrected and an adjustment made in the next payment certificate. The index value shall be deemed to take account of all changes in cost due to fluctuations in costs.

#### **46. Retention**

46.1 The Employer shall retain from each payment due to the Contractor the proportion **stated in the PCC** until Completion of the whole of the Works.

46.2 Upon the issue of a Certificate of Completion of the Works by the Project Manager, in accordance with GCC 51.1, half the total amount retained shall be repaid to the Contractor and half when the Defects Liability Period has passed and the Project Manager has certified that all Defects notified by the Project Manager to the Contractor before the end of this period have been corrected. The Contractor may substitute retention money with an “on demand” Bank guarantee.

#### **47. Liquidated Damages**

47.1 The Contractor shall pay liquidated damages to the Employer at the rate per day **stated in the PCC** for each day that the Completion Date is later than the Intended Completion Date. The total amount of liquidated damages shall not exceed the amount **defined in the PCC**. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor’s liabilities.

47.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Project Manager shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the overpayment, calculated from the date of payment to the date of repayment, at the rates specified in GCC Sub-Clause 41.1.

#### **48. Bonus**

48.1 The Contractor shall be paid a Bonus calculated at the rate per calendar day **stated in the PCC** for each day (less any days for which the Contractor is paid for acceleration) that the Completion is earlier than the Intended Completion Date. The Project Manager shall certify that the Works are complete, although they may not be due to be complete.

**49. Advance Payment**

49.1 The Employer shall make advance payment to the Contractor of the amounts **stated in the PCC** by the date **stated in the PCC**, against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a bank acceptable to the Employer in amounts and currencies equal to the advance payment. The Guarantee shall remain effective until the advance payment has been repaid, but the amount of the Guarantee shall be progressively reduced by the amounts repaid by the Contractor. Interest shall not be charged on the advance payment.

49.2 The Contractor is to use the advance payment only to pay for Equipment, Plant, Materials, and mobilization expenses required specifically for execution of the Contract. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other documents to the Project Manager.

49.3 The advance payment shall be repaid by deducting proportionate amounts from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works on a payment basis. No account shall be taken of the advance payment or its repayment in assessing valuations of work done, Variations, price adjustments, Compensation Events, Bonuses, or Liquidated Damages.

**50. Securities**

50.1 The Performance Security shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount **specified in the PCC**, by a bank or surety acceptable to the Employer, and denominated in the types and proportions of the currencies in which the Contract Price is payable. The Performance Security shall be valid until a date 28 days from the date of issue of the Certificate of Completion in the case of a Bank Guarantee, and until one year from the date of issue of the Completion Certificate in the case of a Performance Bond.

**51. Dayworks**

51.1 If applicable, the Dayworks rates in the Contractor's Bid shall be used only when the Project Manager has given written instructions in advance for additional work to be paid for in that way.

51.2 All work to be paid for as Dayworks shall be recorded by the Contractor on forms approved by the Project Manager. Each completed form shall be verified and signed by the Project Manager within two days of the work being done.

51.3 The Contractor shall be paid for Dayworks subject to obtaining

signed Dayworks forms.

- 52. Cost of Repairs** 52.1 Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.

#### **E. Finishing the Contract**

- 53. Completion** 53.1 The Contractor shall request the Project Manager to issue a Certificate of Completion of the Works, and the Project Manager shall do so upon deciding that the whole of the Works is completed.
- 54. Taking Over** 54.1 The Employer shall take over the Site and the Works within seven days of the Project Manager's issuing a certificate of Completion.
- 55. Final Account** 55.1 The Contractor shall supply the Project Manager with a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Project Manager shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor's account if it is correct and complete. If it is not, the Project Manager shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Project Manager shall decide on the amount payable to the Contractor and issue a payment certificate.
- 56. Operating and Maintenance Manuals** 56.1 If "as built" Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates **stated in the PCC**.
- 56.2 If the Contractor does not supply the Drawings and/or manuals by the dates **stated in the PCC** pursuant to GCC Sub-Clause 56.1, or they do not receive the Project Manager's approval, the Project Manager shall withhold the amount **stated in the PCC** from payments due to the Contractor.

**57. Termination**

57.1 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract.

57.2 Fundamental breaches of Contract shall include, but shall not be limited to, the following:

- (a) the Contractor stops work for 28 days when no stoppage of work is shown on the current Program and the stoppage has not been authorized by the Project Manager;
- (b) the Project Manager instructs the Contractor to delay the progress of the Works, and the instruction is not withdrawn within 28 days;
- (c) the Employer or the Contractor is made bankrupt or goes into liquidation other than for a reconstruction or amalgamation;
- (d) a payment certified by the Project Manager is not paid by the Employer to the Contractor within 84 days of the date of the Project Manager's certificate;
- (e) the Project Manager gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Project Manager;
- (f) the Contractor does not maintain a Security, which is required;
- (g) the Contractor has delayed the completion of the Works by the number of days for which the maximum amount of liquidated damages can be paid, as **defined in the PCC**; or
- (h) if the Contractor, in the judgment of the Employer, has engaged in corrupt, fraudulent, collusive, coercive or obstructive practices, in competing for or in executing the Contract, then the Client may, after giving fourteen (14) days written notice to the Contractor, terminate the Contract and expel him from the Site.

57.3 When either party to the Contract gives notice of a breach of Contract to the Project Manager for a cause other than those listed under GCC Sub-Clause 56.2 above, the Project Manager shall decide whether the breach is fundamental or not.

57.4 Notwithstanding the above, the Employer may terminate the Contract for convenience.

57.5 If the Contract is terminated, the Contractor shall stop work

immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible.

- 58. Payment upon Termination**
- 58.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Project Manager shall issue a certificate for the value of the work done and Materials ordered less advance payments received up to the date of the issue of the certificate and less the percentage to apply to the value of the work not completed, as **specified in the PCC**. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be a debt payable to the Employer.
- 58.2 If the Contract is terminated for the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Project Manager shall issue a certificate for the value of the work done, Materials ordered, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works, and less advance payments received up to the date of the certificate.
- 59. Property**
- 59.1 All Materials on the Site, Plant, Equipment, Temporary Works, and Works shall be deemed to be the property of the Employer if the Contract is terminated because of the Contractor's default.
- 60. Release from Performance**
- 60.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor, the Project Manager shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which a commitment was made.
- 61. Suspension of Bank Loan or Credit**
- 61.1 In the event that the Bank suspends the Loan or Credit to the Employer, from which part of the payments to the Contractor are being made:
- (a) The Employer is obligated to notify the Contractor of such suspension within 7 days of having received the Bank's suspension notice.
  - (b) If the Contractor has not received sums due it within the 28 days for payment provided for in Sub-Clause 40.1, the Contractor may immediately issue a 14-day termination notice.





**APPENDIX TO GENERAL CONDITIONS**  
**Bank's Policy- Corrupt and Fraudulent Practices**

*(text in this Appendix shall not be modified)*

**Guidelines for Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers, dated January 2011:**

**“Fraud and Corruption:**

1.16 It is the Bank’s policy to require that Borrowers (including beneficiaries of Bank loans), bidders, suppliers, contractors and their agents (whether declared or not), sub-contractors, sub-consultants, service providers or suppliers, and any personnel thereof, observe the highest standard of ethics during the procurement and execution of Bank-financed contracts.<sup>38</sup> In pursuance of this policy, the Bank:

- (a) defines, for the purposes of this provision, the terms set forth below as follows:
  - (i) “corrupt practice” is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;<sup>20</sup>
  - (ii) “fraudulent practice” is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;<sup>21</sup>
  - (iii) “collusive practice” is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;<sup>22</sup>
  - (iv) “coercive practice” is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;<sup>23</sup>
  - (v) “obstructive practice” is

<sup>38</sup> In this context, any action to influence the procurement process or contract execution for undue advantage is improper.

<sup>39</sup> For the purpose of this sub-paragraph, “another party” refers to a public official acting in relation to the procurement process or contract execution. In this context, “public official” includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

<sup>40</sup> For the purpose of this sub-paragraph, “party” refers to a public official; the terms “benefit” and “obligation” relate to the procurement process or contract execution; and the “act or omission” is intended to influence the procurement process or contract execution.

<sup>41</sup> For the purpose of this sub-paragraph, “parties” refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non-competitive levels, or are privy to each other’s bid prices or other conditions.

<sup>42</sup> For the purpose of this sub-paragraph, “party” refers to a participant in the procurement process or contract execution.

- (aa) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or
- (bb) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under paragraph 1.16(e) below.
- (b) will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
- (c) will declare misprocurement and cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement or the implementation of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;
- (d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank's sanctions procedures,<sup>24</sup> including by publicly declaring such firm or individual ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract; and (ii) to be a nominated<sup>25</sup>;
- (e) will require that a clause be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers and contractors, and their sub-contractors, agents, personnel, consultants, service providers, or suppliers, to permit the Bank to inspect all accounts, records, and other documents relating to the submission of bids and contract performance, and to have them audited by auditors appointed by the Bank.”

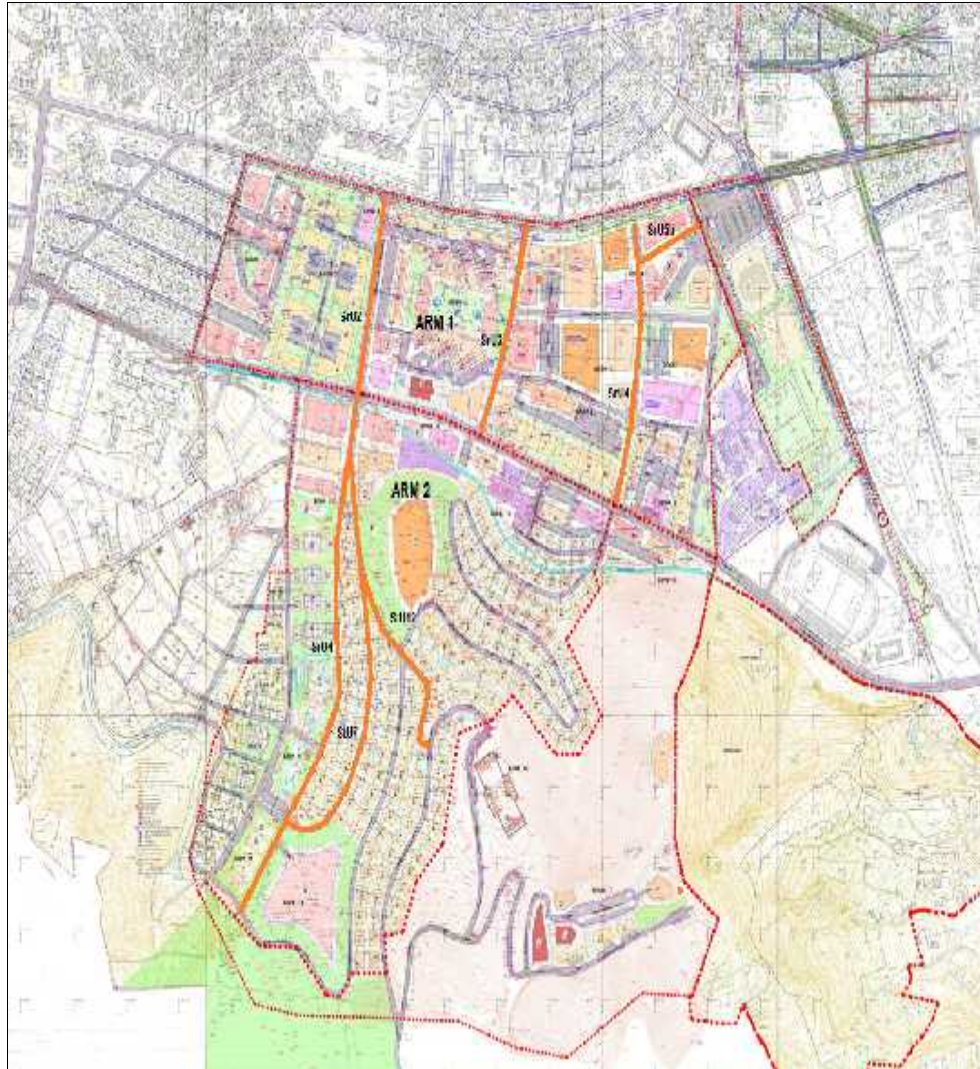
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<sup>43</sup> A firm or individual may be declared ineligible to be awarded a Bank financed contract upon: (i) completion of the Bank's sanctions proceedings as per its sanctions procedures, including, inter alia, cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, and through the application the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption; and (ii) as a result of temporary suspension or early temporary suspension in connection with an ongoing sanctions proceeding. See footnote 14 and paragraph 8 of Appendix 1 of these Guidelines.

<sup>44</sup> A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which has either been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

### Section IX. Particular Conditions of Contract

<b>A. General</b>	
<b>GCC 1.1 (d)</b>	The financing institution is: World Bank
<b>GCC 1.1 (s)</b>	The Employer is Municipality of Bitola, Address: Boulevard 1 <sup>St</sup> of May No 61, City Bitola, ZIP 7 000 , Country: Republic of Macedonia
<b>GCC 1.1 (v)</b>	The Intended Completion Date for the whole of the Works shall be 15 months from date of commencement of works.
<b>GCC 1.1 (y)</b>	The Project Manager is Venco Siskin, Municipality of Bitola, Address: Boulevard 1 <sup>St</sup> of May No 61 ; City Bitola, ZIP Code: 7 000, Country: Republic of Macedonia.
<b>GCC 1.1 (aa)</b>	The Site is located in the municipality of Bitola and is defined in the drawing below:



**GCC 1.1 (dd)** The Start Date shall be 14 days after contract signing.

**GCC 1.1 (hh)** The Works consist of : Construction of 7 streets. The total length of streets that are subject of this project is: 1,124.54m in ARM1 and 1,675.00m in ARM2, respectively the total length of streets projected for construction in the settlement “Zlatan Rid” is 2,799.54m. The project solution provides simultaneous placement of water supply system, storm water system, construction of streets and placement of street lighting. With such approach, the additional damage to the newly constructed streets and some partial solutions which will cause damage to the streets and sidewalks will be prevented.

**GCC 2.2** Sectional Completions are: N/A

<b>GCC 2.3(i)</b>	The following documents also form part of the Contract: <i>none</i>
<b>GCC 3.1</b>	The language of the contract is English. The law that applies to the Contract is the law of the Republic of Macedonia.
<b>GCC 5.1</b>	The Project manager may delegate any of his duties and responsibilities.
<b>GCC 8.1</b>	Schedule of other contractors: none.
<b>GCC 13.1</b>	The minimum insurance amounts and deductibles shall be:  (a) for loss or damage to the Works, Plant and Materials: 35.000,00EUR  (b) For loss or damage to Equipment: equivalent to the equipment value of the Contractor which was engaged for performing of the works EUR 40.000,00  (c) for loss or damage to property (except the Works, Plant, Materials, and Equipment) in connection with Contract 35.000,00EUR  (d) for personal injury or death:  (i) of the Contractor's employees: 25.000,00EUR.  (ii) of other people: 25.000,00EUR.
<b>GCC 14.1</b>	Site Data are: Technical Reports, Technical Terms, Drawings, Bill of Quantities
<b>GCC 20.1</b>	The Site Possession Date(s) shall be: 14 day after contract signing
<b>GCC 23.1 &amp; GCC 23.2</b>	Appointing Authority for the Adjudicator: Chamber of Chartered Architects and Engineers of Macedonia
<b>GCC 24.3</b>	Hourly rate and types of reimbursable expenses to be paid to the Adjudicator: 1.500,00 MKD per hour.
<b>GCC 24.4</b>	Institution whose arbitration procedures shall be used:  <b><i>“Rules of Conciliation and Arbitration of the International Chamber of Commerce (ICC):</i></b>  All disputes arising in connection with the present Contract shall be finally settled under the Rules of Conciliation and Arbitration of the International Chamber of Commerce by one or more arbitrators appointed in accordance with said Rules.”  The place of arbitration shall be: <b><i>Paris, France.</i></b>
<b>B. Time Control</b>	
<b>GCC 26.1</b>	The Contractor shall submit for approval a Program for the Works within

	15 days from the date of the Letter of Acceptance.
<b>GCC 26.3</b>	The period between Program updates is 28 days.  The amount to be withheld for late submission of an updated Program is 35.000, 00EUR.
<b>C. Quality Control</b>	
<b>GCC 34.1</b>	The Defects Liability Period is: 365 days.
<b>D. Cost Control</b>	
<b>GCC 44.1</b>	The currency of the Employer's country is: Macedonian Denar.
<b>GCC 45.1</b>	<p>The Contract <i>is not</i> subject to price adjustment in accordance with GCC Clause 45, and the following information regarding coefficients does not apply.</p> <p><i>[Price adjustment is mandatory for contracts which provide for time of completion exceeding 18 months]</i></p> <p>The coefficients for adjustment of prices are:</p> <p>(a) For currency <i>[insert name of currency]</i>:</p> <p style="padding-left: 40px;">(i) <i>[insert percentage]</i> percent non adjustable element (coefficient A).</p> <p style="padding-left: 40px;">(ii) <i>[insert percentage]</i> percent adjustable element (coefficient B).</p> <p>(b) For currency <i>[insert name of currency]</i>:</p> <p style="padding-left: 40px;">(i) <i>[insert percentage]</i> percent non adjustable element (coefficient A).</p> <p style="padding-left: 40px;">(ii) <i>[insert percentage]</i> percent adjustable element (coefficient B).</p> <p>The Index I for local currency shall be <i>[insert index]</i>.</p> <p>The Index I for the specified international currency shall be <i>[insert index]</i>.</p> <p><i>[These proxy indices shall be proposed by the Contractor, subject to acceptance by the Employer]</i></p> <p>The Index I for currencies other than the local currency and the specified international currency shall be <i>[insert index]</i>.</p> <p><i>[These proxy indices shall be proposed by the Contractor, subject to acceptance by the Employer.]</i></p>
<b>GCC 46.1</b>	The proportion of payments retained is: 5%

<b>GCC 47.1</b>	The liquidated damages for the whole of the Works are 0.10% per day. The maximum amount of liquidated damages for the whole of the Works is 10% of the final Contract Price.
<b>GCC 48.1</b>	The Bonus for the whole of the Works is N/A
<b>GCC 49.1</b>	The Advance Payments shall be: 10% and shall be paid to the Contractor no later than 15 days after submission of unconditional advance payment bank guarantee.
<b>GCC 50.1</b>	The Performance Security amount is 10% of the contract denominated in the types and proportions of the currencies in which the Contract Price is payable, or in a freely convertible currency acceptable to the Employer  (a) Bank Guarantee: 10 %
<b>E. Finishing the Contract</b>	
<b>GCC 56.1</b>	The date by which operating and maintenance manuals are required is at least 30 days of before contract completion.  The date by which “as built” drawings are required is within <b>10 days of completion of contract.</b>
<b>GCC 56.2</b>	The amount to be withheld for failing to produce “as built” drawings and/or operating and maintenance manuals by the date required in GCC 58.1 is 35.000,00 EUR.
<b>GCC 57.2 (g)</b>	The maximum number of days is: 100.
<b>GCC 58.1</b>	The percentage to apply to the value of the work not completed, representing the Employer’s additional cost for completing the Works, is 15%.

**Section X - Contract Forms**

This Section contains forms which, once completed, will form part of the Contract. The forms for Performance Security and Advance Payment Security, when required, shall only be completed by the successful Bidder after contract award.

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**Letter of Acceptance**

*[ on letterhead paper of the Employer]*

..... *[date]* .....

To: ..... *[ name and address of the Contractor]* .....

Subject: ..... *[Notification of Award Contract No]*. .....

This is to notify you that your Bid dated . . . . *[insert date]* . . . . for execution of the . . . . .  
.*[insert name of the contract and identification number, as given in the PCC]* . . . . . for  
the Accepted Contract Amount of . . . . .*[insert amount in numbers and words and name of  
currency]*, as corrected and modified in accordance with the Instructions to Bidders is hereby  
accepted by our Agency.

You are requested to furnish the Performance Security within 28 days in accordance with the  
Conditions of Contract, using for that purpose the of the Performance Security Form included in  
Section X. Contract Forms, of the Bidding Document.

***[Choose one of the following statements:]***

We accept that \_\_\_\_\_ *[insert the name of Adjudicator proposed by the  
Bidder]* be appointed as the Adjudicator.

***[or]***

We do not accept that \_\_\_\_\_ *[insert the name of the Adjudicator proposed  
by the Bidder]* be appointed as the Adjudicator, and by sending a copy of this Letter of  
Acceptance to \_\_\_\_\_ *[insert name of the Appointing  
Authority]*, the Appointing Authority, we are hereby requesting such Authority to appoint the  
Adjudicator in accordance with ITB 43.1 and GCC 23.1.

Authorized Signature: .....

Name and Title of Signatory: .....

Name of Agency: .....

Attachment: Contract Agreement

## Contract Agreement

THIS AGREEMENT made the . . . . .day of . . . . ., . . . . ., between . . . . . *[name of the Employer]*. . . . . (hereinafter “the Employer”), of the one part, and . . . . . *[name of the Contractor]*. . . . .(hereinafter “the Contractor”), of the other part:

WHEREAS the Employer desires that the Works known as . . . . . *[name of the Contract]*. . . . . should be executed by the Contractor, and has accepted a Bid by the Contractor for the execution and completion of these Works and the remedying of any defects therein,

The Employer and the Contractor agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.
  - (i) the Letter of Acceptance
  - (ii) the Letter of Bid
  - (iii) the addenda Nos \_\_\_\_\_(if any)
  - (iv) the Particular Conditions
  - (v) the General Conditions of Contract, including appendix;
  - (vi) the Specification
  - (vii) the Drawings
  - (viii) Bill of Quantities;<sup>26</sup> and
  - (ix) any other document **listed in the PCC** as forming part of the Contract,
3. In consideration of the payments to be made by the Employer to the Contractor as specified in this Agreement, the Contractor hereby covenants with the Employer to execute the Works and to remedy defects therein in conformity in all respects with the provisions of the Contract.
4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

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<sup>26</sup> In lump sum contracts, delete “Bill of Quantities” and replace with “Activity Schedule.”

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of . . . . . *[name of the borrowing country]*. . . . .on the day, month and year specified above.

Signed by: \_\_\_\_\_  
for and on behalf of the Employer

Signed by: \_\_\_\_\_  
for and on behalf the Contractor

in the  
presence of: \_\_\_\_\_  
Witness, Name, Signature, Address,  
Date

in the  
presence of: \_\_\_\_\_  
Witness, Name, Signature, Address, Date

**Performance Security (Bank Guarantee)****Option 1: (Bank Guarantee)**

*[Guarantor letterhead or SWIFT identifier code]*

**Beneficiary:** *[insert name and Address of Employer]*

**Date:** *\_ [Insert date of issue]*

**PERFORMANCE GUARANTEE No.:** *[Insert guarantee reference number]*

**Guarantor:** *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that *\_ [insert name of Contractor, which in the case of a joint venture shall be the name of the joint venture]* (hereinafter called "the Applicant") has entered into Contract No. *[insert reference number of the contract]* dated *[insert date]* with the Beneficiary, for the execution of *\_ [insert name of contract and brief description of Works]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of *[insert amount in figures]* (\_\_\_\_\_) *[insert amount in words]*,<sup>1</sup> such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its obligation(s) under the Contract, without the Beneficiary needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire, no later than the .... Day of ....., 2...<sup>2</sup>, and any demand for payment under it must be received by us at this office indicated above on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

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<sup>1</sup> *The Guarantor shall insert an amount representing the percentage of the Accepted Contract Amount specified in the Letter of Acceptance, less provisional sums, if any, and denominated either in the currency(cies) of the Contract or a freely convertible currency acceptable to the Beneficiary.*

<sup>2</sup> *Insert the date twenty-eight days after the expected completion date as described in GC Clause 53.1. The Employer should note that in the event of an extension of this date for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months][one year], in response to the Beneficiary's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."*

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*[signature(s)]*

*Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.*

### Advance Payment Security

*[Guarantor letterhead or SWIFT identifier code]*

**Beneficiary:** *[Insert name and Address of Employer]*

**Date:** *[Insert date of issue]*

**ADVANCE PAYMENT GUARANTEE No.:** *[Insert guarantee reference number]*

**Guarantor:** *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that *[insert name of Contractor, which in the case of a joint venture shall be the name of the joint venture]* (hereinafter called "the Applicant") has entered into Contract No. *[insert reference number of the contract]* dated *[insert date]* with the Beneficiary, for the execution of *[insert name of contract and brief description of Works]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum *[insert amount in figures]* () *[insert amount in words]* is to be made against an advance payment guarantee.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of *[insert amount in figures]* (\_\_\_\_\_) *[insert amount in words]*<sup>1</sup> upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating either that the Applicant:

- (a) has used the advance payment for purposes other than the costs of mobilization in respect of the Works; or
- (b) has failed to repay the advance payment in accordance with the Contract conditions, specifying the amount which the Applicant has failed to repay.

A demand under this guarantee may be presented as from the presentation to the Guarantor of a certificate from the Beneficiary's bank stating that the advance payment referred to above has been

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<sup>1</sup> *The Guarantor shall insert an amount representing the amount of the advance payment and denominated either in the currency(ies) of the advance payment as specified in the Contract, or in a freely convertible currency acceptable to the Employer.*

credited to the Applicant on its account number *[insert number]* at *[insert name and address of Applicant's bank]*..

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Applicant as specified in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate indicating that ninety (90) percent of the Accepted Contract Amount, less provisional sums, has been certified for payment, or on the *[insert day]* day of *[insert month]*, 2 *[insert year]*,<sup>2</sup> whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

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*[signature(s)]*

***Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.***

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<sup>2</sup> *Insert the expected expiration date of the Time for Completion. The Employer should note that in the event of an extension of the time for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months][one year], in response to the Beneficiary's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."*



**Invitation for Bids (IFB)**  
**REPUBLIC OF MACEDONIA**  
**MUNICIPAL SERVICES IMPROVEMENT PROJECT (MSIP)**  
**Loan No. 8158-MK**  
**MSIP-ICB-018-15**

1. The Republic of Macedonia has received a loan from the International Bank for Reconstruction and Development, for the Project for improvement of municipal services and it intends to apply part of the proceeds of this loan to payments under construction of seven streets with sidewalks, water supply system, storm water system and street lightening in the former military area ARM1 and ARM2 in Municipality Bitola -MSIP-ICB-018-15
2. The Municipality of Bitola now invites sealed bids from eligible bidders for construction of seven streets with sidewalks, water supply system, storm water system and street lightening in the former military area ARM1 and ARM2 in Municipality Bitola -MSIP-ICB-018-15. The construction period is 15 months.
3. Bidding will be conducted through the International Competitive Bidding (ICB) procedures specified in the World Bank's Guidelines: Procurement under IBRD Loans and IDA Credits, January 2011 and is open to all bidders from Eligible Source Countries as defined in the Bidding Documents.
4. Interested eligible bidders may obtain further at the address given below **from 08:00 to 16:00** :  
  
Municipality of Bitola  
Department for Public Procurement  
+389 47 208 332: +389 47 208 333  
+ 389 76 485 770  
Street : Boulevard 1<sup>St</sup> of May No:61  
Bitola, 7 000  
Republic of Macedonia  
E-mail : [slavica.nabavki@bitola.gov.mk](mailto:slavica.nabavki@bitola.gov.mk)
5. A complete set of bidding documents in English language may be purchased by interested eligible bidders upon the submission of a written application to the address below and upon payment of a nonrefundable fee of 100 EUR or equivalent in Macedonian Denars (MKD) according to the middle exchange rate of the National Bank of the Republic of Macedonia on the day of payment. The method of payment will be direct deposit to specified account numbers, as follows:
  - a.) For payments in MKD:  
Name of the final user: Treasury Account  
Bank deponent: National Bank of Republic of Macedonia

Number of Treasury Account: **100000000063095**

Budget user account: **840 103 03359**

Income account: **722212 00 2**

b.) For payments in EUR:

National Bank of Republic of Macedonia

**SWIFT BIC: NBRM MK 2X**

Final beneficiary:

**IBAN: MK07 1007 0100 0067 876**

Name: Municipality of Bitola

6. Bids must be delivered to the address below, on or before **12:00h, 15.12.2015**. Electronic bidding will not be permitted. Late bids will be rejected. Bids will be publicly opened in the presence of the bidders' designated representatives and anyone who choose to attend at the address below on **12:00h, 15.12.2015**.

7. All bids shall be accompanied by a Bid Security of 50,000.00 EUR.

8. The address referred to above is:

Municipality of Bitola

Address: Boulevard 1<sup>st</sup> of May No.61 Bitola

City, ZIP Code: 7 000

Country: Republic of Macedonia