



### Invitation to Bid ITB 26/2011

**Construction of the Pilot Composting Plant and Four Intermediate Collecting Centres** to support the establishment of Biodegradable Waste Management in Prespa Region, under the project “00077357 - “Pilot Project for Biodegradable Waste Management in Prespa Region” funded by the Swiss Development Cooperation Agency (SDC).

The United Nations Development Programme (**UNDP**) invites construction companies to submit bids in MKD, VAT exempted, for **Construction of the Pilot Composting Plant and Four Intermediate Collecting Centres**.

The scope of construction works consist of construction of all facilities and structures comprising the Pilot Composting Plant. Works includes the following:

(I) Construction of the Windrow Area:

- a) Preliminary works: conducting relevant surveying activities; geotechnical investigation; soil mechanic investigations; construction of Access Roads serving the project during construction; compaction of the previously constructed sub-grade including carrying out control tests of sub-grade; conduct quality control of asphalt layer;
- b) Earth works: construction and compacting of the sub-grade; construction of the capping layer (improved sub-grade layer); formation of the sub-base for application of the material for the bearing layer of suitable quarry crushed aggregate (compacted); Construction of stabilized shoulders made of mechanically stabilized gravel or stone material; Manual excavation of soil category III and IV for foundations for the prefabricated office and laboratory
- c) Asphalt works: supply and construction of asphalt bearing/wearing course type BNHS-16 with minimum 7 cm compacted thickness
- d) Supply, delivery and put into operation of the prefabricated container-type office and laboratory with dimensions 2,4 m x 6,0 m
- e) Construction of Disinfecting basin: works include electrical power installation works for the pump for the disinfecting basin, concrete and insulating works;

(II) Construction of Water Intake / Water supply Well

Work includes the following:

- f) site clearing and cleaning around the well; careful drilling and placing water collecting drainage PE pipe up to 65 meter depth; supply, delivery and installing of fittings for the Water intake/Water-supply well; Supply, delivery and installing of a drowned pump as per specification; Electrictrical Power installation works for power-supply for the pump for the well.
- g) Concrete and insulating works: transportation and placing of water tight reinforced concrete; apply cement based hydro insulation on the dry chamber;
- h) Reinforcement works: supply and installation of metal tops (heavy type)

(III) Finishing works on previously constructed Collecting Reservoir for Compost Liquid Drains and Atmosphere Water

Work includes the following:

- i) Insulating works, apply cement based hydro insulation on the internal side of the reservoir, external walls and top of the slab.

(IV) Construction of the Mechanics Workshop, and

(V) Shop for Final Compost

Work includes the following:

- j) Earth works: Manual Excavation of soil around the previously constructed foundations and basement slab (category III and IV); Manual backfilling around the base (foundations) of the structures; Supply and laying of suitable quarry crushed aggregate.
- k) Concrete and insulating works: Supply, transportation and placing of water tight reinforced concrete C30 (MB30) for construction of the construction's walls above the foundations of the structures, construction of construction's columns and construction of a path around the constructions; Applying horizontal and vertical insulation on the external walls of the columns in three layers and on top slab;
- l) Reinforcement works: consisting of supply, laying and securing in place of various types of reinforcement.
- m) Metal works: Supply, laying and instalment of main steel beams/supports of the roof construction, Supply and Installation of double coated plastic still sheet roofing.
- n) Miscellaneous: painting the roofing construction with anti-corrosive paint; Supply, delivery and installation of horizontal and vertical draining system of double-coated steel plastic material.

(VI) Construction of Intermediate Collecting Centers with 2 metal containers of the capacity of 6m<sup>3</sup>

(VII) Construction of Intermediate Collecting Centers with 3 metal containers of the capacity of 6m<sup>3</sup>

Work includes the following:

- o) Earth works: Mechanical and Manual excavation of soil (category III and IV), including loading, transport and disposal of surplus material to approved areas; Manual backfilling around the base (foundations) of the Intermediate Collecting Centres; Supply and laying of suitable quarry crushed aggregate under the foundation; Landscaping the area surrounding the Intermediate Collecting Centres.
- p) Concrete and insulating works: apply, casting and compaction of lean concrete bedding, to serve as structures base for concrete foundations.; Supply, transportation and placing of water tight reinforced concrete C30 (MB30) for construction of the slab, foundation's beams and walls of the Intermediate Collecting Centers and cast-in-situ gutters; Applying horizontal and vertical insulation-under the foundation, on the external walls of the foundation and on top slab in three layers.
- q) Reinforcement works: consisting of supply, laying and securing in place of various types of reinforcement.
- r) Metal works: Supply, laying and instalment of main steel beams/supports of the roof construction, Supply and Installation of double coated plastic still sheet roofing.
- s) Miscellaneous: painting the roofing construction with anti-corrosive paint; Supply, delivery and installation of horizontal and vertical draining system of double-coated steel plastic material.

(VIII) Construction of the fence around the Composting Plant

Work includes the following:

- t) Earth works: Mechanical and Manual excavation of soil (category III and IV), including loading, transport and disposal of surplus material to approved areas; Manual backfilling around the base (foundations) of the Intermediate Collecting Centres; Supply and laying of suitable quarry crushed aggregate under the foundation; Landscaping the area surrounding the Intermediate Collecting Centres.
- u) Concrete works: reinforced concrete C30 (MB30) for constructions of the foundations and foundation's walls;
- v) Reinforcement works: consisting of supply, laying and securing in place of various types of reinforcement.
- w) Metal works: Supply, laying and instalment of metal poles (supports) made of steel box profiles; Placing and fastening galvanized protective barbed wire/wire netting in row; Constriction and installation of two-part sliding lockable entrance gate of metal box profiles, rust protected;
- x) Miscellaneous: painting the metal poles (supports) of the mesh fence and the two-part sliding gate with anti-corrosive paint.

- (IX) Construction external electrical installation, internal electrical installation within the Composting plant and power connection of objects of the Composting plant

The construction of the above mentioned works is envisaged to commence in mid September 2011, while the estimated duration of contract is approximately 8 months.

### **Submission of documents**

1. Your bids shall be prepared in duplicate with one (1) marked "Original" and one (1) marked "Copy". The bid documents (both the original and the copy) shall be sealed in one outer and two inner envelopes. The outer envelope shall be addressed as follows:

**To: UNDP / Ref.: ITB 26/2011 - Construction of the Pilot Composting Plant and Four Intermediate Collecting Centres** to support the establishment of Biodegradable Waste Management in Prespa Region , under the project "00077357 - "Pilot Project for Biodegradable Waste Management in Prespa Region" **"Do not open before 11:00 h on 02 September 2011"**. **Address: UNDP, 8-ma Udarna Brigada 2, Skopje**

2. Any requests for clarification about the contents of this application shall be addressed in writing only to: [procurement.mk@undp.org](mailto:procurement.mk@undp.org) or sent by fax to the following number: +389 2 3249505. No phone calls will be accepted.

3. To enable you to submit a bid, please find enclosed:

Annex I Instructions to Bidders  
Annex II Bid Data Sheet  
Annex III General Conditions of Contract for Civil Works  
Annex IV Special Conditions  
Annex V Scope of Work & Other Conditions  
Annex VI Drawings  
Annex VII Bill of Quantities  
Annex VIII Bid Submission Form  
Annex IX Bid Security Forms  
Annex X Performance Security Forms  
Annex XI Model Contract for Works

4. It is strongly recommended that the bidders have a site visit prior to submission of their bids.

5. Bids must be delivered to the above office on or **before 11:00 h on 02 September 2011**. Late bids shall be rejected.

6. Bids will be opened in the UNDP Conference room IV floor in the presence of the Bidder's Representatives who chose to attend at the address, date and time indicated in the Bidding Document

### **Annex I**

#### **INSTRUCTIONS TO BIDDERS**

##### **A. Introduction**

**1. General:** The Employer invites Sealed Bids for the construction works to UNDP.

**2. Eligible Bidders:** The Bidders should not be associated, or have been associated in the past, directly or indirectly, with a firm or any of its affiliates which have been engaged by the Employer to provide consulting services for the preparation of the design specifications, and other documents to be used for the procurement of goods to be purchased under this Invitation to Bids.

**3. Cost of Bid:** The Bidder shall bear all costs associated with the preparation and submission of the Bid, and

the procuring UNDP entity will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the Tender.

## B. Tender Documents

**4. Examination of Tender Documents:** The Bidder is expected to examine all corresponding instructions, forms, terms and specifications contained in the Tender Documents. Failure to comply with these documents will be at the Bidder's risk and may affect the evaluation of the Bid.

**5. Clarification of Tender Documents:** A prospective Bidder requiring any clarification of the Tender Documents may notify the procuring entity in writing earlier than **26 August 2011**. The responses (including an explanation of the query but without identifying the source of inquiry) will be posted at UNDP web site at <http://www.undp.org.mk> under Vacancy/Tender Announcements.

**6. Amendments of Tender Documents:** No later than three (3) days prior to the Deadline for Submission of Bids, the procuring entity may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, amend the Tender Documents. All prospective Bidders that have received the Tender Documents will be notified in writing of any amendments. In order to afford prospective Bidders reasonable time in which to take the amendments into account in preparing their offers, the procuring entity may, at its discretion, extend the Deadline for the Submission of Bids.

## 7. Documents Comprising the Bid:

### 7.1 UNDP Model Documents

The Bid must comprise the following documents:

- a. Bid Submission form in accordance with Annex VIII;
- b. Price Schedule ( Bill of Quantity ) completed in accordance with the Annexes V, VI and VII and clause 8 of Instructions to Bidders; provided on a CD (Excel format) and in a hard copy, each page initialled/signed and stamped.
- c. Bid security: it is set 3% of the amount of the bid, but for an amount of not less than 15,000 USD (fifteen thousand USD) presented in the form specified in Annex IX of these tender documents. The original bid guarantee must be included in the original bid.
  - i. The Bid Security is to protect the Employer against the risk of the Bidder's conduct which would warrant the security's forfeiture.
  - ii. The Bid Security shall be denominated in the currency of the Purchase Order or in a freely convertible currency and shall be in the form of a bank guarantee issued by a reputable bank located in the Employer's country or abroad, and in the sample form provided in these Tender Documents,
  - iii. Any Bid not secured in accordance with Clause 7.1 (c) shall be rejected by the Employer as non-responsive pursuant to clause 13 of Instructions to Bidders.
  - iv. Unsuccessful Bidder Bid Security will be discharged or returned as promptly as possible, but not later than thirty (30) days after the expiration of the period of Bid Validity prescribed by the Employer pursuant to clause 9 of instructions to Bidders.
  - v. The successful Bidder's Bid Security will be discharged or returned upon the Bidder signing the Contract, pursuant to clause 18 of Instructions to Bidders, and furnishing the Performance Security, pursuant to clause 19 of Instructions to Bidders.
  - vi. The Bid Security may be forfeited:
    - If a Bidder withdraws its offer during the period of the Bid Validity specified by the Bidder on the Bid Submission Form, or,

- In the case of a successful Bidder, if the Bidder fails: (i) to sign the Contract in accordance with Clause 18 of Instructions to Bidders, or, (ii) to furnish Performance Security in accordance with Clause 19 of Instructions to Bidders.

## 7.2 Required Documentation – General liability of the company/minimum qualifications

a) Copies of original documents defining the constitution or legal status, place of registration, and principal place of business;

*\* copy of the original document, no translation required;*

b) For companies registered/based in the host country: Copy of License B for construction works issued by the Ministry of Transport and Communication (according to the law on Construction, O.G. of RM No. 59/2011) or minimum valid Licence C for Construction Works issued by the Ministry of Transport and Communication (according to the law on Construction, O.G. of RM No. 51/2005 and Amendments of the Law, O.G. of RM No. 82/2008 and 106/2008.). For international companies: international companies are allowed to execute construction works in Macedonia, provided that they present a permit/confirmation for execution of civil works obtained from the State Authority for Urban Planning in Macedonia in accordance with the rules set out in Article 42 of the Law on Construction.

c) Reference list of similar projects and evidence of at least three (3) projects of a nature and complexity comparable to this requirement expressed in US Dollars (including name/contact details of clients who can be contacted for reference).

d) Financial statement issued by the Central Registry or balance sheets officially certified by an authorized auditor where applicable, for the last three years of operation (2008, 2009 and 2010) showing minimum average annual turnover equivalent to three times the value of the financial offer of this bid.

*\* copy of the original document, no translation required;*

e) Qualifications and experience of the key personnel proposed for this assignment (names and CVs for the Project Manager, Site Manager to be submitted). Both the Project Manager and the Site Manager shall hold minimum licence/certification B for execution of construction works in the fields of civil engineering or architecture issued by the Macedonian Chamber of Authorized Architects and Authorized Engineers and shall have at least 5 years of specialised/appropriate experience and proven qualifications relevant to works of similar nature to this project (infrastructure works).

f) List of equipment available for realization of the construction works including their basic technical specifications, the year of production and the ownership status (own or leased).

g) Certifications listed below showing that the company (or each of the companies in case of consortium) is active and has fulfilled all their past and current obligations concerning the payment of taxes in their country:

- Confirmation the company is not bankrupt or has suspended business activities issued by the Central Registry or equivalent for international companies;
- Confirmation of payment of taxes, contributions and other public fees, issued by the Public Revenue Office or equivalent for international companies;

*\* copy of the original document, no translation required;*

h) Documents submitted by a joint-venture will be considered and shall be signed by a firm as the leader of the joint venture, who shall be the prime contractor with whom UNDP will sign a contract. In this case the following documentation is needed:

i) A copy of the joint venture agreement stamped and signed by involved parties legally binding all partners for the whole duration of the contract shall be submitted. The bid must be signed in a way that legally binds all partners.

7.3 All documents required under item 7.2 should be submitted by the leading company and all partners of consortium;

7.4 In case of a joint venture the Lead member must reach 50% of the minimum qualifications;

7.5 In case of a joint venture the Lead member must carry out at least 50% of the contract works by his own resources, which means that he must have the equipment, materials, human and financial resources necessary to enable him to carry out that percentage of the contract;

7.6 Information on volume of works for subcontracting components;

Failure to provide information which is essential to evaluate the applicant's qualifications or to provide timely clarification or substantiation of the information presented may result in disqualification of the applicant.

#### **8. Bid Currencies/Bid Prices:**

**All prices shall be quoted in Macedonian Denars (MKD), VAT exempted.** The Bidder shall indicate on the Price Schedule the unit prices and total Bid Price of the works it proposes to supply under the contract.

#### **9. Period of Validity of Bids:**

Bids shall remain valid for 90 days after the date of Bid Submission. A Bid valid for a shorter period may be rejected as non-responsive pursuant to clause 14 of Instructions to Bidders. In exceptional circumstances, the procuring UN entity may solicit the Bidder's consent to an extension of the period of validity. The request and the responses thereto shall be made in writing.

#### **10. Modification and Withdrawal of Bids:**

The Bidder may withdraw its Bid after submission, provided that written notice of the withdrawal is received by the procuring UNDP entity prior to the deadline for submission. No Bid may be modified after passing of the Deadline for Submission of Bids. No Bid may be withdrawn in the interval between the Deadline for Submission of Bids and the expiration of the Period of Bid Validity.

#### **11. Opening of Bids:**

11.1 The Employer will open all Bids in the presence of Bidders' Representatives who choose to attend, at 11:00 h on 02 September 2011, in the facility on UNDP at 8-ma Udarna Brigada 2, Skopje, fourth floor. The Bidders' Representatives who are present shall sign a register evidencing their attendance.

11.2 The bidders' names, Bid Modifications or withdrawals, bid Prices, discounts, and the presence or absence of requisite Bid Security and such other details as the Employer, at its discretion, may consider appropriate, will be announced at the opening. No Bid shall be rejected at Bid Opening, except for Late Bids, which shall be returned unopened to the Bidder.

11.3 Bids (and modifications sent pursuant to clause 10 of Instructions to Bidders) that are not opened and read out at Bid Opening shall not be considered further for evaluation, irrespective of the circumstances. Withdrawn Bids will be returned unopened to the Bidders.

11.4 The Employer will prepare minutes of the Bid Opening.

#### **12. Clarification of Bids:**

To assist in the examination, evaluation and comparison of Bids the procuring UNDP entity may at its discretion ask the Bidder for clarification of its Bid. The request for clarification and the response shall be in writing and no change in price or substance of the Bid shall be sought, offered or permitted.

#### **13. Preliminary Examination:**

13.1 The Employer will determine the substantial responsiveness of each Bid to the Invitation to Bid (ITB). A substantially responsive Bid is one which conforms to all the terms and conditions of the ITB without material deviations.

13.2 The Employer will examine the bids to determine whether they are complete, whether any computational errors have been made, whether the documents have been properly signed, and whether the bids are generally in order.



#### 14. Evaluation of Bids:

Determination of compliance with the Tender Documents is based on the content of the Bid itself without recourse to extrinsic evidence.

Evaluation Criteria	
14.1	Compliance with overall conditions set in the ITB 26/2011 including period of validity of bids
14.2	<p>Compliance with Special and General Conditions specified by these Tender Documents.</p> <p>a) The detailed evaluation of the bids takes place after checking that the bids satisfy the formal requirements of bid submission. The purpose of this evaluation is to assess whether or not the competing bids meet the minimum technical requirements and selection criteria:</p> <ul style="list-style-type: none"><li>- economic and financial capacity of the bidder,</li><li>- professional capacity, technical capacity of the bidder,</li><li>- compliance with the technical specification,</li><li>- other technical requirement in the ITB</li></ul> <p>b) Bid determined as not substantially responsive will be rejected by the Employer and may not subsequently be made responsive by the Bidder by correction of the nonconformity;</p> <p>c) Once the technical evaluation has been completed, the Committee checks that the financial offers of the technically responsive bids contain no arithmetical errors;</p> <p>d) Arithmetical errors will be rectified on the following basis: 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. If the Bidder does not accept the correction of errors, its Bid will be rejected. If there is a discrepancy between words and figures the amount in words will prevail.</p>
14.3	Compliance with deadlines set by the procuring entity in the ITB
14.4	Demonstrated ability to honour important responsibilities and liabilities allocated to Contractor in this ITB (e.g. bid guarantees, warranties, or insurance coverage, etc).

#### F. Award of Contract

##### 15. Award Criteria:

The procuring UNDP entity will Award the Contract to the lowest priced technically qualified Bidder. The Employer reserves the right to accept or reject any Bid, to annul the Tender process and reject all Bids at any time prior to award of a contract, without thereby incurring any liability to the affected Bidder(s) or any obligation to provide information on the grounds for the Employer's action.

##### 16. Employer's Right to Vary Requirements at Time of Award:

The Employer reserves the right at the time of making the award of contract to increase or decrease by up to 20 % the quantity of goods specified in the Bill of Quantities without any change in unit price or other terms and conditions.

##### 17. Notification of Award:

Prior to the expiration of the period of Bid Validity, the Employer will send the successful Bidder the Contract. The Contract may only be accepted by the Bidder's signing and returning an acknowledgement copy of it, as herein specified. Acceptance of this Contract shall effect a contract between the Parties under which the rights and obligations of the Parties shall be governed solely by the terms and conditions of this Contract, including

General and Special Conditions.

**18. Signing of the Contract:**

Within 15 days of receipt of the Contract the successful Bidder shall sign, date and return it to the Employer.

**19. Performance Security:**

The successful Bidder shall provide the Performance Security set at 10% of the amount of the contract to be presented in the form specified in Annex X of these Tender Documents, within 14 days of return of the signed and stamped Contract to the Employer.

**20.** Failure of the successful Bidder to comply with the requirement of clause 18 or clause 19 of Instructions to Bidders shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security, in which event the Employer may make the award to the next lowest evaluated Bidder or call for new Bids.

**Annex II**

**BID DATA SHEET**

The following specific data for the goods to be procured shall complement, supplement, or amend the provisions in the Instruction to Bidders. Whenever there is a conflict, the provisions herein shall prevail over those in the Instructions to Bidders.

Relevant clause(s) of Instruction to Bidders	Specific data complementing, supplementing, or amending instructions to Bidders
Contracting Authority	United Nations Development Programme Address: 8-ma Udarna Brigada 2, Skopje
Documents Establishing Bidder's Eligibility & Qualifications	<ul style="list-style-type: none"> <li>• For companies registered/based in the host country: copy of License B for construction works issued by the Ministry of Transport and Communication (according to the law on Construction, O.G. of RM No. 59/2011) or minimum valid Licence C for Construction Works issued by the Ministry of Transport and Communication (according to the law on Construction, O.G. of RM No. 51/2005 and Amendments of the Law, O.G. of RM No. 82/2008 and 106/2008.). For International companies: international companies need to present a permit/confirmation for execution of civil works obtained from the State Authority for Urban Planning in Macedonia.</li> <li>• Reference list and evidence of at least three (3) projects of a nature and complexity comparable to this requirement expressed in US Dollars (including name/contact details of clients who can be contacted for reference);</li> <li>• Financial statement issued by the Central Registry or balance sheets officially certified by an authorized auditor where applicable, for the last three years of operation (2008, 2009 and 2010) showing minimum average annual turnover equivalent to three times the value of the financial offer of this bid;</li> <li>• Two (2) key personnel proposed for this assignment (Project Manager and the Site Manager) shall have at least 5 years of specialised/appropriate experience and proven qualifications relevant to works of similar nature to this project;</li> <li>• Both the Project Manager and the Site Manager shall hold</li> </ul>



	<p>minimum licence/certification B for execution of construction works in the field of civil engineering or architecture issued by the Macedonian Chamber of Authorized Architects and Authorized Engineers.</p> <ul style="list-style-type: none"> <li>• List of equipment available for realization of the construction works;</li> <li>• Confirmation the company in not bankrupt or has suspended business activities issued by the Central Registry or equivalent;</li> <li>• Confirmation of payment of taxes, contributions and other public fees, issued by the Public Revenue Office and equivalent;</li> </ul>
Bid Validity Period.	90 days
Deadline for submission	02 September 2011 at 11:00 h.
Purchaser's Right to Vary Requirements at Time of Award	20 percent in QTY increase or decrease.
Bid security	3% of the amount of the bid but for an amount of not less than 15,000 USD (fifteen thousand USD) presented in the form specified in Annex IX
Evaluation Criteria	<ul style="list-style-type: none"> <li>• Compliance with overall conditions set in the ITB;</li> <li>• Compliance with Special and General Conditions specified by these Tender Documents(determine whether or not the competing bids meet the minimum technical requirements and selection criteria);</li> <li>• Compliance with commencement date and other deadlines;</li> <li>• Demonstrated ability to honour important responsibilities and liabilities allocated;</li> </ul>
Award Criteria	the lowest priced technically complied bid
Performance security	10% of the Contract amount
Signing of contract:	Within 15 days of receipt of the Contract
Joint-venture:	<ul style="list-style-type: none"> <li>• Joint-ventures are allowed. A copy of the joint venture agreement stamped and signed by involved parties legally binding all partners for the whole duration of the contract.</li> <li>• All documents required under item 7.2 should be submitted by the leading company and all partners of consortium;</li> </ul>

### **Annex III**

#### **General Conditions of Contract for Civil Works**

1. Definitions
2. Singular and Plural
3. Headings or Notes
4. Legal Relationships
5. General Duties/Powers of Engineer
6. Contractor's General Obligations/Responsibilities
7. Assignment and Subcontracting

8. Drawings
9. Work Book
10. Performance Security
11. Inspection of Site
12. Sufficiency of Tender
13. Programme of Work to be Furnished
14. Weekly Site Meeting
15. Change Orders
16. Contractor's Superintendence
17. Contractor's Employees
18. Setting-Out
19. Watching and Lighting
20. Care of Works
21. Insurance of Works, Etc.
22. Damage to Persons and Property
23. Liability Insurance
24. Accident or Injury to Workmen
25. Remedy on Contractor's Failure to Insure
26. Compliance with Statutes, Regulations, Etc.
27. Fossils, Etc.
28. Copyright, Patents and Other Proprietary Rights, and Royalties
29. Interference With Traffic and Adjoining Properties
30. Extraordinary Traffic and Special Loads
31. Opportunities for Other Contractors
32. Contractor to Keep Site Clean
33. Clearance of Site on Substantial Completion
34. Labour
35. Returns of Labour, Plant, Etc.
36. Materials, Workmanship and Testing
37. Access to Site
38. Examination of Work Before Covering Up
39. Removal of Improper Work and Materials
40. Suspension of Work
41. Possession of Site
42. Time for Completion
43. Extension of Time for Completion
44. Rate of Progress
45. Liquidated Damages for Delay
46. Certificate of Substantial Completion
47. Defects Liability
48. Alterations, Additions and Omissions
49. Plant, Temporary Works and Materials
50. Approval of Materials, Etc., Not Implied
51. Measurement of Works
52. Liability of the Parties
53. Authorities
54. Urgent Repairs
55. Increase and Decrease of Costs
56. Taxation
57. Blasting
58. Machinery
59. Temporary Works and Reinstatement
60. Photographs and Advertising
61. Prevention of Corruption
62. Date Falling on Holiday
63. Notices
64. Language, Weights and Measures
65. Records, Accounts, Information and Audit

- 66. Force Majeure
- 67. Suspension by the UNDP
- 68. Termination by the UNDP
- 69. Termination by the Contractor
- 70. Rights and Remedies of the UNDP
- 71. Settlement of Disputes
- 72. Privileges and Immunities

Appendix I: Formats of Performance Security      Performance Bank Guarantee      Performance Bond

## **1. DEFINITIONS**

For the purpose of the Contract Documents the words and expressions below shall have the following meanings:

"Employer" means the United Nations Development Programme (UNDP).

"Contractor" means the person whose tender has been accepted and with whom the Contract has been entered into.

"Engineer" means the person whose services have been engaged by UNDP to administer the Contract as provided therein, as will be notified in writing to the Contractor.

"Contract" means the written agreement between the Employer and the Contractor, to which these General Conditions are annexed.

"The Works" means the works to be executed and completed under the Contract.

"Temporary Works" shall include items to be constructed which are not intended to be permanent and form part of the Works.

"Drawings" and "Specifications" mean the Drawings and Specifications referred to in the Contract and any modification thereof or addition thereto furnished by the Engineer or submitted by the Contractor and approved in writing by the Engineer in accordance with the Contract.

"Bill of Quantities" is the document in which the Contractor indicates the cost of the Works, on the basis of the foreseen quantities of items of work and the fixed unit prices applicable to them.

"Contract Price" means the sum agreed in the Contract as payable to the Contractor for the execution and completion of the Works and for remedying of any defects therein in accordance with the Contract.

"Site" means the land and other places on, under, in or through which the Works or Temporary Works are to be constructed.

## **2. SINGULAR AND PLURAL**

Words importing persons or parties shall include firms or companies and words importing the singular only shall also include the plural and vice versa where the context requires.

## **3. HEADINGS OR NOTES**

The headings or notes in the Contract Documents shall not be deemed to be part thereof or be taken into consideration in their interpretation.

## **4. LEGAL RELATIONSHIPS**

The Contractor and the sub-contractor(s), if any, shall have the status of an independent contractor vis-à-vis the Employer. The Contract Documents shall not be construed to create any contractual relationship of any kind between the Engineer and the Contractor, but the Engineer shall, in the exercise of his duties and powers under the Contract, be entitled to performance by the Contractor of its obligations, and to enforcement thereof. Nothing contained in the Contract Documents shall create any contractual relationship between the Employer or the Engineer and any subcontractor(s) of the Contractor.

## **5. GENERAL DUTIES/POWERS OF ENGINEER**

The Engineer shall provide administration of Contract as provided in the Contract Documents. In particular, he shall perform the functions hereinafter described.

The Engineer shall be the Employer's representative vis-à-vis the Contractor during construction and until final payment is due. The Engineer shall advise and consult with the Employer. The Employer's instructions to the

Contractor shall be forwarded through the Engineer. The Engineer shall have authority to act on behalf of the Employer only to the extent provided in the Contract Documents as they may be amended in writing in accordance with the Contract. The duties, responsibilities and limitations of authority of the Engineer as the Employer's representative during construction as set forth in the Contract shall not be modified or extended without the written consent of the Employer, the Contractor and the Engineer.

The Engineer shall visit the Site at intervals appropriate to the stage of construction to familiarize himself generally with the progress and quality of the Works and to determine in general if the Works are proceeding in accordance with the Contract Documents. On the basis of his on-site observations as an Engineer, he shall keep the Employer informed of the progress of the Works.

The Engineer shall not be responsible for and will not have control or charge of construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Works or the Temporary Works. The Engineer shall not be responsible for or have control or charge over the acts or omissions of the Contractor (including the Contractor's failure to carry out the Works in accordance with the Contract) and of Sub-contractors or any of their agents or employees, or any other persons performing services for the Works, except if such acts or omissions are caused by the Engineer's failure to perform his functions in accordance with the contract between the Employer and the Engineer.

The Engineer shall at all times have access to the Works wherever and whether in preparation or progress. The Contractor shall provide facilities for such access so that the Engineer may perform his functions under the Contract.

Based on the Engineer's observations and an evaluation of the documentation submitted by the Contractor together with the invoices, the Engineer shall determine the amounts owed to the Contractor and shall issue Certificates for Payment as appropriate.

The Engineer shall review and approve or take other appropriate action upon the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for conformity with the design concept of the Works and with the provisions of the Contract Documents. Such action shall be taken with reasonable promptness so as to cause no delay. The Engineer's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

The Engineer shall interpret the requirements of the Contract Documents and judge the performance hereunder by the Contractor. All interpretations and orders of the Engineer shall be consistent with the intent of and reasonably inferable from the Contract Documents and shall be in writing or in the form of drawings. Either party may make a written request to the Engineer for such interpretation. The Engineer shall render the interpretation necessary for the proper execution of the Works with reasonable promptness and in accordance with any time limit agreed upon. Any claim or dispute arising from the interpretation of the Contract Documents by the Engineer or relating to the execution or progress of the Works shall be settled as provided in Clause 71 of these General Conditions.

Except as otherwise provided in the Contract, the Engineer shall have no authority to relieve the Contractor of any of his obligations under the Contract nor to order any work involving delay in completion of the Works or any extra payment to the Contractor by the Employer, or to make any variations to the Works.

In the event of termination of the employment of the Engineer, the Employer shall appoint another suitable professional to perform the Engineer's duties.

The Engineer shall have authority to reject work which does not conform to the Contract Documents. Whenever, in his opinion, he considers it necessary or advisable for the implementation of the intent of the Contract Documents, he will have authority to require special inspection or testing of the work whether or not such work be then fabricated, installed or completed. However, neither the Engineer's authority to act nor any reasonable decision made by him in good faith either to exercise or not to exercise such authority shall give rise to any duty or responsibility of the Engineer to the Contractor, any subcontractor, any of their agents or employees, or any other person performing services for the Works.

The Engineer shall conduct inspections to determine the dates of Substantial Completion and Final Completion, shall receive and forward to the Employer for the Employer's review written warranties and related documents required by the Contract and assembled by the Contractor, and shall issue a final Certificate for Payment upon compliance with the requirements of Clause 47 hereof and in accordance with the Contract.

If the Employer and Engineer so agree, the Engineer shall provide one or more Engineer's Representative(s) to assist the Engineer in carrying out his responsibilities at the site. The Engineer shall notify in writing to the Contractor and the Employer the duties, responsibilities and limitations of authority of any such Engineer's Representative(s).

## **6. CONTRACTOR'S GENERAL OBLIGATIONS/RESPONSIBILITIES**

### **Obligation to Perform in Accordance with Contract**

The Contractor shall execute and complete the Works and remedy any defects therein in strict accordance with the Contract, with due care and diligence and to the satisfaction of the Engineer, and shall provide all labour, including the supervision thereof, materials, Constructional Plant and all other things, whether of a temporary or permanent nature, required in and for such execution, completion and remedying of defects, as far as the necessity for providing the same is specified in or is reasonably to be inferred from the Contract. The Contractor shall comply with and adhere strictly to the Engineer's instructions and directions on any matter, touching or concerning the Works.

#### **Responsibility for Site Operations**

The Contractor shall take full responsibility for the adequacy, stability and safety of all site operations and methods of construction, provided that the Contractor shall not be responsible, except as may be expressly provided in the Contract, for the design or specification of the Permanent Works or of any Temporary Works prepared by the Engineer.

#### **Responsibility for Employees**

The Contractor shall be responsible for the professional and technical competence of his employees and will select for work under this Contract, reliable individuals who will perform effectively in the implementation of the Contract, respect local customs and conform to a high standard of moral and ethical conduct.

#### **Source of Instructions**

The Contractor shall neither seek nor accept instructions from any authority external to the Employer, the Engineer or their authorized representatives in connection with the performance of his services under this Contract. The Contractor shall refrain from any action which may adversely affect the Employer and shall fulfil his commitments with fullest regard for the interest of the Employer.

#### **Officials Not to Benefit**

The Contractor warrants that no official of the Employer has been or shall be admitted by the Contractor to any direct or indirect benefit arising from this Contract or the award thereof. The Contractor agrees that breach of this provision is a breach of an essential term of the Contract.

#### **Use of Name, Emblem or Official Seal of UNDP or the United Nations**

The Contractor shall not advertise or otherwise make public the fact that he is performing, or has performed services for the Employer or use the name, emblem or official seal of the Employer or the United Nations or any abbreviation of the name of the Employer or the United Nations for advertising purposes or any other purposes.

#### **Confidential Nature of Documents**

All maps, drawings, photographs, mosaics, plans, reports, recommendations, estimates, documents and all other data compiled by or received by the Contractor under the Contract shall be the property of the Employer, shall be treated as confidential and shall be delivered only to the duly authorized representative of the Employer on completion of the Works; their contents shall not be made known by the Contractor to any person other than the personnel of the Contractor performing services under this Contract without the prior written consent of the Employer.

## **7. ASSIGNMENT AND SUBCONTRACTING**

#### **Assignment of Contract**

The Contractor shall not, except after obtaining the prior written approval of the Employer, assign, transfer, pledge or make other disposition of the Contract or any part thereof or of any of the Contractor's rights, claims or obligations under the Contract.

#### **Subcontracting**

In the event the Contractor requires the services of subcontractors, the Contractor shall obtain the prior written approval of the Employer for all such subcontractors. The approval of the Employer shall not relieve the Contractor of any of his obligations under the Contract, and the terms of any subcontract shall be subject to and be in conformity with the provisions of the Contract.

#### **Assignment of Subcontractor's Obligations**

In the event of a subcontractor having undertaken towards the Contractor in respect of the work executed or the goods, materials, Plant or services supplied by such subcontractor for the Works, any continuing obligation extending for a period exceeding that of the Defects Liability Period under the Contract, the Contractor shall at any time after the expiration of such Period, assign to the Employer, at the Employer's request and cost, the benefit of such obligation for the unexpired duration thereof.

## **8. DRAWINGS**

### **Custody of drawings**

The drawings shall remain in the sole custody of the Employer but two (2) copies thereof shall be furnished to the Contractor free of cost. The Contractor shall provide and make at his own expense any further copies required by him. At the completion of the Works, the Contractor shall return to the Employer all drawings provided under the Contract.

### **One copy of Drawings to be kept on Site**

One copy of the Drawings furnished to the Contractor as aforesaid shall be kept by the Contractor on the Site and the same shall at all reasonable times be available for inspection and use by the Engineer and by any other person authorized in writing by the Engineer.

### **Disruption of Progress**

The Contractor shall give written notice to the Engineer whenever planning or progress of the Works is likely to be delayed or disrupted unless any further drawing or order, including a direction, instruction or approval, is issued by the Engineer within a reasonable time. The notice shall include details of drawing or order required and of why and by when it is required and of any delay or disruption likely to be suffered if it is late.

## **9. WORK BOOK**

The Contractor shall maintain a Work Book at the Site with numbered pages, in one original and two copies. The Engineer shall have full authority to issue new orders, drawings and instructions to the Contractor, from time to time and as required for the correct execution of the Works. The Contractor shall be bound to follow such orders, drawings and instructions.

Every order shall be dated and signed by the Engineer and the Contractor, in order to account for its receipt.

Should the Contractor want to refuse an order in the Work Book, he shall so inform the Employer, through the Engineer, by means of an annotation in the Work Book made within three (3) days

from the date of the order that the Contractor intends to refuse. Failure by the Contractor to adhere to this procedure shall result in the order being deemed accepted with no further possibility of refusal.

The original of the Work Book shall be delivered to the Employer at the time of Final Acceptance of the Works. A copy shall be kept by the Engineer and another copy by the Contractor.

## **10. PERFORMANCE SECURITY**

As guarantee for his proper and efficient performance of the Contract, the Contractor shall on signature of the Contract furnish the Employer with a Performance Security issued for the benefit of the Employer. The amount and character of such security (bond or guarantee) shall be as indicated in the Contract.

The Performance Bond or Bank Guarantee must be issued by an acceptable insurance company or accredited bank, in the format included in Appendix I to these General Conditions, and must be valid up to twenty-eight days after issuance by the Engineer of the Certificate of Final Completion. The Performance Bond or Bank Guarantee shall be returned to the Contractor within twenty-eight days after the issuance by the Engineer of the Certificate of Final Completion, provided that the Contractor shall have paid all money owed to the Employer under the Contract.

If the surety of the Performance Bond or Bank Guarantee is declared bankrupt or becomes insolvent or its right to do business in the country of execution of the Works is terminated, the Contractor shall within five (5) days thereafter substitute another bond or guarantee and surety, both of which must be acceptable to the Employer.

## **11. INSPECTION OF SITE**

The Contractor shall be deemed to have inspected and examined the site and its surroundings and to have satisfied himself before submitting his Tender and signing the Contract as to all matters relative to the nature of the land and subsoil, the form and nature of the Site, details and levels of existing pipe lines, conduits, sewers, drains, cables or other existing services, the quantities and nature of the work and materials necessary for the completion of the Works, the means of access to the Site, and the accommodation he may require, and in general to have himself obtained all necessary information as to risk contingencies, climatic, hydrological and natural conditions and other circumstances which may influence or affect his Tender, and no claims will be entertained in this connection against the Employer.

## **12. SUFFICIENCY OF TENDER**

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency



of his Tender for the construction of the Works and of the rates and prices, which rates and prices shall, except in so far as it is otherwise provided in the Contract, cover all his obligations under the Contract and all matters and things necessary for the proper execution and completion of the Works.

### **13. PROGRAMME OF WORK TO BE FURNISHED**

Within the time limit specified in the Contract, the Contractor shall submit to the Engineer for his consent a detailed Programme of Work showing the order of procedure and the method in which he proposes to carry out the Works. In preparing his Programme of Work the Contractor shall pay due regard to the priority required by certain works. Should the Engineer, during the progress of work, require further modifications to the Programme of Work, the Contractor shall review the said program. The Contractor shall also whenever required by the Engineer submit particulars in writing of the Contractor's arrangements for carrying out the Works and of the Constructional Plant and Temporary Works which the Contractor intends to supply, use or construct as the case may be. The submission of such program, or any modifications thereto, or the particulars required by the Engineer, shall not relieve the Contractor of any of his duties or obligations under the Contract nor shall the incorporation of any modification to the Programme of Work either at the commencement of the contract or during its course entitle the Contractor to any additional payments in consequence thereof.

### **14. WEEKLY SITE MEETING**

A weekly site meeting shall be held between the UNDP Project Coordinator or engineer, if any, the representative of the Contractor and the Engineer or the Engineer's Representative, in order to verify that the Works are progressing normally and are executed in accordance with the Contract.

### **15. CHANGE ORDERS**

The Engineer may instruct the Contractor, with the approval of the Employer and by means of Change Orders, all variations in quantity or quality of the Works, in whole or in part, that are deemed necessary by the Engineer. Processing of change orders shall be governed by clause 48 of these General Conditions.

### **16. CONTRACTOR'S SUPERINTENDENCE**

the Contract. The Contractor or a competent and authorized agent or representative of the Contractor approved in writing by the Engineer, which approval may at any time be withdrawn, shall be constantly on the site and shall devote his entire time to the superintendence of the Works. Such authorized agent or representative shall receive on behalf of the Contractor directions and instructions from the Engineer. If the approval of such agent or representative shall be withdrawn by the Engineer, as provided in Clause 17(2) hereinafter, or if the removal of such agent or representative shall be requested by the Employer under Clause 17(3) hereinafter, the Contractor shall as soon as it is practicable after receiving notice of such withdrawal remove the agent or representative from the Site, and replace him by another agent or representative approved by the Engineer. Notwithstanding the provision of Clause 17(2) hereinafter, the Contractor shall not thereafter employ, in any capacity whatsoever, a removed agent or representative again on the Site.

### **17. CONTRACTOR'S EMPLOYEES**

The Contractor shall provide and employ on the Site in connection with the execution and completion of the Works and the remedying of any defects therein:

Only such technical assistants as are skilled and experienced in their respective callings and such sub-agent foremen and leading hands as are competent to give proper supervision to the work they are required to supervise, and

Such skilled, semi-skilled, and unskilled labour as is necessary for the proper and timely execution and completion of the Works.

The Engineer shall be at liberty to object to and require the Contractor to remove forthwith from the Works any person employed by the Contractor in or about the execution or completion of the Works, who in the opinion of the Engineer is misconducting himself, or is incompetent or negligent in the proper performance of his duties, or whose employment is otherwise considered reasonably by the Engineer to be undesirable, and such person shall

not be again employed on the Site without the written permission of the Engineer. Any person so removed from the Works shall be replaced as soon as reasonably possible by a competent substitute approved by the Engineer. Upon written request by the Employer, the Contractor shall withdraw or replace from the Site any agent, representative or other personnel who does not conform to the standards set forth in paragraph (1) of this Clause. Such request for withdrawal or replacement shall not be considered as termination in part or in whole of this Contract. All costs and additional expenses resulting from any withdrawal or replacement for whatever reason of any of the Contractor's personnel shall be at the Contractor's expense.

## **18. SETTING-OUT**

The Contractor shall be responsible for the true and proper setting out of the Works in relation to original points, lines and levels of reference given by the Engineer in writing and for the correctness of the position, levels, dimensions and alignment of all parts of the Works and for the provision of all necessary instruments, appliances and labor in connection therewith. If, at any time during the progress of the Works, any error shall appear or arise in the position, levels, dimensions or alignment of any part of the Works, the Contractor, on being required so to do by the Engineer, shall, at his own cost, rectify such error to the satisfaction of the Engineer.

## **19. WATCHING AND LIGHTING**

The Contractor shall in connection with the Works provide and maintain at his own cost all lights, guards, fencing and watching when and where necessary or required by the Engineer or by any duly constituted authority for the protection of the Works and the materials and equipment utilized therefor or for the safety and convenience of the public or others.

## **20. CARE OF WORKS**

From the commencement date of the Works to the date of substantial completion as stated in the Certificate of Substantial Completion, the Contractor shall take full responsibility for the care thereof and of all Temporary Works. In the event that any damage or loss should happen to the Works or to any part thereof or to any Temporary Works from any cause whatsoever (save and except as shall be due to Force Majeure as defined in Clause 66 of these General Conditions), the Contractor shall at his own cost repair and make good the same so that, at completion, the Works shall be in good order and condition and in conformity in every respect with the requirements of the Contract and the Engineer's instructions. The Contractor shall also be liable for any damage to the Works occasioned by him in the course of any operations carried out by him for the purpose of complying with his obligations Clause 47 hereof.

The Contractor shall be fully responsible for the review of the Engineering design and details of the Works and shall inform the Employer of any mistakes or incorrectness in such design and details which would affect the Works.

## **21. INSURANCE OF WORKS, ETC.**

Without limiting his obligations and responsibilities under Clause 20 hereof, the Contractor shall insure immediately following signature of this Contract, in the joint names of the Employer and the Contractor (a) for the period stipulated in Clause 20(1) hereof, against all loss or damage from whatever cause arising, other than cause of Force majeure as defined in clause 66 of these General Conditions, and (b) against loss or damage for which the Contractor is responsible, in such manner that the Employer and the Contractor are covered for the period stipulated in Clause 20 (1) hereof and are also covered during the Defects Liability Period for loss or damage arising from a cause occurring prior to the commencement of the Defects Liability Period and for any loss or damage occasioned by the Contractor in the course of any operations carried out by him for the purpose of complying with his obligations under Clause 47 hereof:

The Works, together with the materials and Plant for incorporation therein, to their full replacement cost, plus an additional sum of ten (10) per cent of such replacement cost, to cover any additional costs of and incidental to the rectification of loss or damage including professional fees and the cost of demolishing and removing any part of the Works and of removing debris of whatsoever nature; \

The Contractor's equipment and other things brought on to the Site by the Contractor to the replacement value of such equipment and other things;

An insurance to cover the liabilities and warranties of Section 52(4);

Such insurance shall be effected with an insurer and in terms approved by the Employer, which approval shall not be unreasonably withheld, and the Contractor shall, whenever required, produce to the Engineer the policy or policies of insurance and the receipts for payment of the current premiums.

## **22. DAMAGE TO PERSONS AND PROPERTY**

The Contractor shall (except if and so far as the Contract provides otherwise) indemnify, hold and save harmless and defend at his own expense the Employer, its officers, agents, employees and servants from and against all suits, claims, demands, proceedings, and liability of any nature or kind, including costs and expenses, for injuries or damages to any person or any property whatsoever which may arise out of or in consequence of acts or omissions of the Contractor or its agents, employees, servants or subcontractors in the execution of the Contract. The provision of this Clause shall extend to suits, claims, demands, proceedings and liability in the nature of workmen's compensation claims and arising out of the use of patented inventions and devices. Provided always that nothing herein contained shall be deemed to render the Contractor liable for or in respect of or with respect to:

The permanent use or occupation of land by the Works or any part thereof;

The right of the Employer to construct the Works or any part thereof on, over, under, or through any land.

Interference whether temporary or permanent with any right of light, airway or water or other easement or quasi-easement which is the unavoidable result of the construction of the Works in accordance with the Contract.

Death, injuries or damage to persons or property resulting from any act or neglect of the Employer, his agents, servants or other contractors, done or committed during the validity of the Contract.

## **23. LIABILITY INSURANCE**

### **Obligation to take out Liability Insurance**

Before commencing the execution of the Works, but without limiting his obligations and responsibility under Clause 20 hereof, the Contractor shall insure against his liability for any death, material or physical damage, loss or injury which may occur to any property, including that of the Employer or to any person, including any employee of the Employer by or arising out of the execution of the Works or in the carrying out of the Contract, other than due to the matters referred to in the proviso to Clause 22 hereof.

### **Minimum Amount of Liability Insurance**

Such insurance shall be effected with an insurer and in terms approved by the Employer, which approval shall not be unreasonably withheld, and for at least the amount specified in the contract. The Contractor shall, whenever required by the Employer or the Engineer, produce to the Engineer the policy or policies of insurance and the receipts for payment of the current premiums.

### **Provision to Indemnify Employer**

The insurance policy shall include a provision whereby, in the event of any claim in respect of which the Contractor would be entitled to receive indemnity under the policy, being brought or made against the Employer, the insurer shall indemnify the Employer against such claims and any costs, charges and expenses in respect thereof.

## **24. ACCIDENT OR INJURY TO WORKMEN**

The Employer shall not be liable for or in respect of any damages or compensation payable at law in respect or in consequence of any accident or injury to any workman or other person in the employment of the Contractor or any sub-Contractor, save and except an accident or injury resulting from any act or default of the Employer, his agents or servants. The Contractor shall indemnify, hold and save harmless the Employer against all such damages and compensation, save and except as aforesaid, and against all claims, proceedings, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

### **Insurance Against Accident, etc., to Workmen**

The Contractor shall insure against such liability with an insurer approved by the Employer, which approval shall not be unreasonably withheld, and shall continue such insurance during the whole of the time that any persons are employed by him for the Works and shall, when required, produce to the Engineer such policy of insurance and the receipt for payment of the current premium. Provided always that, in respect of any persons employed by any subcontractor, the Contractor's obligation to insure as aforesaid under this sub-clause shall be satisfied if the subcontractor shall have insured against the liability in respect of such persons in such manner

that the Employer is indemnified under the policy but the Contractor shall require such subcontractor to produce to the Engineer when required such policy of insurance and the receipt for the current premium, and obtain the insertion of a provision to that effect in its contract with the subcontractor.

## **25. REMEDY ON CONTRACTOR'S FAILURE TO INSURE**

If the Contractor shall fail to effect and keep in force any of the insurances referred to in Clauses 21, 23 and 24 hereof, or any other insurance which he may be required to effect under the terms of the Contract, the Employer may in any such case effect and keep in force any such insurance and pay such premium as may be necessary for that purpose and from time to time deduct the amount so paid by the Employer as aforesaid from any monies due or which may become due to the Contractor, or recover the same as a debt due from the Contractor.

## **26. COMPLIANCE WITH STATUTES, REGULATIONS, ETC.**

The Contractor shall give all notices and pay all fees and charges required to be given or paid by any national or State Statutes, Ordinances, Laws, Regulations or By-laws, or any local or other duly constituted authority in relation to the execution of the Works or of any Temporary Works and by the Rules and Regulations of all public bodies and companies whose property or rights are affected or may be affected in any way by the Works or any Temporary Works.

The Contractor shall conform in all respects with any such Statutes, Ordinances, Laws, Regulations, By-laws or requirements of any such local or other authority which may be applicable to the Works and shall keep the Employer indemnified against all penalties and liabilities of every kind for breach of any such Statutes, Ordinances, Laws, Regulations, By-laws or requirements.

## **27. FOSSILS, ETC.**

All fossils, coins, articles of value or antiquity and structures and other remains or things of geological or archaeological interest discovered on the Site of the Works shall as between the Employer and the Contractor be deemed to be the absolute property of the Employer and the Contractor shall take reasonable precautions to prevent his workmen or any other persons from removing or damaging any such article or thing and shall immediately upon discovery thereof and before removal acquaint the Employer of such discovery and carry out at the expense of the Employer the Engineer's orders as to the disposal of the same.

## **28. COPYRIGHT, PATENT AND OTHER PROPRIETARY RIGHTS, AND ROYALTIES**

The Contractor shall hold harmless and fully indemnify the Employer from and against all claims and proceedings for or on account of infringement of any patent rights, design trademark or name or other protected rights in respect of any Plant, equipment, machine, work or material used for or in connection with the Works or Temporary Works and from and against all claims, demands proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto, except where such infringement results from compliance with the design or Specification provided by the Engineer.

Except where otherwise specified, the Contractor shall pay all tonnage and other royalties, rent and other payments or compensation, if any, for getting stone, sand, gravel, clay or other materials required for the Works or Temporary Works.

## **29. INTERFERENCE WITH TRAFFIC AND ADJOINING PROPERTIES**

All operations necessary for the execution of the Works and for the Construction of any Temporary Works shall, so far as compliance with the requirements of the Contract permits, be carried on so as not to interfere unnecessarily or improperly with the public convenience, or the access to, use and occupation of, public or private roads and footpaths to or of properties whether in the possession of the Employer or of any other person. The Contractor shall hold harmless and indemnify the Employer in respect of all claims, demands, proceedings, damages, costs, charges and expenses whatsoever arising out of or in relation to any such matters in so far as the Contractor is responsible therefor.

## **30. EXTRAORDINARY TRAFFIC AND SPECIAL LOADS**

The Contractor shall use every reasonable means to prevent any of the roads or bridges communicating with or

on the routes to the Site from being damaged by any traffic of the Contractor or any of his sub-contractors and, in particular, shall select routes, choose and use vehicles and restrict and distribute loads so that any such extraordinary traffic as will inevitably arise from the moving of plant and material from and to the Site shall be limited as far as reasonably possible and so that no unnecessary damage may be occasioned to such roads and bridges.

Should it be found necessary for the Contractor to move any load of Constructional Plant, machinery, preconstructed units or parts of units of work, or other thing, over part of a road or bridge, the moving whereof is likely to damage any such road or bridge unless special protection or strengthening is carried out, then the Contractor shall before moving the load on to such road or bridge, save insofar as the Contract otherwise provide, be responsible for and shall pay for the cost of strengthening any such bridge or altering or improving any such road to avoid such damage, and the Contractor shall indemnify and keep the Employer indemnified against all claims for damage to any such road or bridge caused by such movement, including such claim as may be made directly against the Employer, and shall negotiate and pay all claims arising solely out of such damage.

### **31. OPPORTUNITIES FOR OTHER CONTRACTORS**

The Contractor shall in accordance with the requirements of the Engineer afford all reasonable opportunities for carrying out their work to any other contractors employed by the Employer and their workmen and to the workmen of the Employer and of any other duly constituted authorities who may be employed in the execution on or near the Site of any work not included in the Contract or of any contract which the Employer may enter into in connection with or ancillary to the Works. If work by other contractors of the Employer as above-mentioned involves the Contractor in any direct expenses as a result of using his Site facilities, the Employer shall consider payment to the Contractor of such sum or sums as may be recommended by the Engineer.

### **32. CONTRACTOR TO KEEP SITE CLEAN**

During the progress of the Works, the Contractor shall keep the Site reasonably free from all unnecessary obstruction and shall store or dispose of any Constructional Plant and surplus materials and clear away and remove from the Site any wreckage, rubbish or Temporary Works no longer required.

### **33. CLEARANCE OF SITE ON SUBSTANTIAL COMPLETION**

On the substantial completion of the Works, the Contractor shall clear away and remove from the Site all Constructional Plant surplus materials, rubbish and Temporary Works of every kind and leave the whole of the Site and Works clean and in a workmanlike condition to the satisfaction of the Engineer.

### **34. LABOUR**

#### **Engagement of Labour**

The Contractor shall make his own arrangements for the engagement of all labour local or otherwise.

#### **Supply of Water**

The Contractor shall provide on the Site to the satisfaction of the Engineer an adequate supply of drinking and other water for the use of the Contractor's staff and work people.

#### **Alcoholic Drinks or Drugs**

The Contractor shall comply with Government laws and regulations and orders in force as regards the import, sale, barter or disposal of alcoholic drinks or narcotics and he shall not allow or facilitate such importation, sale, gift, barter or disposal by his sub-contractors, agents or employees.

#### **Arms and Ammunition**

The restrictions specified in clause 34.3 above shall include all kinds of arms and ammunition.

#### **Holiday and Religious Customs**

The Contractor shall in all dealings with labour in his employ have due regard to all holiday, recognized festivals and religious or other customs.

#### **Epidemics**

In the event of any outbreak of illness of an epidemic nature the Contractor shall comply with and carry out such regulations, orders, and requirements as may be made by the Government or the local medical or sanitary authorities for the purpose of dealing with and overcoming the same.

#### **Disorderly Conduct, etc.**

The Contractor shall at all times take all reasonable precautions to prevent any unlawful riotous or disorderly



conduct by or amongst his employees and for the preservation of peace and the protection of persons and property in the neighborhood of the Works against the same.

**Observance by Sub-Contractors**

The Contractor shall be considered responsible for the observance of the above provisions by his Sub-Contractors.

**Legislation applicable to Labour**

The Contractor shall abide by all applicable legislation and regulation with regard to labour.

**35. RETURNS OF LABOUR, PLANT, ETC.**

The Contractor shall, if required by the Engineer, deliver to the Engineer at his office, a return in detail in the form and at such intervals as the Engineer may prescribe showing the supervisory staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such information respecting Constructional plant as the Engineer may require.

**36. MATERIALS, WORKMANSHIP AND TESTING**

**Materials and Workmanship**

All materials and workmanship shall be of the respective kinds described in the Contract and in accordance with the Engineer's instructions and shall be subjected from time to time to such tests as the Engineer may direct at the place of manufacture or fabrication, or on the Site or at all or any of such places. The Contractor shall provide such assistance, instruments, machines, labour and materials as are normally required for examining, measuring and testing any work and the quality, weight or quantity of any materials used and shall supply samples of materials before incorporation in the Works for testing as may be selected and required by the Engineer. All testing

equipment and instruments provided by the Contractor shall be used only by the Engineer or by the Contractor in accordance with the instructions of the Engineer.

No material not conforming with the Specifications in the Contract may be used for the Works without prior written approval of the Employer and instruction of the Engineer, provided always that if the use of such material results or may result in increasing the Contract Price, the procedure in Clause 48 shall apply.

**Cost of Samples**

All samples shall be supplied by the Contractor at his own cost unless the supply thereof is clearly intended in the Specifications or Bill of Quantities to be at the cost of the Employer. Payment will not be made for samples which do not comply with the Specifications.

**Cost of Tests**

The Contractor shall bear the costs of any of the following tests:

Those clearly intended by or provided for in the Contract Documents.

Those involving load testing or tests to ensure that the design of the whole of the Works or any part of the Works is appropriate for the purpose which it was intended to fulfill.

**37. ACCESS TO SITE**

The Employer and the Engineer and any persons authorized by either of them shall, at all times, have access to the Works and to the Site and to all workshops and places where work is being prepared or whence materials, manufactured articles or machinery are being obtained for the Works and the Contractor shall afford every facility for and every assistance in or in obtaining the right to such access.

**38. EXAMINATION OF WORK BEFORE COVERING UP**

No work shall be covered up or put out of view without the approval of the Engineer and the Contractor shall afford full opportunity for the Engineer to examine and measure any work which is about to be covered up or put out of view and to examine foundations before permanent work is placed thereon. The Contractor shall give due notice to the Engineer whenever any such work or foundations is or are ready or about to be ready for examination and the Engineer shall without unreasonable delay unless he considers it unnecessary and advises the Contractor accordingly attend for the purpose of examining and measuring such work or of examining such foundations.



### **39. REMOVAL OF IMPROPER WORK AND MATERIALS**

#### **Engineer's power to order removal**

The Engineer shall during the progress of the Works have power to order in writing from time to time, and the Contractor shall execute at his cost and expense, the following operations:

The removal from the Site within such time or times as may be specified in the order of any materials which in the opinion of the Engineer are not in accordance with the Contract;

The substitution of proper and suitable materials; and

The removal and proper re-execution (notwithstanding any previous test thereof or interim payment therefore) of any work which in respect of materials or workmanship is not in the opinion of the Engineer in accordance with the Contract.

#### **Default of Contractor in carrying out Engineer's Instructions**

In case of default on the part of the Contractor in carrying out an instruction of the Engineer, the Employer shall be entitled to employ and pay other persons to carry out the same and all expenses consequent thereon or incidental thereto shall be borne by the Contractor and shall be recoverable from him by the Employer and may be deducted by the Employer from any monies due or which may become due to the Contractor.

### **40. SUSPENSION OF WORK**

The Contractor shall on the written order of the Engineer suspend the progress of the Works or any part thereof for such time or times and in such manner as the Engineer may consider necessary and shall, during such suspension, properly protect and secure the Works so far as it is necessary in the opinion of the Engineer. The Employer should be notified and his written approval should be sought for any suspension of work in excess of three (3) days.

### **41. POSSESSION OF SITE**

#### **Access to Site**

The Employer shall with the Engineer's written order to commence the Works, give to the Contractor possession of so much of the Site as may be required to enable the Contractor to commence and proceed with the construction of the Works in accordance with the Programme referred to in Clause 13 hereof and otherwise in accordance with such reasonable proposals of the Contractor as he shall make to the Engineer by notice in writing, and shall from time to time as the Works proceed give to the Contractor possession of such further portions of the Site as may be required to enable the Contractor to proceed with the construction of the Works with due dispatch in accordance with the said Programme or proposals, as the case may be.

#### **Wayleaves, etc.**

The Contractor shall bear all expenses and charges for special temporary wayleaves required by him in connection with access to the Site. The Contractor shall also provide at his own cost any additional accommodation outside the Site required by him for the purpose of the Works.

#### **Limits of the Site**

Except as defined below, the limits of the Site shall be as defined in the Contract. Should the Contractor require land beyond the Site, he shall provide it entirely at his own expense and before taking possession shall supply the Engineer with a copy of the necessary permits. Access to the Site is available where the Site adjoins a public road but it is not provided unless shown on the Drawings. When necessary for the safety and convenience of workmen, public or livestock or for the protection of the Works, the Contractor shall, at his own expense, provide adequate temporary fencing to the whole or part of the Site. The Contractor shall not disturb, damage or pull down any hedge, tree or building within the Site without the written consent of the Engineer.

### **42. TIME FOR COMPLETION**

Subject to any requirement in the Contract as to completion of any section of the Works before completion of the whole, the whole of the Works shall be completed, in accordance with the provisions of Clause 46 and 47 hereof, within the time stated in the Contract.

The completion time includes weekly rest days, official holidays, and days of inclement weather.

### **43. EXTENSION OF TIME FOR COMPLETION**

If, subject to the provisions of the Contract, the Engineer orders alterations or additions in the Works in

accordance with Clause 48 hereof, or if circumstances constituting force majeure as defined in the Contract have occurred, the Contractor shall be entitled to apply for an extension of the time for completion of the Works specified in the Contract. The Employer shall, upon such application, determine the period of any such extension of time; provided that in the case of alterations or additions in the Works, the application for such an extension must be made before the alterations or additions in the Works are undertaken by the Contractor.

#### **44. RATE OF PROGRESS**

The whole of the materials, plant and labour to be provided by the Contractor and the mode, manner and speed of execution and completion of the Works are to be of a kind and conducted in a manner to the satisfaction of the Engineer. Should the rate of progress of the Works or any part thereof be at any time in the opinion of the Engineer too slow to ensure the completion of the Works by the prescribed time or extended time for completion, the Engineer shall so notify the Contractor in writing and the Contractor shall thereupon take such steps as the Contractor may think necessary and the Engineer may approve to expedite progress so as to complete the Works by the prescribed time or extended time for completion. If the work is not being carried on by day and by night and the Contractor shall request permission to work by night as well as by day, then, if the Engineer shall grant such permission, the Contractor shall not be entitled to any additional payment. All work at night shall be carried out without unreasonable noise and disturbance. The contractor shall indemnify the Employer from and against any claims or liability for damages on account of noise or other disturbance created while or in carrying out the work and from and against all claims, demands, proceedings, costs and expenses whatsoever in regard or in relation to such noise or other disturbance. The Contractor shall submit in triplicate to the Engineer at the end of each month signed copies of explanatory Drawings or any other material showing the progress of the Works.

#### **45. LIQUIDATED DAMAGES FOR DELAY**

If the Contractor shall fail to complete the Works within the time for completion prescribed in the Contract, or any extended time for completion in accordance with the Contract, then the Contractor shall pay to the Employer the sum specified in the Contract as liquidated damages, for the delay between the time prescribed in the Contract or the extended time for completion, as the case may be, and the date of substantial completion of the Works as stated in the Certificate of Substantial Completion, subject to the applicable limit stated in the Contract. The said sum shall be payable by the sole fact of the delay without the need for any previous notice or any legal proceedings, or proof of damage, which shall in all cases be considered as ascertained. The Employer may, without prejudice to any other method of recovery, deduct the amount of such liquidated damages from any monies in its hands due or which may become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from his obligation to complete the Works or from any other of his obligations and liabilities under the Contract.

If, before the time for completion of the whole of the Works or of a Section of the Works, a Certificate of Substantial Completion has been issued for any part or Section of the Works, the liquidated damages for delay in completion of the remainder of the Works or of that Section may, for any period of delay after the date stated in such Certificate of Substantial Completion, and in the absence of alternative provisions in the Contract, be reduced in the proportion which the value of the part or Section so certified bears to the total value of the whole of the Works or Section, as applicable. The provisions of this Sub-Clause shall only apply to the rate of liquidated damages and shall not affect the limit thereof.

#### **46. CERTIFICATE OF SUBSTANTIAL COMPLETION**

##### **Substantial Completion of the Works**

When the whole of the Works have been substantially completed and have satisfactorily passed any test on completion prescribed by the Contract, the Contractor may give a notice to that effect to the Engineer accompanied by an undertaking to finish any outstanding work during the Defects Liability Period. Such notice and undertaking shall be in writing and shall be deemed to be a request by the Contractor, for the Engineer to issue a Certificate of Substantial Completion in respect of the Works. The Engineer shall, within twenty-one (21) days of the date of delivery of such notice either issue to the Contractor, with a copy to the Employer, a Certificate of Substantial Completion stating the date on which, in his opinion, the Works were substantially completed in accordance with the Contract or give instructions in writing to the Contractor specifying all the work which, in the Engineer's opinion, requires to be done by the Contractor before the issuance of such Certificate. The Engineer shall also notify the Contractor of any defects in the Works affecting substantial

completion that may appear after such instructions and before completion of the work specified therein. The Contractor shall be entitled to receive such Certificate of Substantial Completion within twenty-one (21) days of completion, to the satisfaction of the Engineer, of the work so specified and making good any defect so notified. Upon issuance of the Certificate of Substantial Completion of the Works, the Contractor shall be deemed to have

undertaken to complete with due expedition any outstanding work during the Defects Liability Period.

#### **Substantial Completion of Sections or Parts of the Works**

In accordance with the procedure in Sub-Clause (1) of this Clause and on the same conditions as provided therein, the Contractor may request the Engineer to issue, and the Engineer may issue, a Certificate of Substantial Completion in respect of any Section or part of the Works which has been substantially completed and has satisfactorily passed any tests on completion prescribed by the Contract, if:

a separate time for completion is provided in the Contract in respect of such Section or part of the Works;

such Section or part of the Works has been completed to the satisfaction of the Engineer and is required by the Employer for his occupation or use.

Upon the issuance of such Certificate, the Contractor shall be deemed to have undertaken to complete any outstanding work during the Defects Liability Period.

### **47. DEFECTS LIABILITY**

#### **Defects Liability Period**

The expression "Defects Liability Period" shall mean the period of twelve (12) months, calculated from the date of completion of the Works stated in the Certificate of Substantial Completion issued by the Engineer or, in respect of any Section or part of the Works for which a separate Certificate of Substantial Completion has been issued, from the date of completion of that Section or part as stated in the relevant Certificate. The expression "the Works" shall, in respect of the Defects Liability Period, be construed accordingly.

#### **Completion of Outstanding Work and Remedying of Defects**

During the Defects Liability Period, the Contractor shall finish the work, if any, outstanding at the date of the Certificate of Substantial Completion, and shall execute all such work of repair, amendment, reconstruction, rectification and making good defects, imperfections, shrinkages or other faults as may be required of the Contractor in writing by the Engineer during the Defects Liability Period and within fourteen (14) days after its expiration, as a result of an inspection made by or on behalf of the Engineer prior to expiration of the Defects Liability Period.

#### **Cost of Execution of Work of Repair, etc.**

All such outstanding work shall be carried out by the Contractor at his own expense if the necessity thereof shall, in the opinion of the Engineer, be due to the use of material or workmanship not in accordance with the Contract, or to neglect or failure on the part of the Contractor to comply with any obligation expressed or implied, on the Contractor's part under the Contract.

#### **Remedy on Contractor's Failure to Carry Out Work Required**

If the Contractor shall fail to do any such work outstanding on the Works, the Employer shall be entitled to employ and pay other persons to carry out the same, and all expenses consequent thereon or incidental thereto shall be recoverable from the Contractor by the Employer, and may be deducted by the Employer from any monies due or which may become due to the Contractor.

#### **Certificate of Final Completion**

Upon satisfactory completion of the work outstanding on the Works, the Engineer shall within twenty eight (28) days of the expiration of the Defects Liability period issue a Certificate of Final Completion to the Contractor. The Contract shall be deemed to be completed upon issuance of such Certificate, provided that the provisions of the Contract which remain unperformed and the Settlement of Disputes provision in the Contract shall remain in force for as long as is necessary to dispose of any outstanding matters or issues between the Parties.

### **48. ALTERATIONS, ADDITIONS AND OMISSIONS**

#### **Variations**

The Engineer may within his powers introduce any variations to the form, type or quality of the Works or any part thereof which he considers necessary and for that purpose or if for any other reasons it shall, in his opinion be desirable, he shall have power to order the Contractor to do and the Contractor shall do any of the following:

increase or decrease the quantity of any work under the Contract;

omit any such work;

change the character or quality or kind of any such work;

change the levels, lines, positions and dimensions of any part of the Works;  
execute additional work of any kind necessary for the completion of the Works, and no such variation shall in any way vitiate or invalidate the Contract.

**Variations Increasing Cost of Contract or altering the Works.**

The Engineer shall, however, obtain the written approval of the Employer before giving any order for any variations which may result in an increase of the Contract Price or in an essential alteration of the quantity, quality or character of the Works.

Orders for Variations to be in Writing No variations shall be made by the Contractor without an order in writing from the Engineer. Variations requiring the written approval of the Employer under paragraph (2) of this Clause shall be made by the Contractor only upon written order from the Engineer accompanied by a copy of the Employer's approval. Provided that, subject to the provisions of the Contract, no order in writing shall be required for any increase or decrease in the quantity of any work where such increase or decrease is not the result of an order given under this Clause but is the result of the quantities exceeding or being less than those stated in the Bill of Quantities.

**Valuation of Variations**

The Engineer shall estimate to the Employer the amount to be added or deducted from the Contract Price in respect of any variation, addition or omission. In the case of any variation, addition or omission which may result in an increase of the Contract Price, the Engineer shall communicate such estimate to the Employer together with his request for the Employer's written approval of such variation, addition or omission. The value of any variation, addition or omission shall be calculated on the basis of the unit prices contained in the Bill of Quantities.

## **49. PLANT, TEMPORARY WORKS AND MATERIALS**

**Plant, etc., Exclusive Use for the Works**

All Constructional Plant, Temporary Works and Materials provided by the Contractor shall, when brought on the Site, be deemed to be exclusively intended for the construction and completion of the Works and the Contractor shall not remove the same or any part thereof (save for the purpose of moving it from one part of the Site to another) without the consent in writing of the Engineer which shall not be unreasonably withheld.

**Removal of Plant, etc.**

Upon completion of the Works the Contractor shall remove from the Site all the said Constructional Plant and Temporary Works remaining thereon and any unused materials provided by the Contractor.

**Employer not liable for Damage to Plant**

The Employer shall not be at any time liable for the loss of any of the said Constructional plant, Temporary Works or Materials save if such loss results from the act or neglect of the Employer, its employees or agents.

**Ownership of paid material and work**

All material and work covered by payments made by the Employer to the Contractor shall thereupon become the sole property of the Employer, but this provision shall not be construed as relieving the Contractor from the sole responsibility for all material and work upon which payments have been made or the restoration of any damaged work or as waiving the right of the Employer to require the fulfillment of all of the terms of the Contract.

**Equipment and supplies furnished by Employer**

Title to any equipment and supplies which may be furnished by the Employer shall rest with the Employer and any such equipment and supplies shall be returned to the Employer at the conclusion of the Contract or when no longer needed by the Contractor. Such equipment when returned to the Employer, shall be in the same condition as when delivered to the Contractor, subject to normal wear and tear.

## **50. APPROVAL OF MATERIALS ETC., NOT IMPLIED**

The operation of Clause 49 hereof shall not be deemed to imply any approval by the Engineer of the materials or other matters referred to therein nor shall it prevent the rejection of any such materials at any time by the Engineer.

## **51. MEASUREMENT OF WORKS**

The Engineer shall, when he requires any part or parts of the Works to be measured, give notice to the Contractor or the Contractor's authorized agent or representative who shall forthwith attend or send a qualified agent to assist the Engineer in making such measurement and shall furnish all particulars required by either of them. Should the Contractor not attend or neglect or omit to send such agent, then the measurement made by the Engineer or approved by him shall be taken to be the correct measurement of the work. The purpose of measuring is to ascertain the volume of work executed by the Contractor and therefore determine the amount of the monthly payments.

## **52. LIABILITY OF THE PARTIES**

The Works shall not be considered as completed until a Certificate of Final Completion shall have been signed by the Engineer and delivered to the Employer stating that the Works have been completed and that the Contractor has fulfilled all his obligations under Clause 47 to his satisfaction.

The Employer shall not be liable to the Contractor for any matter arising out of or in connection with the Contract or the execution of the Works unless the Contractor shall have made a claim in writing in respect thereof before the giving of the Certificate of Final Completion and in accordance with the Contract.

### **Unfulfilled Obligations**

Notwithstanding the issue of the Certificate of Final Completion, the Contractor shall remain liable for the fulfillment of any obligation incurred under the provisions of the Contract prior to the issuance of the Certificate of Final Completion and which remains unperformed at the time such Certificate is issued. For the purpose of determining the nature and extent of any such obligation the Contract shall be deemed to remain in force between the parties hereto.

### **Contractor Responsible**

Notwithstanding any other provisions in the Contract documents, the Contractor shall be totally responsible for and shall bear any and all risks of loss or damage to or failure of the Works or any part thereof for a period of ten years after issuance of the Certificate of Final Completion, provided always that such risks, damage or failure result from acts, defaults and negligence of the Contractor, his agents, employees or workmen and such contractors.

## **53. AUTHORITIES**

The Employer shall have the right to enter upon the Site and expel the Contractor therefrom without thereby voiding the Contract or releasing the Contractor from any of his obligations or liabilities under the Contract or affecting the rights and powers conferred on the Employer and the Engineer by the Contract in any of the following cases:

If the Contractor is declared bankrupt or claims bankruptcy or court protection against his creditors or if the Contractor is a company or member of a company which was dissolved by legal action;

If the Contractor makes arrangements with his creditors or agrees to carry out the Contract under an inspection committee of his creditors;

If the Contractor withdraws from the Works or assigns the Contract to others in whole or in part without the Employer's prior written approval;

If the Contractor fails to commence the Works or shows insufficient progress to the extent which in the opinion of the Engineer will not enable him to meet the target completion date of the Works;

If the Contractor suspends the progress of the Works without due cause for fifteen (15) days after receiving from the Engineer written notice to proceed;

If the Contractor fails to comply with any of the Contract conditions or fails to fulfill his obligations and does not remedy the cause of his failure within fifteen (15) days after being notified to do so in writing;

If the Contractor is not executing the work in accordance with standards of workmanship specified in the Contract;

If the Contractor gives or promises to give a present or loan or reward to any employee of the Employer or of the Engineer.

Then the Employer may himself complete the Works or may employ any other contractor to complete the Works and the Employer or such other contractor may use for such completion so much of Constructional Plant, Temporary Works and Materials, which have been deemed to be reserved exclusively for the construction and completion of the Works under the provision of the Contract as he or they may think proper and the Employer may at any time sell any of the said Constructional Plant, Temporary Works and unused materials and apply the proceeds of sale in or towards the satisfaction of any sums due or which may become due to him from the



Contractor under the Contract.

#### **Evaluation after Re-entry**

The Engineer shall as soon as may be practicable after any such entry and expulsion by the Employer notify the Contractor to attend the necessary evaluation of the Works. In the event that for any reason the Contractor does not attend such evaluation the Engineer shall undertake the said evaluation in the absence of the Contractor and shall issue a certificate stating the sum, if any, due to the Contractor for work done in accordance with the Contract up to the time of entry and expulsion by the Employer which has been reasonably accumulated to the Contractor in respect of the Works he has executed in such case in accordance with the Contract. The Engineer shall indicate the value of the materials whether unused or partially used and the value of construction equipment and any part of the Temporary Works.

#### **Payment After Re-entry**

If the Employer shall enter and expel the Contractor under this Clause he shall not be liable to pay the Contractor any money on account of the Contract until the expiration of the Defects Liability Period, and thereafter until the costs of completion and making good any defects of the Works, damages for delay in completion (if any), and all other expenses incurred by the Employer have been ascertained and their amount certified by the Engineer. The Contractor shall then be entitled to receive only such sum or sums (if any) as the Engineer may certify would have been due to him upon due completion by him after deducting the said amount. But if such amount shall exceed the sum which would have been payable to the Contractor on due completion by him, then the Contractor shall upon demand pay to the Employer the amount of such excess. The Employer in such case may recover this amount from any money due to the Contractor from the Employer without the need to resort to legal procedures.

#### **54. URGENT REPAIRS**

If by reason of any accident or failure or other event occurring to, in or in connection with the Works or any part thereof either during the execution of the Works or during the Defects Liability Period any remedial or other work or repair shall in the opinion of the Engineer be urgently necessary for security and the Contractor is unable or unwilling at once to do such work or repair, the Employer may by his own or other workmen do such work or repair as the Engineer may consider necessary. If the work or repair so done by the Employer is work which in the opinion of the Engineer the Contractor was liable to do at his own expense under the Contract, all costs and charges properly incurred by the Employer in so doing shall on demand be paid by the Contractor to the Employer or may be deducted by the Employer from any monies due or which may become due to the Contractor provided always that the Engineer shall as soon after the occurrence of any such emergency as may be reasonably practicable notify the Contractor thereof in writing.

#### **55. INCREASE AND DECREASE OF COSTS**

Except if otherwise provided by the Contract, no adjustment of the Contract Price shall be made in respect of fluctuations of market, prices of labour, materials, plant or equipment, neither due to fluctuation in interest rates nor devaluation or any other matters affecting the Works.

#### **56. TAXATION**

The Contractor shall be responsible for the payment of all charges and taxes in respect of income including value added tax, all in accordance with and subject to the provisions of the income tax laws and regulations in force and all amendments thereto. It is the Contractor's responsibility to make all the necessary inquiries in this respect and he shall be deemed to have satisfied himself regarding the application of all relevant tax laws.

#### **57. BLASTING**

The Contractor shall not use any explosives without the written permission of the Engineer who shall require that the Contractor has complied in full with the regulations in force regarding the use of explosives. However, the Contractor, before applying to obtain these explosives, has to provide well arranged storage facilities. The Engineer's approval or refusal to permit the use of explosives shall not constitute ground for claims by the Contractor.

#### **58. MACHINERY**



The Contractor shall be responsible for coordinating the manufacture, delivery, erection and commissioning of plant machinery and equipment which are to form a part of the Works. He shall place all necessary orders as soon as possible after the signing of the Contract. These orders and their acceptance shall be produced to the Engineer on request. The Contractor shall also be responsible for ensuring that all sub-contractors adhere to such programs as are agreed and are needed to ensure completion of the Works within the period for completion. Should any subcontracted works be delayed, the Contractor shall initiate the necessary action to speed up such completion. This shall not prejudice the Employer's right to exercise his remedies for delay in accordance with the Contract.

#### **59. TEMPORARY WORKS AND REINSTATEMENT**

The Contractor shall provide and maintain all temporary roads and tracks necessary for movement of plant and materials and clear same away at completion and make good all works damaged or disturbed. The Contractor shall submit drawings and full particulars of all Temporary Works to the Engineer before commencing same. The Engineer may require modifications to be made if he considers them to be insufficient and the Contractor shall give effect to such modifications but shall not be relieved of his responsibilities. The Contractor shall provide and maintain weatherproof sheds for storage of material pertinent to the Works both for his own use and for the use of the Employer and clear same away at the completion of the Works. The Contractor shall divert as required, at his own cost and subject to the approval of the Engineer, all public utilities encountered during the progress of the Works, except those specially indicated on the drawings as being included in the Contract. Where diversions of services are not required in connection with the Works, the Contractor shall uphold, maintain and keep the same in working order in existing locations. The Contractor shall make good, at his own expense, all damage to telephone, telegraph and electric cable or wires, sewers, water or other pipes and other services, except where the Public Authority or Private Party owning or responsible for the same elects to make good the damage. The costs incurred in so doing shall be paid by the Contractor to the Public Authority or Private Party on demand.

#### **60. PHOTOGRAPHS AND ADVERTISING**

The Contractor shall not publish any photographs of the Works or allow the Works to be used in any form of advertising whatsoever without the prior approval in writing from the Employer.

#### **61. PREVENTION OF CORRUPTION**

The Employer shall be entitled to cancel the Contract and to recover from the Contractor the amount of any loss resulting from such cancellation, if the Contractor has offered or given any person any gift or consideration of any kind as an inducement or reward for doing or intending to do any action in relation to the obtaining or the execution of the Contract or any other contract with the Employer or for showing or intending to show favour or disfavour to any person in relation to the Contract or any other contract with the Employer, if the like acts shall have been done by any persons employed by him or acting on his behalf whether with or without the knowledge of the Contractor in relation to this or any other Contract with the Employer.

#### **62. DATE FALLING ON HOLIDAY**

Where under the terms of the Contract any act is to be done or any period is to expire upon a certain day and that day or that period fall on a day of rest or recognized holiday, the Contract shall have effect as if the act were to be done or the period to expire upon the working day following such day.

#### **63 NOTICES**

Unless otherwise expressly specified, any notice, consent, approval, certificate or determination by any person for which provision is made in the Contract Documents shall be in writing. Any such notice, consent, approval, certificate or determination to be given or made by the Employer, the Contractor or the Engineer shall not be unreasonably withheld or delayed.

Any notice, certificate or instruction to be given to the Contractor by the Engineer or the Employer under the terms of the Contract shall be sent by post, cable, telex or facsimile at the Contractor's principal place of business specified in the Contract or such other address as the Contractor shall nominate in writing for that

purpose, or by delivering the same at the said address against an authorized signature certifying the receipt. Any notice to be given to the Employer under the terms of the Contract shall be sent by post, cable, telex or facsimile at the Employer's address specified in the Contract, or by delivering the same at the said address against an authorized signature certifying the receipt. Any notice to be given to the Engineer under the terms of this Contract shall be sent by post, cable, telex or facsimile at the Engineer's address specified in the Contract, or by delivering the same at the said address against an authorized signature certifying the receipt.

#### **64. LANGUAGE, WEIGHTS AND MEASURES**

Except as may be otherwise specified in the Contract, English shall be used by the Contractor in all written communications to the Employer or the Engineer with respect to the services to be rendered and with respect to all documents procured or prepared by the Contractor pertaining to the Works. The metric system of weights and measures shall be used in all instances.

#### **65. RECORDS, ACCOUNTS, INFORMATION AND AUDIT**

The Contractor shall maintain accurate and systematic records and accounts in respect of the work performed under this Contract.

The Contractor shall furnish, compile or make available at all times to the UNDP any records or information, oral or written, which the UNDP may reasonably request in respect of the Works or the Contractor's performance thereof.

The Contractor shall allow the UNDP or its authorized agents to inspect and audit such records or information upon reasonable notice.

#### **66. FORCE MAJEURE**

Force majeure as used herein means Acts of God, war (whether declared or not), invasion, revolution, insurrection or other acts or events of a similar nature or force.

In the event of and as soon as possible after the occurrence of any cause constituting force majeure, the Contractor shall give notice and full particulars in writing to the UNDP and to the Engineer of such force majeure if the Contractor is thereby rendered unable, wholly or in part, to perform its obligations and meet its responsibilities under this Contract. Subject to acceptance by the UNDP of the existence of such force majeure, which acceptance shall not be unreasonably withheld, the following provisions shall apply:

The obligations and responsibilities of the Contractor under this Contract shall be suspended to the extent of his inability to perform them and for as long as such inability continues. During such suspension and in respect of work suspended, the Contractor shall be reimbursed by the UNDP substantiated costs of maintenance of the Contractor's equipment and of per diem of the Contractor's permanent personnel rendered idle by such suspension;

The Contractor shall within fifteen (15) days of the notice to the UNDP of the occurrence of the force majeure submit a statement to the UNDP of estimated costs referred to in sub-paragraph (a) above during the period of suspension followed by a complete statement of actual expenditures within thirty (30) days after the end of the suspension;

The term of this Contract shall be extended for a period equal to the period of suspension taking however into account any special condition which may cause the additional time for completion of the Works to be different from the period of suspension;

If the Contractor is rendered permanently unable, wholly or in part, by reason of force majeure, to perform his obligations and meet his responsibilities under the Contract, the UNDP shall have the right to terminate the Contract on the same terms and conditions as provided for in Clause 68 of these General Conditions, except that the period of notice shall be seven (7) days instead of fourteen (14) days, and

For the purpose of the preceding sub-paragraph, the UNDP may consider the Contractor permanently unable to perform in case of any suspension period of more than ninety (90) days.

#### **67. SUSPENSION BY THE UNDP**

The UNDP may by written notice to the Contractor suspend for a specified period, in whole or in part, payments to the Contractor and/or the Contractor's obligation to continue to perform the Works under this Contract, if in the UNDP' sole discretion:

any conditions arise which interfere, or threaten to interfere with the successful execution of the Works or the accomplishment of the purpose thereof, or the Contractor shall have failed, in whole or in part, to perform any of the terms and conditions of this Contract. After suspension under sub-paragraph (a) above, the Contractor shall be entitled to reimbursement by the UNDP of such costs as shall have been duly incurred in accordance with this Contract prior to the commencement of the period of such suspension.

The term of this Contract may be extended by the UNDP for a period equal to any period of suspension, taking into account any special conditions which may cause the additional time for completion of the Works to be different from the period of suspension.

## **68. TERMINATION BY THE UNDP**

The UNDP may, notwithstanding any suspension under Clause 67 above, terminate this Contract for cause or convenience in the interest of the UNDP upon not less than fourteen (14) days written notice to the Contractor.

Upon termination of this Contract:

The Contractor shall take immediate steps to terminate his performance of the Contract in a prompt and orderly manner and to reduce losses and to keep further expenditures to a minimum, and

The Contractor shall be entitled (unless such termination has been occasioned by the Contractor's breach of this Contract), to be paid for the part of the Works satisfactorily completed and for the materials and equipment properly delivered to the Site as of the date of termination for incorporation to the Works, plus substantiated costs resulting from commitments entered into prior to the date of termination as well as any reasonable substantiated direct costs incurred by the Contractor as a result of the termination, but shall not be entitled to receive any other or further payment or damages.

## **69. TERMINATION BY THE CONTRACTOR**

In the case of any alleged breach by the UNDP of the Contract or in any other situation which the Contractor reasonably considers to entitle him to terminate his performance of the Contract, the Contractor shall promptly give written notice to the UNDP detailing the nature and the circumstances of the breach or other situation. Upon acknowledgement in writing by the UNDP of the existence of such breach and the UNDP' inability to remedy it, or upon failure of the UNDP to respond to such notice within twenty (20) days of receipt thereof, the Contractor shall be entitled to terminate this Contract by giving 30 days written notice thereof. In the event of disagreement between the Parties as to the existence of such breach or other situation referred to above, the matter shall be resolved in accordance with Clause 71 of these General Conditions.

Upon termination of this Contract under this Clause the provisions of sub-paragraph (b) of Clause 68 hereof shall apply.

## **70. RIGHTS AND REMEDIES OF THE UNDP**

Nothing in or relating to this Contract shall be deemed to prejudice or constitute a waiver of any other rights or remedies of the UNDP.

The UNDP shall not be liable for any consequences of, or claim based upon, any act or omission on the part of the Government.

## **71. SETTLEMENT OF DISPUTES**

In the case of any claim, controversy or dispute arising out of, or in connection with this Contract or any breach thereof, the following procedure for resolution of such claim, controversy or dispute shall apply.

### **Notification**

The aggrieved party shall immediately notify the other party in writing of the nature of the alleged claim, controversy or dispute, not later than seven (7) days from awareness of the existence thereof.

### **Consultation**

On receipt of the notification provided above, the representatives of the Parties shall start consultations with a view to reaching an amicable resolution of the claim, controversy or dispute without causing interruption of the Works.

### **Conciliation**

Where the representatives of the Parties are unable to reach such an amicable settlement, either party may

request the submission of the matter to conciliation in accordance with the UNCITRAL Rules of Conciliation then obtaining.

**Arbitration**

Any claim, controversy or dispute which is not settled as provided under clauses 71.1 through 3 above shall be referred to arbitration in accordance with the UNCITRAL Arbitration Rules then obtaining. The Parties shall be bound by the arbitration award rendered in accordance with such arbitration as the final adjudication of any such controversy or claim.

**72. PRIVILEGES AND IMMUNITIES**

Nothing in or relating to this Contract shall be deemed a waiver of any of the privileges and immunities of the United Nations of which the UNDP is an integral part.

**Annex IV**

**Special Conditions**

The following Special Conditions shall complement, supplement, or amend the General Conditions. Whenever there is a conflict, the provisions herein shall prevail over those in the General Conditions.

<b>Warranty/Guarantee</b>	
X Applies	If, within 12 months after the completion of the construction works, any defects are discovered or arise in normal course of usage, the Contractor shall remedy the them either by replacement or by repair.
<b>Liquidated damages</b>	
X Applies	If the Contractor fails to provide the specified works within the time period(s) stipulated by the Contract, the Employer shall, without prejudice to its other remedies under the contract, deduct from the Contract price, as liquidated damages, a sum equivalent to 2 percent of the delivered price of the delayed works for each week of delay until actual delivery, up to a maximum deduction of 10 percent of the delayed works Contract price. Once the maximum is reached, the Employer may consider termination of the Contract.
<b>Performance security</b>	
X Applies	10% of Contract value
<b>Advance payment</b>	
X Applies	The Contractor is entitle to advance payment of 10% of Contract value to be made upon signature of the contract by both parties contingent upon receipt and acceptance by UNDP of a bank guarantee for the full amount of the advance payment issued by a Bank and in a form acceptable to UNDP. The amounts of the advance payments shall be subject to a deduction of 10% of the amount accepted for payment until the cumulative amount of the deductions so effected shall equal the amount of the advance payment.
<b>Contractor may submit invoices for materials</b>	
X Applies	The Contractor may submit invoices for materials and plant stored at the Site, provided they are necessary and adequate for the performance of the Works and they are protected from weather conditions and duly insured.
<b>The liability insurance</b>	
X Applies	The liability insurance referred to in Clause 23 of the General Conditions shall be taken out by the Contractor for an amount of 1.5 times the Contract amount. Site insurance: shall be taken out by the Contractor for an amount of the Contract value.

**Annex V**

**SCOPE OF WORK**

## 1. INTRODUCTION

UNDP in partnership with the Local Authorities in Resen, the Government, civil society and local stakeholders over the past decade implemented a number of comprehensive activities under the Golema Reka Programme, which are complementary to the trans-boundary project on Integrated Ecosystem Management in the Prespa Lakes Basin of Albania, Macedonia and Greece thus contributing to gradual improvement of the environmental status of the Golema Reka River and all natural resources of the Prespa Lake watershed.

A number of activities were focused on measures to mitigate the negative impact of the human activities in the watershed as a result of intensive agriculture activities in the region. As a continuation of these activities a new “Pilot Project for Biodegradable Waste Management in Prespa Region“ was introduced in 2011. It concerns the management of extraordinary amount of biodegradable waste that is generated from the apple orchards, illegally disposed/dumped in the selected area of the Prespa watershed region (the town of Resen and its surrounding). The proposed management system offers practical solution for (i) collection and transport of biodegradable wastes and (ii) suitable technologies for waste treatment/recycling, by which end-products with commercial value will be generated.

The project concerns construction of a Pilot Central Composting Plant - open windrow method with a designed production capacity of compost of up to 1,600 m<sup>3</sup> a year and four (4) intermediate collecting centers. It is developed in a manner that it represents a complete and viable management solution for treatment of the BW generated in the area of the town of Resen and village of Jankovec. Once established, it would verify the implementability and viability of the full-size management solution for BW for the entire region of Prespa. The Pilot project is intended to serve as a pilot activity at national level (other areas face similar problems).

Main/Implementation Design for Construction of a Pilot Composting Plant and Four Intermediate Collection Stations had been developed in accordance with the applicable Law on Construction in the country.

## 2. Technical Concept of the Pilot Composting Plant

### • Biodegradable waste generation and inflow

Of all available biodegradable wastes analyzed in the Feasibility Study, the following waste types will be collected and processed in the pilot composting plant: waste apples, crop residues, sewage sludge and wood residues (see Table below).

The maximum annual volume of biodegradable waste that can be processed into compost with the pilot plant equals 1,600 m<sup>3</sup>, assumed to be fully reached in year 5 from commencement of the composting operations.

The wastes used for production of compost are: waste apples with volume of 760 to 950 t/year (roughly 60% of the total bio waste volume), followed by wood residues 280 to 350 t/year (22% of the total) and sewage sludge with volume of 200 t/year (roughly 15% of the total).



<b>BW Inflow/Year</b>	<b>Unit</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Waste Apples (Max)	t/year	950	950	950	950	950
% of inflow	%	80%	85%	90%	95%	100%
Waste Apple Volume	t/year	760	808	855	903	950
Crop Residues (Max)	t/year	100	100	100	100	100
% of inflow	%	65%	70%	75%	90%	100%
Crop Residue Volume	t/year	65	70	75	90	100
Poultry and livestock manure (Max)	t/year	300	300	300	300	300
% of inflow	%	0%	0%	0%	0%	0%
Livestock Volume	t/year	0	0	0	0	0
Industry BW Waste (Max)	t/year	250	250	250	250	250
% of inflow	%	0%	0%	0%	0%	0%
Industry BW Volume	t/year	0	0	0	0	0
Sewage sludge	t/year	200	200	200	200	200
% of inflow	%	100%	100%	100%	100%	100%
Sewage sludge Volume	t/year	200	200	200	200	200
Wood residues (Max)	t/year	350	350	350	350	350
% of inflow	%	80%	85%	90%	95%	100%
Wood residues Volume	t/year	280	298	315	333	350
<b>Total BW Inflow</b>	<b>t/year</b>	<b>1,305</b>	<b>1,375</b>	<b>1,445</b>	<b>1,525</b>	<b>1,600</b>
<i>Annual increase</i>	%		105%	105%	106%	105%

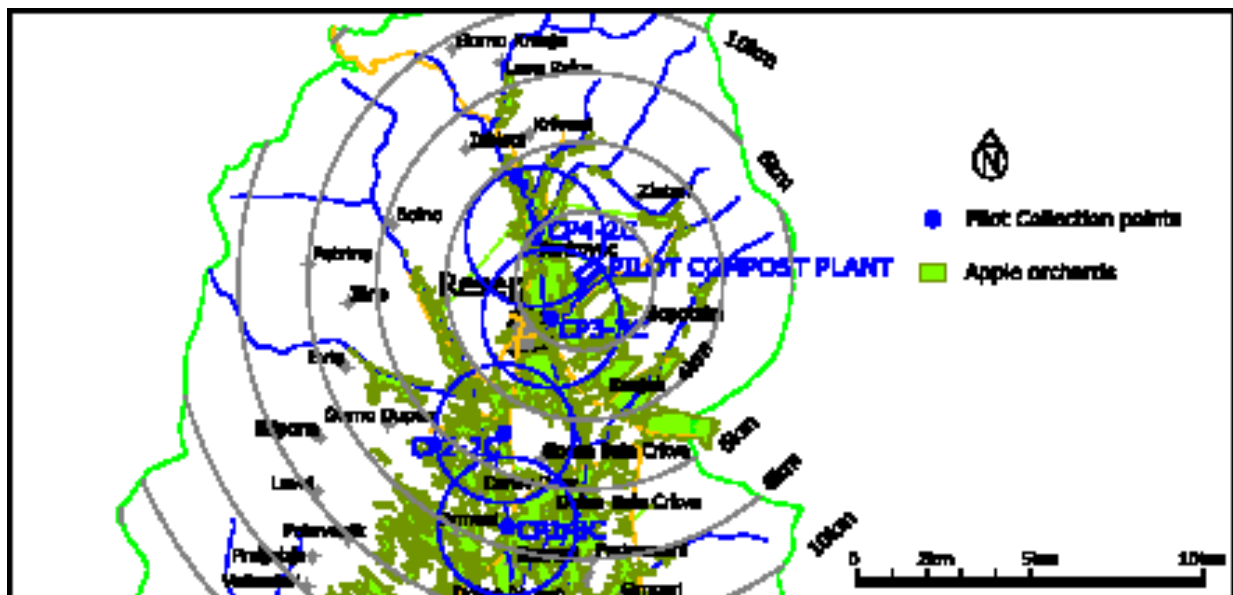
It should be noted that, although waste apples make the most important organic material for the composting process, the use of other organic materials is determined by the adopted treatment process itself (in open windrows, as described below). Namely, 35%-40% – as a minimum – of other (than waste apples) input material must be used to enable proper structure of the windrows so that an aerobic treatment is secured. Hence, the need for adding wood waste, crop residues and sewage sludge in the process.

- **Waste collection and transport: process flow**

In order to come with an optimal solution for collection of waste apples and other types of organic waste, detailed analyses were made related to the disposition of apple orchards within the pilot project area, i.e. the town of Resen and Jankovec.

While determining the locations of the collection points the target was to place them as much as possible near areas where the apples are actually stored and along local roads, thus ensuring easy access and favorable configuration of the terrain. In addition, during determination of the number of collection points and selection of specific locations, the objective was that these are with approximately similar size, i.e. they serve areas with approximately equal production of apples.

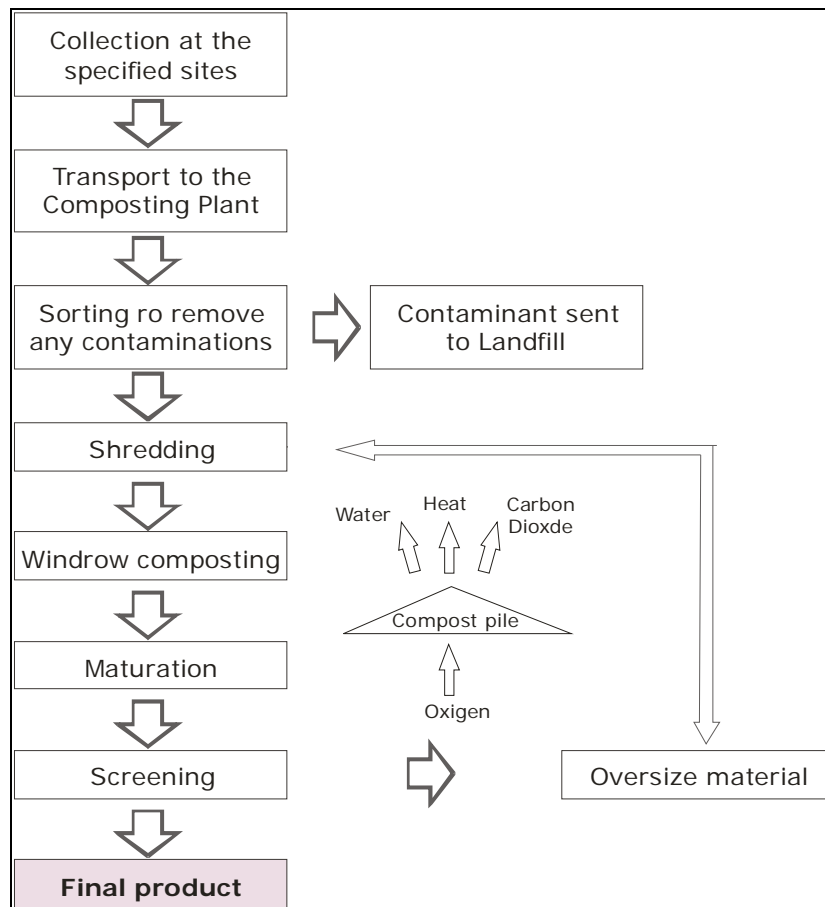
Based on the analyses it was decided that the collection of waste apples for the pilot composting facility will be organized at 4 collection stations.



The collection points (stations) are designed as entirely asphalted and fenced areas. The waste apples and other organic wastes will be collected in metal containers placed on a lower level than the access area, thus providing for easy and direct dumping of waste apples into the containers. The containers are with volume of 5 to 7 m<sup>3</sup>. In order to protect the containers from precipitation, the area where they are located will be completely covered with a metal roof (shelter) structure.

- **Windrow composting – process flow**

The windrow composting process is the most common processes used for treatment of organic waste. With the windrowing composting system the raw material is placed into long narrow piles, which are typically triangular in cross-section.



Collected and transported material from waste collection points will be stockpiled on the composting site on an impermeable pad at one end of the site until there is enough material to go ahead with the shredding operation. Before shredding/crushing can be made the material has to be hand sorted in order to remove any contamination that would hinder the rest of the composting process. The presence of contaminating items may interfere with the composting operation either by damaging equipment, or if present in the final product may limit its uses. The contaminating items will be removed to the municipal landfill for disposal.

Once the stockpiled material is sorted the next stage in the composting process is the shredding, which is carried out by shredding machine. The primary purpose of shredding the bio waste is to increase the surface area of the raw material, open to microbial attack and thereby increase the speed of the composting process. There are several different types of shredders, which are suitable for different types of waste and will produce an end product that has different characteristics.

After shredding it is necessary to form the material into windrows. For the pilot composting project in Resen, the windrows are 2-3m wide (at the base), 1.6m tall and 52m long. They are arranged so that they follow the slope of the concrete pad to allow any surface water to drain away. Initially the windrows can be turned/agitated using a front-end loader, but for the latter part of the project they need to be turned using a windrow turning machine.

During the composting period it is important to apply water to the windrows at regular intervals if the material is drying out.

The material remains in the windrows until the active composting phase is completed, after which it is transferred to larger maturation piles. These are piles where the material is left to mature until the activity of the compost is reduced sufficiently for screening to take place; they are situated adjacent to the asphalt pad (windrow area).

Screening gives the finished compost a consistently uniform size and also homogenizes it visually. The oversize material from the screening stage is passed back to the beginning of the process where it is incorporated into the stockpile for the next batch.

Layout of the composting facility is presented in Annex VI (Drawings).

- **Pilot composting plant: location**

The central composting plant is planned to be situated in the locality of the existing Resen municipal communal waste landfill representing the community contribution to the project activity

The site area is located about 2.8 km south-west of the Zlatari village and 2.5 km north-east of Resen.

- **Pilot composting plant: network and facilities**

- ✓ NETWORK

Water supply and sanitation: Water can be provided by a groundwater abstraction well or by placement of a plastic 10-15 m<sup>3</sup> water tank on the site. Sanitation will be provided by mobile sanitary facility.

Electricity: Electricity can be provided from the transmission line at the entrance of the municipal landfill.

Access road: The access to the site will be via the existing access road to the municipal landfill.

- ✓ FACILITIES

1. Gate:

The entrance to the site is through a gate, to be linked to the fence surrounding the plant area and will correspond with road width (min 5m).

2. Wheel cleaning basin:

A simple wheel cleaning unit for vehicles leaving the composting site is envisaged. The wheel cleaning unit will be located directly before the gate. The cleaning unit consists of concrete tank with a horizontal steel grid inside the concrete structure. For the discharge of collected water a flexible pump will be available.

3. and

4. Operation/admin building and parking:

The administrative building is a small unit, i.e. a prefabricated container structure. The house includes a small office and storing space for a portable laboratory.

5. Machine shed and workshop (vehicle maintenance):

The unit serves as a shelter for all mechanical equipment to be used at the composting site and collection vehicles. The garage/shed area will be paved with asphalt and will be protected by an appropriate roof cover. (*Pilot composting plant scheme given in Annex III - Drawings*)

6. Waste inspection and staging area:

A waste inspection area will serve to identify the waste coming to the plant, in order to inspect, control, segregate, mix and shred the incoming waste. This area will be located after the operation building and can be controlled from this building. The inspection area will be paved with asphalt.

7. Windrow area:

Normally windrow composting systems take about 8 to 12 weeks to make finished compost. Windrow system is attractive because of simplicity, mobility, and relatively low capital cost, but requires larger operating area.

The gross composting area which includes windrow area, roads, buffer zone and clear space between the windrows, is around 2,700m<sup>2</sup>.

8. Fence:

The entire composting site will be surrounded by a fence. The fence will have a height of 1.5 m.

9. Runoff collection and storage:

The composting plant will be suitably designed to prevent leachate penetration to ground water. The design criteria used is based on the highest 24 hours rainfall from a 25-year historical weather data set ( $P_{24h-25y}=80\text{mm}$ ). The total collection network and detention pond are sized to collect this projected maximum runoff.

It is designed that the leachate and storm water will be collected in lateral drain pipes and will be discharged into the main pipe (perforated HPDE pipes, DIA 200-300mm).

Collected water will be discharged into a runoff basin (pond) The runoff basin will be watertight by sealing with HDPE geomembrane on a gravel blanket. The leachate collected can be applied back to the windrows as a nutrient source. For the transferring of the collected leachate a flexible pump will be available.

10. Curing pile:

Curing is the process of stabilizing of composted products. This function is common to all composting technologies, but the time frame may vary. This phase takes 5 to 7 weeks to produce mature finished compost.

11. Final product storage:

After shredding, the compost will be sent for packing or transferred directly to the storage under roof cover, ready for delivery. The compost will be packed in 10 up to 70 kilogram bags and placed on pallets.

The finished storage will be paved with asphalt and will be protected by an appropriate roof cover. The covered storage area will be able to store about 625 m<sup>3</sup> of compost.

12. and

13. Storm water management:

Surface water from the perimeters of the windrow area will be collected in perimeter drainages and discharged to the main road drainage or adjacent water courses. Also the storm water/leachate from the paved area will be collected with drainage system and discharges to the runoff pound.

### **3. TECHNICAL DESCRIPTION**

The documentation that served as basis for the preparation of the bidding dossier for Construction of the Pilot Composting Plant and Four Intermediate Collecting Centres had been developed at a level of a Main/Implementation Design in accordance with the applicable Law on Construction in the country. A technical review of the main design had been carried out by an independent reviewer.

Following the recommendations set in the Main/Implementation Design, the works on construction of the Pilot Composting Plant and Four Intermediate Collecting Centres had been organized into two individual groups of activities with the aim to arrange the implementation of those according to their relevance. The first group of activities which are in progress concern the following: (i) preparatory works, construction of the network and construction of the sub-grade and capping layer (improved sub-grade) of the Windrow Area of the Pilot Composting Plant laid in cadastral plot 1500/13 and (ii) preparatory works, construction of the network of the Pilot Composting Plant including construction of the sub-grade and foundations of all future structures laid on cadastral plot 1503/1 and partially in cadastral plot 1500/13.

The second groups of activities, which are subject to this bidding procedure, concern the following civil works: (i) construction of the fence to safeguard the plant, (ii) construction of the lower bearing layer of the plant using suitable quarry crushed material which is to be laid and compacted in accordance with the technical specification, (iii) paving with asphalt layer and (iv) construction of all facilities, i.e. Machine Warehouse, Shop for Producing Compost, Windrow Area, Water Supply Well, Reservoir for Compost Liquid Drains and Atmosphere Water and Office with Laboratory. In addition, the works include construction of four (4) Intermediate Collecting Centers of which two (2) of capacity of 12m<sup>3</sup> and two (2) of capacity of 18m<sup>3</sup>.

The scope of construction works consist of construction of all facilities and structures comprising the Pilot Composting Plant. Works includes the following:

(I) Construction of the Windrow Area:

- a) Preliminary works: conducting relevant surveying activities; geotechnical investigation; soil mechanic investigations; construction of Access Roads serving the project during construction; compaction of the previously constructed sub-grade including carrying out control tests of sub-grade; conduct quality control of asphalt layer;
- b) Earth works: construction and compacting of the sub-grade; construction of the capping layer (improved sub-grade layer); formation of the sub-base for application of the material for the bearing layer of suitable quarry crushed aggregate (compacted); Construction of stabilized shoulders made of mechanically stabilized gravel or stone material; Manual excavation of soil category III and IV for foundations for the prefabricated office and laboratory
- c) Asphalt works: supply and construction of asphalt bearing/wearing course type BNHS-16 with minimum 7 cm compacted thickness
- d) Supply, delivery and put into operation of the prefabricated container-type office and laboratory with dimensions 2,4 m x 6,0 m
- e) Construction of Disinfecting basin: works include electrical power installation works for the pump for the disinfecting basin, concrete and insulating works;



(II) Construction of Water Intake / Water supply Well

Work includes the following:

- f) site clearing and cleaning around the well; careful drilling and placing water collecting drainage PE pipe up to 65 meter depth; supply, delivery and installing of fittings for the Water intake/Water-supply well; Supply, delivery and installing of a drowned pump as per specification; Electrictrical Power installation works for power-supply for the pump for the well.
- g) Concrete and insulating works: transportation and placing of water tight reinforced concrete; apply cement based hydro insulation on the dry chamber;
- h) Reinforcement works: supply and installation of metal tops (heavy type)

(III) Finishing works on previously constructed Collecting Reservoir for Compost Liquid Drains and Atmosphere Water

Work includes the following:

- i) Insulating works, apply cement based hydro insulation on the internal side of the reservoir, external walls and top of the slab.

(IV) Construction of the Mechanics Workshop, and

(V) Shop for Final Compost

Work includes the following:

- j) Earth works: Manual Excavation of soil around the previously constructed foundations and basement slab (category III and IV); Manual backfilling around the base (foundations) of the structures; Supply and lying of suitable quarry crushed aggregate.
- k) Concrete and insulating works: Supply, transportation and placing of water tight reinforced concrete C30 (MB30) for construction of the construction's walls above the foundations of the structures, construction of construction's columns and construction of a path around the constructions; Applying horizontal and vertical insulation on the external walls of the columns in three layers and on top slab;
- l) Reinforcement works: consisting of supply, laying and securing in place of various types of reinforcement.
- m) Metal works: Supply, laying and instalment of main steel beams/supports of the roof construction, Supply and Installation of double coated plastic still sheet roofing.
- n) Miscellaneous: painting the roofing construction with anti-corrosive paint; Supply, delivery and installation of horizontal and vertical draining system of double-coated steel plastic material.

(VI) Construction of Intermediate Collecting Centers with 2 metal containers of the capacity of 6m<sup>3</sup>

(VII) Construction of Intermediate Collecting Centers with 3 metal containers of the capacity of 6m<sup>3</sup>

Work includes the following:

- o) Earth works: Mechanical and Manual excavation of soil (category III and IV), including loading, transport and disposal of surplus material to approved areas; Manual backfilling around the base (foundations) of the Intermediate Collecting Centres; Supply and laying of suitable quarry crushed aggregate under the foundation; Landscaping the area surrounding the Intermediate Collecting Centres.
- p) Concrete and insulating works: apply, casting and compaction of lean concrete bedding, to serve as structures base for concrete foundations.; Supply, transportation and placing of water tight reinforced concrete C30 (MB30) for construction of the slab, foundation's beams and walls of the Intermediate Collecting Centers and cast-in-situ gutters; Applying horizontal and vertical insulation-under the foundation, on the external walls of the foundation and on top slab in three layers.
- q) Reinforcement works: consisting of supply, laying and securing in place of various types of reinforcement.
- r) Metal works: Supply, laying and instalment of main steel beams/supports of the roof construction, Supply and Installation of double coated plastic still sheet roofing.
- s) Miscellaneous: painting the roofing construction with anti-corrosive paint; Supply, delivery and installation of horizontal and vertical draining system of double-coated steel plastic material.

(VIII) Construction of the fence around the Composting Plant

Work includes the following:

- t) Earth works: Mechanical and Manual excavation of soil (category III and IV), including loading, transport and disposal of surplus material to approved areas; Manual backfilling around the base (foundations) of the Intermediate Collecting Centres; Supply and laying of suitable quarry crushed aggregate under the foundation; Landscaping the area surrounding the Intermediate Collecting Centres.
  - u) Concrete works: reinforced concrete C30 (MB30) for constructions of the foundations and foundation's walls;
  - v) Reinforcement works: consisting of supply, laying and securing in place of various types of reinforcement.
  - w) Metal works: Supply, laying and instalment of metal poles (supports) made of steel box profiles; Placing and fastening galvanized protective barbed wire/wire netting in row; Constriction and installation of two-part sliding lockable entrance gate of metal box profiles, rust protected;
  - x) Miscellaneous: painting the metal poles (supports) of the mesh fence and the two-part sliding gate with anti-corrosive paint.
- (IX) Construction external electrical installation, internal electrical installation within the Composting plant and power connection of objects of the Composting plant

## **4. TECHNICAL SPECIFICATION**

### **4.1 PRELIMINARY WORKS**

The present Section refers to all necessary preliminary, preparatory and temporary works to be executed on site immediately after the signing of the contract. These works have to be foreseen in the overall works time schedule and by no means will they affect, the overall duration of the project.

Access Roads serving the project during construction either for by-passing the traffic or for transportation reasons (supply of goods, machinery approach, etc) are temporal works and deemed to be included in the unit rates. Temporal diversion roads will be constructed to the satisfaction and approval of the supervising engineer and maintained in good condition during the construction period for serving the traffic properly, with drainage pipes in case of stream or river crossing, paved, signed for safety reasons, etc.

Pegging of the alignment of the tendered Design and all relevant surveying activities with special attention in transferring properly the information from the drawings, as well as, the preservation of marks pegged out since the beginning of the works until they are handed over to the Supervisor.

The Contractor shall peg out polygon (traverse) points with 12x12x50cm concrete posts with a hole in the middle and underground centre. In settlements or on roads polygon points shall be pegged out with buried galvanized pipes  $\varnothing$  2.5 cm. The polygon is connected by turning points, calculated according to Gauss-Crueger method, with deviation according to the book of regulations on the polygon network of I (first) order.

A geotechnical investigation is required for all structures and utility services in accordance with the local statutory requirements. The Contractor is required to engage an approved and accredited specialist geotechnical firm with a certified laboratory to perform geotechnical investigation and provide geotechnical reports and other services as outlined hereafter.

Soil mechanic investigations shall be carried out on the sites where structures and utility services are to be constructed to determine the bearing capacity of the soil, stability of the slopes and ground water table. The company that will carry out these investigations shall prepare Method Statement for solving of foundation issues and supervise the implementation.

Within thirty days of the Certificate of Provisional Acceptance the Contractor shall submit (4) four sets of "As Built" drawings in hard copy and one in electronic form, photographic documents and Project Data book. The "As Built" drawings shall be encased in loose leaf binders and shall be checked and approved by the Supervisor.

### **4.2 EARTH WORKS**

Technical Specification shall be applied to the execution of earthworks for public Projects and includes the conditions to be fulfilled during the construction of cuttings and embankments regarding the transport, compaction, levelling and finishing of earthworks and the quality control and acceptance criteria.

#### 4.2.1 Preparation of subsoil

Sub soil is original soil on which foundation (construction) of the embankment shall be done.

Works include tamping (compaction), eventual excavation for drying or moistening of the natural soil with depth foreseen in the design.

Regulations according to which quality control of the materials shall be done:

Regulation	Description of works
MKS U.B1.010	Sampling
MKS U.B1.012	Determination of moisture content
MKS U.B1.014	Determination of specific weight of soil
MKS U.B1.016	Determination of soil weight by volume
MKS U.B1.018	Determination of granular composition
MKS U.B1.020	Determination of yield point and plasticity limit soil
MKS U.B1.024	Contents of flammable and organic materials
MKS U.B1.038	Determination of optimal water contents
MKS U.E1.010	Earth works in construction of roads

In cases where the soil/sub-soil composition is such that direct construction of embankment cannot be done on it, (saturated soil, muddy soil, organic soil or similar), it is mandatory that the soil shall be prepared or repaired before embankment construction as given in the design, or as proposed by the Supervisor.

Regulations according to which quality control of application of materials shall be done:

Regulation	Description of works
MKS U.B1.010	Sampling
MKS U.B1.012	Determination of moisture content
MKS U.B1.016	Determination of soil weight by volume
MKS U.B1.046	Determination of compression modules

Before start of the embanking/filling, cleaned and flattened foundation - sub-soil shall be tamped (compacted) according to the following requirements:

Table 1.4 Degree of compaction

Description	Minimal percentage of density (degree of compactness) required according to the standard Proctor test (or other methods)	Compression modules Mc tested by plate Ø300mm at least (MN/m <sup>2</sup> )
a) Original soil consisting of cohesive soils materials where the designed embankment is not higher than 2.00 m.	100%	Not required
b) Original consisting of cohesive soils materials where the designed embankment is higher than 2.00 m.	97%	Not required
c) Original soil consisting of non-cohesive soils materials where the designed embankment is not higher than 2.00 m.	100%	30
d) Original soil consisting of non-cohesive soils materials where the designed embankment is higher than 2.00 m.	97%	25
e) In cuttings, 30 cm deep under	100%	Min 45

Description	<b>Minimal</b> percentage of density (degree of compactness) required according to the standard Proctor test (or other methods)	Compression modules Mc tested by plate Ø300mm at least (MN/m <sup>2</sup> )
the roadbed;.		

The embankment height is considered the height from the level of the constructed subsoil-foundation base to the level of the bed formation (sub-grade), at the lowest part. Tests shall be performed at each 250 m<sup>2</sup> of constructed subsoil.

In case the composition of soil- subsoil of the embankment is such that it does not satisfy the criteria given in the Table 1.4 (saturated soil, muddy soil, soil of organic origin and alike) it is necessary that the subsoil be prepared/repared in a manner approved by the Supervisor, prior to the construction of the embankment.

#### 4.2.2 Construction of embankments

##### General provisions

The Contractor shall not start embankment works before the Supervisor has approved all preparatory works. In addition, the Supervisor shall approve the Contractor's Method Statement for embankment construction.

No earthworks shall be carried out during bad weather conditions (heavy rain etc.) or when an excess of moisture is detected. If bad weather compromises the quality of the embankment, as defined by these specifications and by any Macedonian laws and regulations, the works shall be interrupted. The Contractor may restart the works after a period of time to be established by the Supervisor.

The embankments shall be constructed with uniformly overlain layers, laid parallel to the line of the road, over the full width of the platform, and over a length adequate to meet the approved specification and avoiding segregation, grading and moisture content variations.

The maximum particle size of any fill material shall be no more than 2/3 of the compacted layer thickness.

The material brought onto the platform shall be spread and levelled across the width of the platform to the optimum thickness for compaction, observing as closely as possible the final longitudinal profile.

These works include embanking/filling, distribution, rough and fine levelling, moistening, and tamping (compaction) of materials in the embankment, according to the dimensions given in the design. The whole operation shall be done in accordance to the design and the following Specifications.

##### Materials

For construction of embankments, all non-organic substances with proper quality shall be used. Organic rubbish, roots, bushes or materials that could have changed their mechanical-physical characteristics with time due to the biochemical effects, shall not be incorporated in the embankments.

Regulations according to which quality control of the materials shall be done:

Regulation	Description of works
MKS U.B1.010	Sampling
MKS U.B1.012	Determination of moisture content
MKS U.B1.014	Determination of specific weight of soil
MKS U.B1.016	Determination of soil weight by volume
MKS U.B1.018	Determination of granular composition
MKS U.B1.020	Determination of yield point and plasticity limit soil
MKS U.B1.024	Contents of flammable and organic materials
MKS U.B1.038	Determination of optimal water contents
MKS U.E1.010	Earth works in construction of roads
MKS U.E8. 010	Bearing capacity and evenness at the sub-grade level.

Determination of percentage of organic and flammable materials as well as volume of soil shall be done in specific cases.

### Transportation and filling

The Contractor shall start transportation and filling of material over prepared foundation soil or over previously laid layers, after acceptance of lower layers by the Supervisor. Each individual layer shall be applied in longitudinal direction, horizontally, or at maximal gradient equal to the designed longitudinal gradient. Transversally each layer shall have bilateral or unilateral gradient of 2-4%.

### Compaction (tamping)

Each layer of the embankment/fill shall be tamped (compacted) in its full width with appropriate machinery and tamping shall principally be done from the margins towards the centre of the embankment. All places inaccessible to the machinery or places where use of tamping machinery is inappropriate due to other reasons (filling behind structures, retaining walls etc.) shall be tamped (compacted) with other suitable means or methods, as approved by the Supervisor.

Before the beginning of compaction, each layer of the embankment shall be wetted or dried to an optimal moisture content, which is in accordance to the previous testing and enables compaction of the used type of material up to the required degree.

If following the compaction and quality control, the activities are not resumed immediately by filling the next layer, but are postponed for a longer period under different weather conditions, the quality of the compaction and moisture content shall be controlled again before filling. In this case the compaction shall start only when the repeated tests have proved the quality of compaction.

### Quality control during application:

Regulations according to which quality control of the materials shall be done:

Regulation	Description of works
MKS U.B1.010	sampling
MKS U.B1.012	determination of moisture content of the soil
MKS U.B1.016	determination of soil weight by volume
MKS U.B1.046	determination of compressibility module with a round plate

### Classification of materials

The unique terminology according to U.S.C.S. and A.A.S.H.O. Classification and norms and to the Casa-Grande plasticity diagram shall be used for classification of materials.

### Preparatory tests of materials for embankment

To determine the suitability of the materials for the embankment construction, tests on all materials from the cuts and the borrow pits with cohesive and non-cohesive soil including also mixed and rock materials, should be carried out.

### The following tests shall be performed:

- Dry weight by volume according to Proctor's test, optimal moisture and actual moisture content;
- Granular composition and degree of unevenness.
- Aterberg's consistency limits: yield limit, plasticity limit, plasticity index and Casa Grande's frost criteria.
- California laboratory index of bearing capacity of soil shall be determined according to MKS U.B1.042.

### 4.2.3 Construction of sub-grade

Arrangement of sub-grade formation level of roadbed in cuttings and embankments with rough and fine levelling and compaction:

- In rock materials-flattening of the remaining rock-tops, filling of the flattened layer, spreading, levelling, moistening and compactor of the layer;
- In cohesive materials-levelling, repairing of certain smaller non-homogenous places, moistening, i. e. drying of the soil by tamping up to the prescribed compaction degree;



or, in cases where compaction is not possible due to high natural moisture content of soil, or unfavourable weather conditions, a 15 cm. deeper excavation shall be done prior to embanking, spreading and levelling of the 15 cm thick levelling layer. It shall be mechanical or chemical stabilized after the Supervisor's approval.

**Regulations to be applied:**

Regulation	Description of works
MKS U.B1.010	Sampling
MKS U.B1.012	determination moisture content of soil
MKS U.B1.014	determination of specific weight of soil
MKS U.B1.016	determination of soil weight by volume
MKS U.B1.018	determination of granular composition
MKS U.B1.020	determination of yield point and plasticity limit of soil
MKS U.B1.022	determination of soil volume change
MKS U.B1.024	determination of contents of flammable and organic materials
MKS U.B1.038	determination of optimal water contents
MKS U.B1.042	determination of Californian bearing power index CBR

Except for the standards given above observing all regulations given in these Specifications shall be mandatory.

**Material for Sub-Grade**

The terminology according to U.S.C.S. and A.A.S.H.O. Classification and norms and to the Casa-Grande plasticity diagram shall be used for classification of materials for the sub-grade - formation of the substructure.

**Preparatory tests of materials for sub-grade**

The following preparatory tests of material for sub-grade shall be performed:

- Dry weight by volume according to Proctor's test, optimal moisture and actual moisture content;
- Granular composition and degree of unevenness.
- Aterberg's consistency limits: yield limit, plasticity limit, plasticity index and Casa Grande's frost criteria.
- California laboratory index of bearing capacity of soil shall be determined according to MKS U.B1.042.

**Compaction of sub-grade**

The whole width of the sub-grade – formation level (Planum) shall be mechanically or chemically stabilized .The excavated or filled and spread material for the sub-grade - formation level shall be immediately tamped (compacted) to  $\geq 100\%$  by normal Proctor. In case that the already tamped (compacted) sub-grade - formation level has been exposed to bad weather conditions for a longer period, or has been damaged due to other reasons, the Contractor is obliged to bring it to the condition required by these Specifications.

The material filled and spread for the formation level that shall be chemically stabilized, shall be mechanically tamped (compacted) immediately, to prevent filtering of rainwater through the surface of the sub-grade - formation prepared. The usability of the tamping instruments shall be controlled before or at the beginning of the works, except in cases where sub-grade is tamped (compacted) into cuttings with stone materials.

**Criteria for estimation of quality of sub-grade**

For sub-grade made of cohesive material or mixed material with up to 20% stone material minimal value of compressibility module  $M_c$ , calculated with the experiment with plate  $\phi 30$  cm shall be as follows:

- For mixed material with 20-35% stone materials min.  $M_c=35$  MPa
- For mixed material with 30-50% stone materials min.  $M_c=40$  MPa
- For mixed material with more than 50% stone materials min.  $M_c=45$  MPa

- For non-cohesive materials min.  $M_c=50$  MPa

These tests shall be done at optimal (or close to optimal) humidity.

#### 4.2.4 Capping layer

This Specification applies to the construction of the capping layer (improved sub-grade layer) in the upper part of the sub-grade of the earthworks under sub-base layer only where is required by the design or:

- In cases where the sub-grade has CBR (California Bearing Ratio) less than 8% the capping layer-chemically stabilized layer under sub-base layer shall be constructed of better materials with CBR >20% with laboratory tests.
- In cases of construction or reconstruction of industrial roads with heavy and very heavy traffic.
- In case of very bed soil and if it is required and approved by the Supervisor

The capping layer shall be constructed of chemically stabilized suitable soil with addition of :

- lime;
- granular slag and lime;
- cement.

The main use of capping layer is to provide a firm foundation for application and compaction of the sub-base and subsequent pavement layers as well as cost saving for more expensive sub-base material.

#### 4.2.5 Ditches and gutters

The excavation for the channels shall be done prior to the beginning of the works on the embankment.

Ditches, gutters, transverse depressions and drains shall be constructed to the cross section, base level and position in the profile, as foreseen in the design. The ditch or gutter must be parallel to the toe of the slope; interruptions due to rocky outcrops are not permitted. Surfaces must be plane, so any sticking out rock shall be cut in order to prevent retaining of water and earth falls.

The whole suitable material excavated manually or by use of mechanical equipment shall be used for embankments or other works, or if it is not suitable shall be transported to an approved disposal area.

At the end of the Works, and before the final acceptance, the ditches and gutters shall be cleared of fallen lumps or blocks and top soiled. The topsoil shall be placed on previously prepared and compacted areas with a thickness prescribed by the design.

The clearance and modification of existing, or the construction of new watercourses, including ditches, streams, rivers, lagoons and ponds, shall be including any protection, lining, revetment or other works.

Clearance of existing watercourses shall include the removal of vegetation, vegetable matter and all other deposits within the watercourse profile. Materials resulting from this clearance shall be dealt with as unacceptable material.

Redundant watercourses shall, be drained and cleared and material outside the watercourse profile excavated and dealt with as unacceptable material. The excavations shall be to the dimensions stated in the design and the whole filled with general or selected fills deposited and compacted in compliance with the specification. Where the surface is to remain exposed it shall be top-soiled and seeded, or receive other treatment.

The Supervisor is obliged to conduct parallel control of the vertical alignment and the inclination, the quality of used material and the performance. If the works are not performed with required quality, The Supervisor shall terminate the works and shall require repair of defects. Control of performance shall be done at maximum 250m length.

#### 4.2.6 Sub-base

Description

This work includes purchase and application of materials for bearing layers on places determined by the design. The complete works shall be done according to these Specifications and dimensions given in the design.

Regulations according to which quality control of the materials shall be done:

Regulation	
MKS.B.B0.001	Natural aggregates and stone. Sampling
MKS.B.B8.012	Natural stone, testing resistance to pressure
MKS.B.B8.010	Determination of water absorbed by the natural stone
MKS.B.B8.030	Determination of aggregate's weight by volume at certain compactness
MKS.B.B8.032	Determination of specific weight of aggregate
MKS.B.B8.031	Determination of weight by volume and gravel absorption of water
MKS.B.B8.036	Determination of quantity of particles that pass through sieve with 0.02 mm holes.
MKS.B.B8.037	Determination of fragile grains in coarse aggregate (gravel)
MKS.B.B8.048	Definition of shape and appearance of the surface of grains of aggregate.
MKS.B.B8.039	Approximate determination of pollution with organic materials
MKS.B.B8.047	Testing grain shape of stone aggregate.
MKS.B.B8.035	Determination of moisture content
MKS.B.B1.018	Determination of granular composition and determination of 0.02 mm particles with aerometry (or according to MKS.B.B8.036)
MKS.B.B1.038	Determination of optimal water contents and max. dry density according to Proctor
MKS.B.B3.050	Contents of clay and mud
MKS.B.B1.046	Determination of compressibility module according to round plate method
MKS.B.E9.020	Conventional and contemporary road foundation
MKS.B.B8.001	Testing resistance of stones to ice
MKS.B.B.8.044	Testing ice resistance of aggregated with usage of Sodium sulphate
MKS.B.B.8.045	Testing resistance to wearing of stone and stone aggregate with the "Los Angeles" method
MKS.U.B1.042	Determination of California bearing ratio

### Materials

Gravel or stone debris shall be used for mechanical stabilization of bearing layers.

### Gravel materials

Gravel materials shall consist of gravel grains, sand and filling in a ratio that meets the requirements in following, depending on the size of the biggest grains in the material.

### Stone debris

Stone debris consists of crushed stone grains, chippings, sand and filling, in a ratio that meets the requirements in following table.

### Quality of stone material

Material for mechanically stabilized lower bearing (sub-base) layers shall consist of grains that meet the following requirements:

No.	Test	Required results	
		Gravel aggregate	Crushed aggregate
1.	Testing stone: Resistance to pressure		min. 120 MPa
2.	Water absorption		maximum 1%
3.	Ice resistance		resistant after 25 cycles
4.	Wearing (Los Angeles method)		maximum 40%
5.	Mineralogical-petrography analysis		satisfactory
6.	Opinion on usability		favourable

No.	Test	Required results	
		Gravel aggregate	Crushed aggregate
1.	Testing aggregate Shape of grains	unfavourable up to 50%	unfavourable up to 40%
2.	Fragile grains	up to 7%	up to 7%
3.	Content of mud, clay and organic particles	up to 5%	up to 5%
4.	Sensitivity to frost effects (0.02 mm. particles)	according to MKS.U.E9.020 item 6.11.	according to MKS.U.E9.020 item 6.11.
5.	Aggregate resistance to frost	Constant lose on weight:	Constant lose on weight:
	- for fractions up to 8 mm.	up to 10 %	up to 10 %
	-for fractions bigger than 8 mm.	up to 12 %	up to 12 %
6.	Weight by volume	according to modified Proctor	according to modified Proctor
7.	Specific weight		
8.	Granular composition	according to MKS Standards	according to MKS Standards
9.	Degree of unevenness	min. 15	min. 15
10.	Wearing (Los Angeles method)	maximum 50%	maximum 40%
11.	Mineralogical-petrography analysis:		
	a) contents of rocks and mineral in	satisfactory	satisfactory
	b) appearance of grain surface in weight percents	satisfactory	satisfactory
	- rough, fine to coarse		
	- flat - glossy		
	- cavernous		
	c) degree of altered grains	satisfactory	satisfactory
	- fresh		
	- weakly altered grains		
	- fragile grains		
	d) Opinion for usability	favourable	favourable
12.	Opinion for usability on the basis of the tests performed	favourable	favourable
13	CBR (according to modified Proctor)	>80%	>80%

Mineralogical-petrography analysis shall determine the presence of separate types of rocks with regard to the types and quantities especially of those types regarded as unfavourable for road construction (marls, clay shale, soft and clay sands, conglomerates, disintegrated granites and gneiss).

On the basis of the mineralogical-petrography analysis and spectres the data shall be processed according to item 11. of above table.

In each certificate for tests done, a report shall be attached, signed by the Supervisor and the personnel authorized by the Institution that does the tests and the Contractor.

### Construction of sub-base

#### Purchase of materials

The place where materials shall be purchased for the lower bearing layer (sub-base) has to be reported by the Contractor to the Supervisor before start of exploitation, quality analysis shall be given and approval for usage shall be obtained. Earth borrows pits and stone quarries shall previously be cleaned from barren soil and other harmful materials.

#### Preparation (foundation surface)

The surface of the foundation - formation of the substructure shall be prepared for the start of application of the material for the bearing layer according to the requirements given in section "Construction of embankment" and "Construction of sub-grade"

#### **Transportation of materials for the bearing layer**

On the adequately prepared surface of the foundation, embankment of sub-base material shall be started immediately after the acceptance of the foundation and when approval is obtained from the Supervisor.

Adequately prepared vehicles, i.e. spreading machines that enable the necessary distribution of materials into layers with equal width and thickness shall be used for transport. Thickness of the spread material shall be according to the necessary thickness of tamped layer of material foreseen with the design. In case that the material is applied in more layers, each layer shall be individually adequately formed and tamped before start of transport of material for the next layer.

Vehicles with muddy wheels or with dirty lower parts shall not be driven on spread or tamped material of the bearing layer.

#### **Adding material**

In case that adding material is necessary in order to enhance the granular composition according to the requirements given in the section "Quality of stone materials" of these Specifications, uniform material shall be added, spread with adequate spreading machinery and tested.

#### **Mixing and trimming**

After spreading each layer for the bearing layer and adding material with adequate machinery, whose usage shall be approved by the Supervisor according to the General Specifications, adequate quantities of water shall evenly be added during mixing of material in order to obtain optimal humidity. The homogenized mixture shall be levelled as given in the design. Levelling and tamping of the mixture according to these Specifications shall be done on the same day it has been mixed.

#### **Tamping (Compacting)**

After mixing and trimming complete width of each layer shall be tamped with rollers with smooth steel or rubber wheels, i.e. with vibro-rollers. Rolling shall be done in the direction from the lower margin towards the higher. The number of passes done with the roller for optimal tamping of layers is determined with previous tests according to these Specifications. Compactness of material shall be controlled with tests during works.

All defects noted during rolling shall be repaired upon demand of the Supervisor.

All places inaccessible to the roller shall be tamped to the necessary compactness with other tamping devices, whose usage shall be determined by the Supervisor who shall also determine the conditions under which these devices shall be used. Except compactness, compressibility module shall also be determined before final rolling, that has to be according to the requirements of the design. If not so, the Contractor shall additionally tamp the layer, until the necessary value of Mc module is obtained or degree of compaction by Proctor. Compactness thickness of the lower bearing (sub-base) layer shall be determined using a testing section.

#### **Deposit of material**

If the Contractor deposits the sub-base layer before application, that space shall be appropriately prepared and cleaned in advance.

### **4.3 CONCRETE WORKS AND REINFORCEMENT**

#### **4.3.1 FORMWORK FOR CONCRETE**

Formwork means the surface against which concrete is placed to form a face, together with all the immediate supports to retain it in position while concrete is placed.

A formed face is one which has been cast against formwork. An exposed face is one which will remain visible when construction has been completed.



### **4.3.2 CONSTRUCTION OF FORMWORK**

Formwork shall be so constructed that they will support the loads imposed on them by the fresh concrete together with additional stresses imposed by vibrating equipment and by construction traffic, so that after the concrete has hardened the formed faces shall be in the positions shown on the Drawings within the tolerances set out in MKS U.C9.400.

### **4.3.3 PREPARATION OF FORMWORK**

Before any reinforcement is placed into position within formwork, the latter shall be thoroughly cleaned and then dressed with a release agent. The agent shall be either suitable oil incorporating a wetting agent, an emulsion of water suspended in oil or low viscosity oil containing chemical agents. The Contractor shall not use an emulsion of oil suspended in water nor any release agent which causes staining or discolouration of the concrete, air holes on the concrete surface, or retards the set of the concrete.

### **4.3.4 REMOVAL OF FORMWORK**

Formwork shall be carefully removed without shock or disturbance to the concrete. No formwork shall be removed until the concrete has gained sufficient strength to withstand safely any stresses to which it may thereby be subjected.

As soon as the formwork has been removed, bolt holes in concrete faces other than construction joints which are not required for subsequent operations shall be completely filled with mortar sufficiently dry to prevent any slumping at the face. The mortar shall be mixed in the same proportions as the fine aggregate and cement in the surrounding concrete and with the same materials and shall be finished flush with the face of the concrete.

## **4.4 REINFORCEMENT FOR CONCRETE**

### **4.4.1 MATERIALS**

Reinforcement shall comply with the MKS standards indicated on the Drawings. The Standards include the following:

MKS C.K6.020 and MKS C.K6.020 for hot rolled plain bar and high yield deformed bar  
MKS U.M1.09 for steel mesh fabric

All reinforcement for use in the Permanent Works shall be tested for compliance with the appropriate MKS standard in a laboratory acceptable to the Supervisor and two copies of each test certificate shall be supplied to the Supervisor. The frequency of testing shall be as set out in the MKS standard.

### **4.4.2 STORAGE OF REINFORCEMENT**

Reinforcement shall be stored on Site either in racks or on a hard impermeable base so that it remains straight and free from contamination. Any reinforcement which is likely to remain in storage for a long period shall be protected from the weather so as to avoid corrosion and pitting. All reinforcement which has become corroded or pitted to an extent which, in the opinion of the Supervisor, will affect its properties shall be removed from Site.

### **4.4.3 BENDING REINFORCEMENT**

#### **(a) Bar schedules**

The Contractor shall prepare and submit in duplicate to the Supervisor bar schedules showing cutting and bending details of the reinforcement shown on the Drawings. The schedules shall be prepared in accordance with MKS C.B0.004 and MKS C.K6.120 Bending Dimensions and Scheduling of Bars for Reinforcement of Concrete.

## (b) Cutting and bending reinforcement

The Contractor shall cut reinforcement to length and bend it to the shape shown on the schedules within the dimensional tolerances given in MKS C.K6.120. Bars shall be bent cold by the application of slow steady pressure. Hooks or right angle bends shall be formed where called for by the schedules and to the dimensions and tolerances specified in MKS C.K6.120. After bending, bars shall be securely tied together in bundles or groups and legibly labelled as set out in MKS C.B0.004 and MKS C.K6.120.

Reinforcement shall be thoroughly cleaned and all dirt, scale, loose rust, oil and other contaminants removed before it is placed in the Permanent Works.

### 4.4.4 FIXING REINFORCEMENT

Reinforcement shall be securely fixed in position within a dimensional tolerance of 20mm in any direction parallel to a concrete face and within a tolerance of 5 mm at right angles to a face, provided that the cover is not thereby decreased below the minimum shown on the Drawings.

Unless otherwise agreed by the Supervisor, all intersecting bars shall either be tied together with a 1.6mm diameter soft annealed iron wire and the ends of the wire turned into the body of the concrete, or shall be secured with a wire clip of a type agreed by the Supervisor.

Reinforcement shall be rigidly fixed so that no movement can occur during concrete placing. Any fixings made to the formwork shall not be within the space to be occupied by the concrete being currently placed.

No splices shall be made in the reinforcement except where shown on the Drawings or agreed by the Supervisor. Splice lengths shall be as shown on the Drawings.

Reinforcement shall not be welded except where required by the Contract or agreed by the Supervisor.

## 4.5 CONCRETE

### 4.5.1 SCOPE OF SECTION

This section covers concrete and mortar required in the Permanent Works.

### 4.5.2 MATERIALS FOR CONCRETE

#### (a) General

The Contractor shall submit to the Supervisor full details of all materials which he proposes to use for making concrete. No concrete shall be placed in the Permanent Works until the Supervisor has approved the materials of which it is composed. Approved materials shall not thereafter be altered or replaced by other materials without the consent of the Supervisor.

#### (b) Cement

Cement shall comply with the following Standards:

- MKS B.C1.011 for ordinary Portland cement (OPC)
- MKS B.C1.011 for rapid hardening Portland cement (RHC)
- MKS B.C1.014 for sulphate resisting Portland cement (SRC)
- MKS B.C1.009 for white or coloured Portland cement (WPC) or (CPC)
- MKS B.C1.013 for low heat Portland cement (LHPC)

Cement shall be free flowing and free of lumps. It shall be supplied in the manufacturer's sealed unbroken bags or in bulk as per MKS B.C1.012.

#### (c) Aggregates for concrete

Aggregates for concrete shall conform to the requirements for fine and coarse aggregates in MKS U.M1.057. Aggregates shall be delivered to Site in clean arid suitable vehicles. Different types or sizes of aggregate shall not be delivered in one vehicle.

Each type or size of aggregate shall be stored in a separate bin or compartment having a base such that contamination of the aggregate is prevented. Dividing walls between bins shall be substantial and continuous so that no mixing of types or sizes occurs. The storage of aggregates shall be arranged so that as far as possible rapid drying out in hot weather is prevented in order to avoid sudden fluctuations in water content. Storage of fine aggregates shall be arranged so that they can drain sufficiently before use in order to prevent fluctuations in water content of the concrete.

If the Contractor intends to place concrete during cold weather, storage of aggregates shall be arranged so that ice or snow does not become mixed with them. If the Contractor proposes to heat aggregates in cold weather the arrangements shall ensure substantially uniform heating and shall not cause the introduction of additional works.

(d) Water for concrete and mortar

Water for mixing or curing concrete or mortar shall not contain more than the following concentrations of impurities in accordance to MKS U.M1.058:

	<u>Max. mg/litre</u>
The sum of sulphates, alkali carbonates and bicarbonates	1000
Chlorides	500
Suspended solids	2000
Other dissolved solids	2000

At the commencement of the Works the Contractor shall send a sample of the water proposed for concrete and mortar to an accredited laboratory capable of carrying out the full analysis of potable water. The results of the analysis shall be submitted to the Supervisor

Water to be used for mixing concrete or mortar shall be tested in accordance with MKS U.M1.058 and shall comply with the recommendations for the Initial Setting Time test and the Compressive Strength test. If the source of water is changed it shall be tested as above. If water contains 80 percent of the maximum concentration of impurities properties given above it shall be retested at two monthly intervals.

**4.5.3 CLASSES OF CONCRETE**

The classes of structural concrete to be used in the Permanent Works shall be those shown on the Drawings. The classes are designated in Table 6.3.

Table 6.3

Grade of concrete	Minimum Cement Content kg/m <sup>3</sup>	Maximum Water/Cement ratios		150 mm cubes required minimum average 28 day strength (MAS) N/mm <sup>2</sup>
		A	B	
MB 10	200	0.59		27
MB 15	250	0.57		28.5
MB 20	300	0.53	0.50	30
MB 25	320	0.51	0.48	31.5
MB 30	360	0.49	0.46	33
MB 35	380	0.45	0.42	

Note: MAS = Required Minimum Average 28 day strength

For each grade of concrete in production at each plant for use in the Permanent Works, samples of concrete shall be taken at the point of mixing or of deposition as instructed by the Supervisor and in the presence of a representative of the Supervisor, all in accordance with the sampling procedures described in MKS U.M1.004.

The slump of each sample carried out in accordance with MKS U.M1.004 shall be determined at the time of sampling. Samples shall be taken on the basis of one for each 20m<sup>3</sup> of concrete placed but in any case not less than one sample per day or one sample for each pour of concrete placed, whichever is the more frequent. Three 150 mm test cubes shall be cast from each sample, cured and tested as set out in MKS U.M1.004. One cube shall be tested at seven days and two at 28 days. The average strength of the two cubes crushed at 28 days shall be referred to as one test result.

Concrete shall be deemed to comply with the strength specified if the average strength of any four consecutive test results (8 cubes) exceeds the final average trial mix strength minus 2N/mm<sup>2</sup> for the grade of concrete with no single test result (2 cubes) being less than 2 the final average trial mix strength minus 6 N/mm.

#### **4.5.4 MIXING CONCRETE**

Batching and mixing plants shall be modern efficient equipment complying with the requirements of MKS U.M1.045 and capable of producing a uniform distribution of the ingredients throughout the mass. All mixing operations shall be under the control of an experienced Engineer.

After mixing for the required time, each batch shall be discharged completely from the mixer before any materials for the succeeding batch are introduced.

Mixers which have been out of use for more than 30 minutes shall be thoroughly cleaned before any fresh concrete is mixed and thereafter the first batch of concrete through the mixer shall contain only half the normal quantity of coarse aggregate. This batch shall be mixed for one minute longer than the time applicable to a normal batch.

#### **4.5.5 TRANSPORT OF CONCRETE**

The concrete shall be discharged from the mixer and transported to the Works by means which shall prevent adulteration, segregation or loss of ingredients, and which shall ensure that the concrete is of the required workability.

The time elapsing between mixing and placing a batch of concrete shall be as short as possible, and in any case no longer than will permit completion of placing and compaction before the onset of initial set. If the placing of any batch of concrete is delayed beyond this period, the concrete shall not be placed in the Permanent Works.

#### **4.5.6 PLACING OF CONCRETE**

Concrete shall not be placed in any part of the Permanent Works until the Supervisor Representative's consent has been given in writing, and the Contractor shall give the Supervisor at least 24 hours notice of his intention to place concrete.

If concrete placing is not commenced within 24 hours of the Supervisor's consent, the Contractor shall again request written consent as specified above.

##### **(a) Preparation of surfaces to receive concrete**

Existing concrete surfaces shall be prepared. Before deposition of further concrete they shall be clean, hard and sound and if required by the Supervisor shall be wet but without any freestanding water.

Any flow of water into an excavation shall be diverted through proper side drains to a sump, or be removed by other suitable methods which will avoid washing away the freshly deposited concrete or any of its constituents. Any underdrains constructed for this purpose shall be completely grouted up when they are no longer required by a method agreed by the Supervisor.

If so instructed by the Supervisor rock surfaces against which concrete is to be placed shall receive a prior coating of mortar mixed in the proportions similar to those of the fines portion in the concrete to be placed. The

mortar shall be kept ahead of the concrete. The mortar shall be well worked into all parts of the excavated surfaces and shall be not less than 5mm thick.

The amount of mortar placed at any one time shall be limited so that it does not dry out or set before being covered with concrete.

#### (b) Placing procedures

The concrete shall be deposited as nearly as possible in its final position. It shall be placed so as to avoid segregation of the concrete and displacement of the reinforcement, other embedded items, or formwork. It shall be brought up in layers approximately parallel to the construction joint planes and not exceeding 500mm in compacted thickness unless otherwise permitted or directed by the Supervisor, but the layers shall not be less than four times the maximum nominal size of aggregate in thickness.

Layers shall not be placed so that they form feather edges nor shall they be placed on a previous layer which has taken its initial set.

In order to comply with this requirement, a layer may be started before completion of the preceding layer.

All the concrete in a single bay or pour shall be placed as a continuous operation. It shall be carefully worked round all obstructions, irregularities in the foundations and the like so that all parts are completely full of compacted concrete with no segregation or honeycombing. It shall also be carefully worked round and between waterstops, reinforcement, embedded steelwork and similar items which protrude above the surface of the completed pour.

All work shall be completed on each batch of concrete before its initial set commences and thereafter the concrete shall not be disturbed before it has set hard. No concrete that has partially hardened during transit shall be used in the Permanent Works and the transport of concrete from the mixer to the point of placing shall be such that this requirement can be complied with.

Concrete shall not be placed during rain which is sufficiently heavy or prolonged to wash mortar from coarse aggregate on the exposed faces of fresh concrete. Means shall be provided to remove any water accumulating on the surface of the placed concrete. Concrete shall not be deposited into such accumulations of water.

In drying weather, covers shall be provided for all fresh concrete surfaces which are not being worked on. Water shall not be added to concrete for any reason.

When concrete is discharged above its place of final deposition, segregation shall be prevented by the use of chutes, downpipes, trunking, baffles or other appropriate devices.

Forms for walls, columns and other thin sections of significant height shall be provided with openings or other devices that will permit the concrete to be placed in a manner that will prevent segregation and accumulations of hardened concrete on the formwork or reinforcement above the level of the placed concrete.

#### **4.5.7 COMPACTION OF CONCRETE**

The concrete shall be fully compacted throughout the full extent of the placed layer. It shall be thoroughly worked against the formwork and around any reinforcement and other embedded items, without displacing them. Particular care shall be taken at arises and other confined spaces. Successive layers of the same pour shall be thoroughly worked together.

Concrete shall be compacted with the assistance of mechanical immersion vibrators, unless the Supervisor agrees with another method.



Immersion vibrators shall operate at a frequency of between 7000 and 10000 cycles per minute. The Contractor shall ensure that vibrators are operated at pressures and voltages not less than those recommended by the manufacturer in order that the compacting effort is not reduced.

#### **4.5.8 PROTECTION OF FRESH CONCRETE**

Freshly placed concrete shall be protected from rainfall and from water running over the surface until it is sufficiently hard to resist damage from this cause.

No traffic shall be allowed on any concrete surface until such time as it is hard enough to resist damage by such traffic.

Concrete placed in the Permanent Works shall not be subjected to any structural loading until it has attained at least its minimum average strength as defined.

#### **4.5.9 MORTAR**

This clause covers mortar for use ahead of concrete placing, and other uses not covered elsewhere in this Specification. Mortar shall be composed of fine aggregate and type of cement specified in the Drawings. The mix proportions shall be as stated on the Drawings or if not stated shall be one part of cement to two parts of fine aggregate by weight.

Small quantities of mortar may be hand mixed but for amounts over 0.5 m<sup>3</sup> a mechanical mixer shall be used. The water content of the mortar shall be as low as possible consistent with the use for which it is required but in any case the water/cement ratio shall not be more than 0.5.

#### **4.5.10 GROUTING OF POCKETS AND HOLES**

Pockets and holding-down bolts holes shall be thoroughly cleaned out using compressed air and water jet. Holes drilled by a diamond bit shall be roughened. The pockets and holes shall be filled with grout consisting of cement and clean fresh water mixed in proportion of two parts by weight of cement to one part by weight of water.

The space between the top surface of foundation concrete and the underside of base plates shall be filled with a special mortar made up in the following proportions:

- Portland cement      50 kg
- Fine aggregate      50 kg

An additive acceptable to the Supervisor to counteract shrinkage in proportions recommended by the manufacturer.

The special mortar shall be mixed with the lowest water-cement ratio which will result in a consistency of mix of sufficient workability to enable maximum compaction to be achieved. The special mortar shall then be well rammed in horizontally below the base plate and from one edge only until it is extruded from the other three sides. The mortar which has extruded shall then be rammed back to ensure complete support without voids.

#### **4.5.11 PURCHASED UNITS**

If the Contractor proposes to purchase precast units from a supplier, he shall ensure that such units comply with the requirements of the Specification and shall carry out any tests which the Supervisor may require to check compliance.

Units shall not be obtained from any supplier who refuses free access by the Supervisor to the factory to inspect and test materials and workmanship.

## 4.6 ASPHALT LAYERS

### 4.6.1 TYPES OF ASPHALT MIXTURES OBTAINED THROUGH HOT MIXING

The requirements given in these Specifications are also applied on the asphalt mixtures, used for construction of the following layers of pavement constructions:

Layer	Regulation
Asphalt bearing and wearing layers (BNS and BNHS)	MKS.U.E9.021

Except for these basic asphalt layers, the regulations given in this item shall also apply to the requirements for:

Asphalt masses for fixing pavement connections	MKS.U.M3.095
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Asphalt masses for fixing pavement connections are defined with these Specifications.

### 4.6.2 REGULATIONS OBSERVED:

#### Testing of stone materials, sand and stone dust

Regulations	
MKS.B.B0.001	Natural aggregate and stone sampling.
MKS.B.B3.045	Filler for carbohydrate mixtures. Specifications.
MKS.B.B3.050	Specifications for stone aggregates for fabrication of contemporary road pavements (surfacing).
MKS.B.B3.100	Stone aggregates. Fractionated stone aggregates for concrete and asphalts. Basic quality conditions.
MKS.B.B0.001	Testing stone resistance to ice.
MKS.B.B8.002	Testing natural stone. Resistance during testing with dilution of sodium sulphate.
MKS.B.B8.010	Quantity of water absorbed by the natural stone.
MKS.B.B8.012	Natural stone, testing resistance to pressure.
MKS.B.B8.014	Testing tenacity of stone.
MKS.B.B8.015	Testing resistance of natural stone to wearing with grinding.
MKS.B.B8.016	Testing resistance of crushed stone against shock and pressure.
MKS.B.B8.017	Testing resistance of stone to bending.
MKS.B.B8.029	Stone aggregates. Determination of granular composition.
MKS.B.B8.030	Testing sand and gravel.
MKS.B.B8.031	Stone aggregates. Determination of weight by volume and absorption of water.
MKS.B.B8.032	Stone aggregates. Weight by volume with pores and caverns; Weight by volume without pores and caverns; Coefficient of weight by volume and porosity.
MKS.B.B8.034	Determination of percentage of light particles in stone aggregates.
MKS.B.B8.035	Sand-gravel. Determination of percentage of light particles with wet screening method.
MKS.B.B8.036	Stone aggregates. Determination of percentage of light particles with wet screening method.
MKS.B.B8.037	Determination of fragile grains in aggregate.
MKS.B.B8.039	Approximate determination of organic pollution of aggregates with colorimetric analysis.
MKS.B.B8.044	Natural and crushed stone aggregates. Resistance to ice according to the method using sodium sulphate.
MKS.B.B8.045	Stone aggregates. Resistance to wearing according to the method: "Los Angeles".
MKS.B.B8.047	Shape and appearance of aggregate grains.
MKS.B.B8.101	Filler. Weight by volume of filler without caverns.
MKS.B.B8.102	Filler. Determination of caverns in the filler in dry and compact condition.
MKS.B.B8.103	Filler. External appearance.

Regulations	
MKS.B.B8.104	Filler. Hardening index.
MKS.U.B1.018	Testing 0.02 mm particles with aerometry.
MKS.L.J9.010	Laboratory screens.

### Testing of bitumen, bituminous emulsions and diluted bitumen

Regulations	
MKS.B.H8. 605	Testing of bitumen. Paraffin contents
MKS.B.H8. 610	Testing of bitumen. Sampling
MKS.B.H8. 611	Testing of bitumen. Preparation of samples
MKS.B.H8. 612	Testing of bitumen. Determination of penetration
MKS.B.H8. 613	Testing of bitumen. Softening point according to “PK”
MKS.B.H8. 614	Testing of bitumen. Penetration index
MKS.B.H8. 615	Testing of bitumen. Ductility
MKS.B.H8. 616	Testing of bitumen. Breaking point according to FRAAS
MKS.B.H8. 612	Testing of bitumen. Non-soluble contents
MKS.B.H8. 618	Testing of bitumen. Relative density
MKS.B.H8. 619	Testing of bitumen. Loss of mass at +163° C
MKS.B.H8. 620	Testing of bitumen. Dynamic viscosity
MKS.B.H8. 621	Testing of bitumen. Cinematic viscosity
MKS.B.U8.622	Testing of bitumen. Quantity of ashes
MKS.U.M3.010	Bitumen for road pavement (surfacing)
MKS.U.M3.020	Bituminous emulsions
MKS.U.M3.022	Anionic bituminous emulsion
MKS.U.M3.024	Cationic bituminous emulsion
MKS.U.M3.030	Diluted bitumen for road pavement (surfacing)
MKS.U.M3.090	Sampling from asphalt mixtures and asphalt masses for fixing pavement connections
MKS.L.J9.010	Laboratory screens

### Testing of carbohydrate (asphalt) mixtures

Regulations	
MKS.U.M8.081	Weight by volume
MKS.U.M8.082	Virtual weights by volume of mineral and asphalt mixtures
MKS.U.M8.090	“Marshall” testing
MKS.U.M8.093	Weight by volume and contents of caverns
MKS.U.M8.094	Water absorption of asphalt samples taken from the pavement
MKS.U.M8.095	Bulging under water
MKS.U.M8.099	Water contents
MKS.U.M8.100	Composition of connective materials
MKS.U.M8.102	Granulometric composition
MKS.L.J9.010	Laboratory screens

### 4.6.3 ASPHALT BEARING / WEARING LAYER- BNS (BNHS)

The asphalt layer of bituminized granular rock material produced at asphalt mixing plants through hot mixing is defined by MKS.U.E9.021/86 Standard.

In these technical specification, the asphalt layer is referred to as asphalt bearing layer and is marked by an abbreviation BNS.

Under permanent road exploitation the asphalt bearing layer serve as wearing layer, in which case this is referred to as asphalt wearing course and is marked by an abbreviation BNHS.

According to the greatest grain diameter in the stone material there are the following types of BNS and BNHS:

- BNHS 16 with grains from 0-16mm;

- BNS 22 with grains from 0-22mm;
- BNS 32 with grains from 0-32mm;
- BNS 45 with grains from 0-45mm;

The preparation of BNS and BNHS includes procurement of standardized fine aggregate and binder (bitumen), production of asphalt road mixes for BNS and BNHS and application according to the MKS.U.E9.021/86. Production and application of asphalt road mixes for BNS and BNHS shall be done under favourable weather conditions, when the temperature of the base and the air is not lower than +5°C and there is no wind.

#### 4.6.4 RECIPE FOR PRODUCTION OF TRIAL ASPHALT MIXTURE AND TRIAL SECTION

From the basic materials tested - crushed stone, sand, stone dust and bitumen, with proved quality for usability and production of adequate asphalt mixture. The Contractor shall provide (in his own, or other authorized institution), a recipe for production of trial asphalt mixture for pavement structure according to MKS. U. E9.021/86 standard.

The Contractor is obliged to submit the proposal for composition of trial asphalt mixture to the Supervisor, at least 15 days prior to its application.

The trial recipe with verified physical-mechanical characteristics shall satisfy the requirements specified in Table 3.9

**Table 3.9 Physical-mechanical characteristics/trial recipe/**

Physical-mechanical characteristics	Table of traffic load		
	Moderate	Very light and light	Very light and light
	BNS 22A	BNS 22A	BNHS 16A
	BNS 22B	BNS 22B	BNHS 16B
	BNS 22V	BNS 22V	BNHS 16V
	-	BNS 22G	BNHS 16G
	BNS 32A	BNS 32A	
	BNS 32B	BNS 32B	
	BNS 32V	BNS 32V	
	-	BNS 32G	
Stability 60°(KN)	6	3	4
Stiffness (KN/mm) min.	2.2	1.8	1.4
Content of voids % (v/v)	4-9	3-9	1-4
Filled voids %	to be verified	to be verified	to be verified

After the approval, the trial section shall be constructed. The Supervisor shall select the place for construction. The trial section serves for determination of the technological process of production of asphalt mixes for corresponding BNS or BNHS in the asphalt mixing plant as well as:

- transportation to the place;
- Means of application (rolling, number of compaction runs, control of the smoothing bar of the finisher and alike.)
- required equipment (finisher, compaction devices;
- evenness of the course;

The approval procedure for production and application of asphalt mixes for BNS and BNHS shall be considered completed with report of production and application of the asphalt mix for BNS and BNHS based on laboratory results from trial samples, taken from trial section that satisfy conditions given in MKS.U.E9.021 and Table 3.10 of these Specifications.

For each modification of the content of verified recipe, the procedure shall be repeated and new trial section shall be constructed.

**Table 3.10**

BNS properties /of finished course/	Type of traffic load		
	Heavy and moderate	Light and very light	Light and very light BNHS
Content of voids	3-9	2-10	2-6
Compaction degree %	98	97	97

## 4.7 TRANSPORT AND APPLICATION

### 4.7.1 TEMPERATURE OF BITUMEN AND ASPHALT MIXES FOR BNS AND BNHS

The temperature of bitumen in the heating tank and the temperature of the asphalt mix while being poured from the mixer is determined by the type of the applied bitumen.

**Table 3.11 Allowed temperature**

Type of bitumen for pavement	Temperature of bitumen in tank (°C)		Temperature of asphalt mixes when poured from mixer (°C)	
	optimum	maximum	optimum	maximum
BIT 200	130	140	140	160
BIT 130	135	150	145	165
BIT 90	140	160	150	170
BIT 60	150	165	160	175
BIT 45	160	175	170	180

### 4.7.2 TRANSPORT OF ASPHALT MIXES

The number of dumper trucks and their capacity and the transporting distance (asphalt mixing plant-place of incorporation and unloading into a finisher) shall be coordinated in time with the capacity for application. The full tracks shall not wait for unloading into a finisher as well as finisher shall not wait for the asphalt mixes. The finisher shall be enabled to operate continuously, without undesirable transverse and longitudinal uneven spots.

The dumper trucks shall have proper hydraulic devices for dumping. Their rear loading space shall be clean and covered to protect asphalt mixture during transportation.

### 4.7.3 APPLICATION AND COMPACTION OF THE ASPHALT MIXTURE

The application of BNS and BNHS shall start on the regularly prepared surface, even, clean, dry compacted, accepted and upon written approval issued by the Supervisor, in favourable weather conditions. Prior to application of the BNS and BNHS course, the surface of the sub-base shall be dried, cleaned, well compacted and uniformly sprinkled with bitumen emulsion to provide a required adhesion between the courses.

The bitumen emulsion shall be unstable emulsion (0.50-0.70 kg/m<sup>2</sup>) diluted bitumen. Prior to application of the asphalt mixture for BNS and BNHS, the bitumen emulsion shall be thoroughly evaporated and well bonded to the surface of the base.

For spraying of the bitumen emulsion, a cistern with automatic dosing of the anticipated quantity of emulsion per m<sup>2</sup> shall be used. The temperature of the base, during spraying, shall be beyond +10°C and the weather shall not be rainy or windy. All visible structural elements of road superstructure as curbs, gutters, shall be protected during spraying. Manual spraying shall be forbidden except on inaccessible places for mechanical spraying. Application of asphalt mixture upon insufficiently dried bitumen emulsion is strictly prohibited.

The application of asphalt mixture for BNS and BNHS course shall be done mechanically by the finisher with electronic control of the bar and with at least one vibration-compaction beam along the whole width of the formation level of the course with a capacity of a minimum 85% compactness of the layer for a 15 cm. layer thickness.

The capacity of the finisher shall correspond to the capacity of the asphalt-mixing plant.

Depending of the used type of bitumen, the temperature of the asphalt mixture shall be at least as presented below:

BIT 200	at least	110°C
BIT 130	at least	115°C
BIT 90	at least	120°C
BIT 60	at least	130°C

Compaction shall start from the lower edge to the higher, and the direction of the finisher shall always be in that direction of the formation level of the road. The individual traces of the rollers shall have sufficient overlapping. Standing of the rollers at one place during application of the course shall be forbidden. Places inaccessible for compaction by rollers shall be tamped by other compaction devices previously proposed by the Contractor and upon approval of the Supervisor.

## 4.8 QUALITY CONTROL

**Quality control shall consist of:**

- Previous checking of quality of main materials
- Parallel tests
- Control tests on asphalt

### 4.8.1 CONTROL TESTS ON ASPHALT

4.8.1.1 Control tests on main materials;

- Filler, at each 400t of supplied filler;
- Quarry fines and sand, at each 1.500m<sup>3</sup> of supplied fractions;
- Bitumen at each 500t of supplied bitumen;

After all construction works has been completed, the ground surface shall be shaped to conform to the contour or adjacent surfaces. General cleanup of the entire construction area shall otherwise comply with application requirements specified elsewhere in these Specifications.

After finishing of Permanent Works the Contractor shall remove all surplus materials and all tools and temporary structures from the Site. All dirt, rubbish and excess earth from the excavation shall be removed to a dump provided by the Contractor and the construction site left clean and acceptable to the Supervisor at the earlier possible date.

In roads, streets, footpaths, agricultural areas, fields, etc. where excavation works are to be carried out, the Contractor shall use appropriate equipment to ensure that damage to adjacent surfaces is minimized. Where the surface of the road is damaged because of the operations of the Contractor, he shall permanently reinstate the entire surface so damaged to its original condition.

All roads and pavement excavated or damaged and any damage to adjoining property caused by construction operations shall be restored or repaired by the Contractor at his own expense to a technically sound condition at least equal to that pertaining before the Contractor started work. Materials used and work done in such restoration and repair shall be of the same kind and dimensions.

The Contractor shall restore all paved surfaces, kerbing, sidewalks or other surfaces to their original conditions in such manner as to meet the requirements of applicable sections of these Specifications.

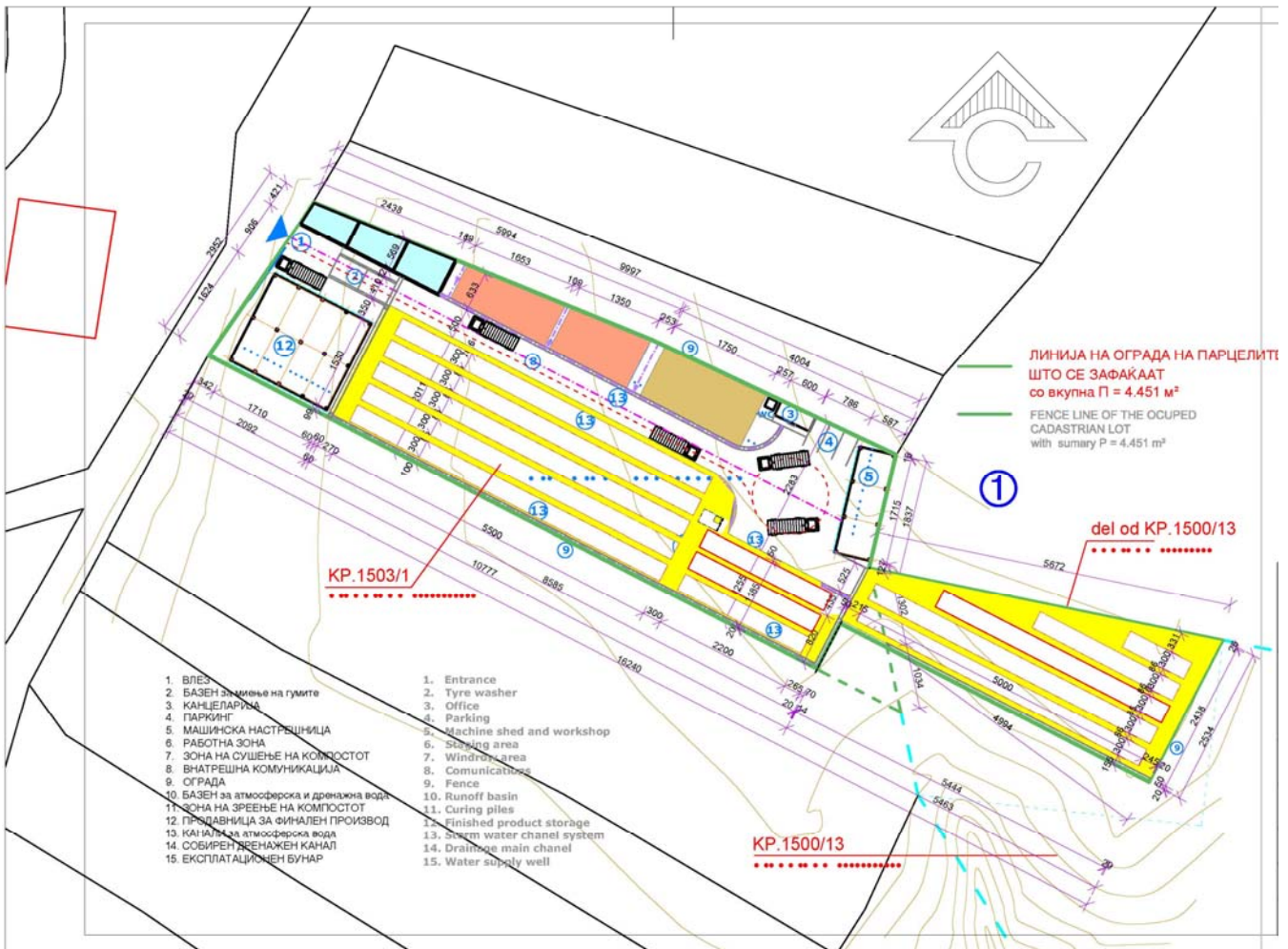


## **ANNEX VI**

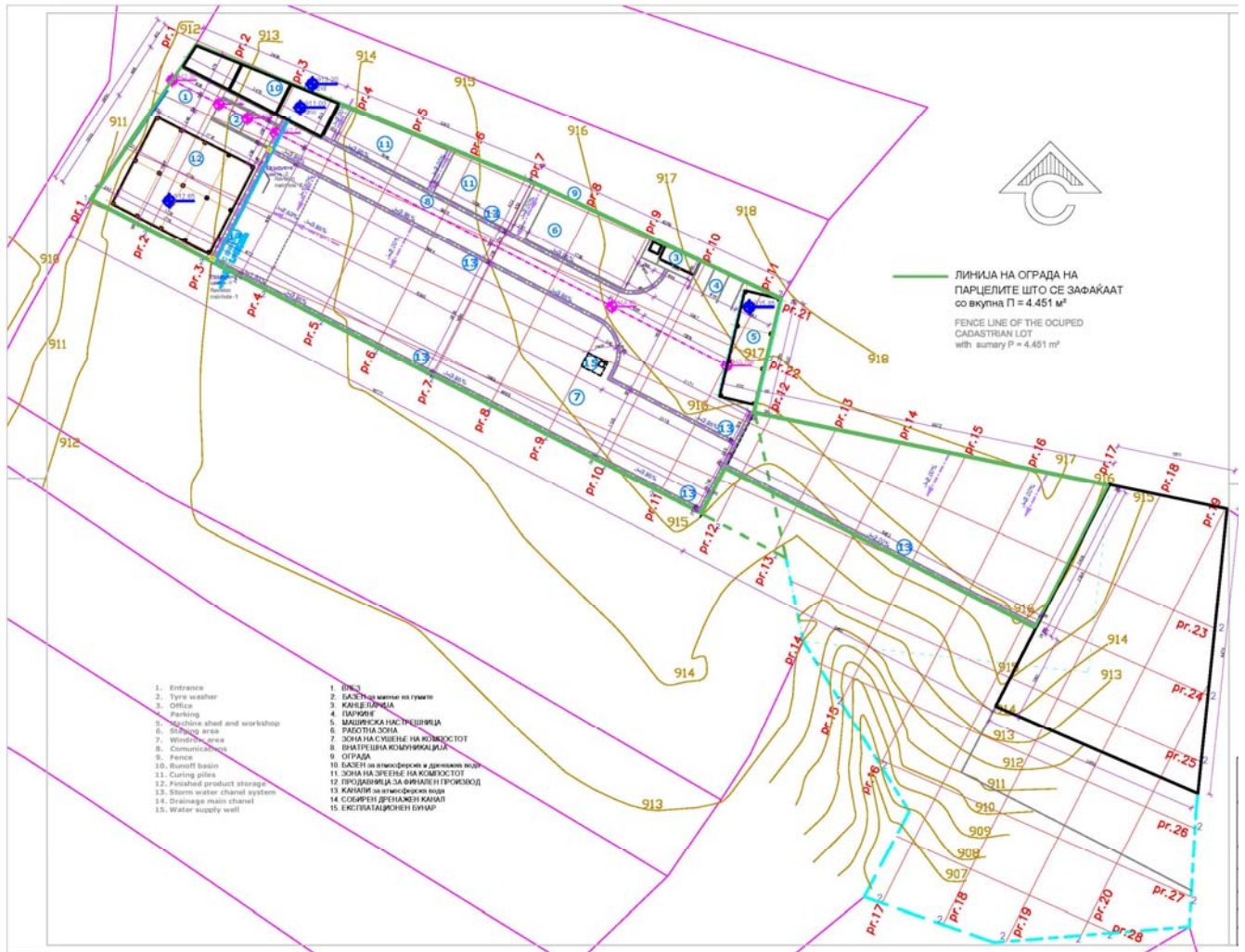
### **DRAWINGS**

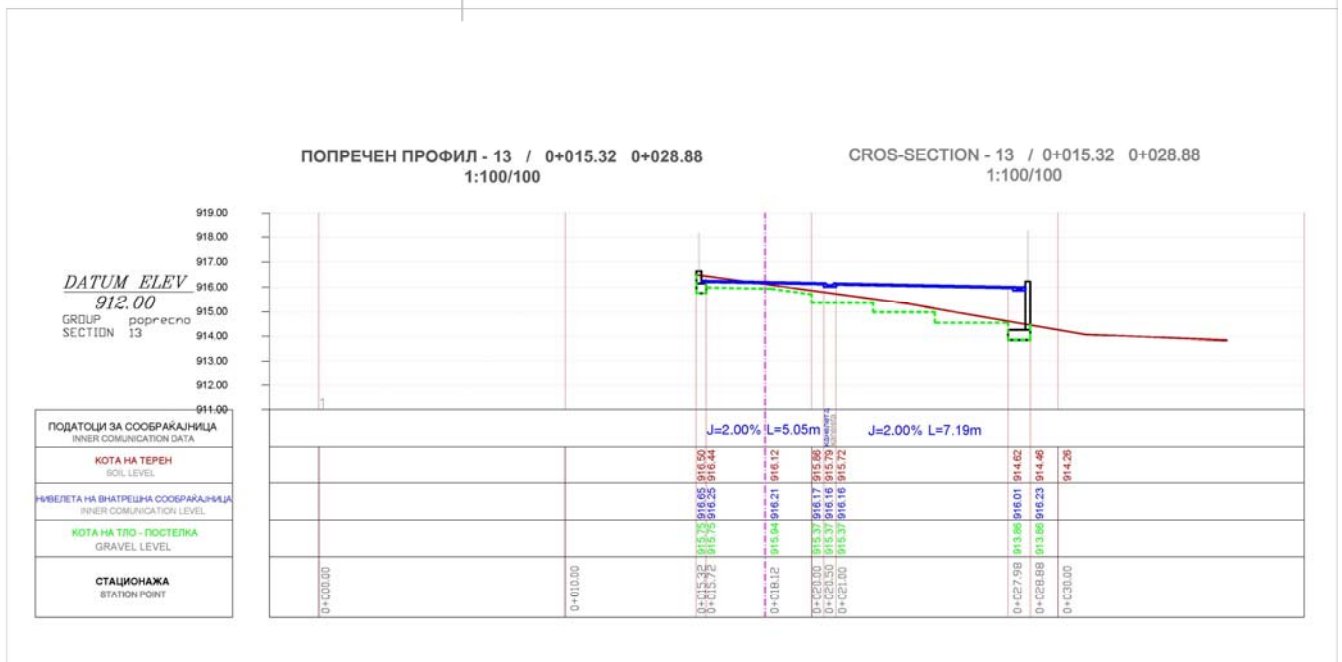
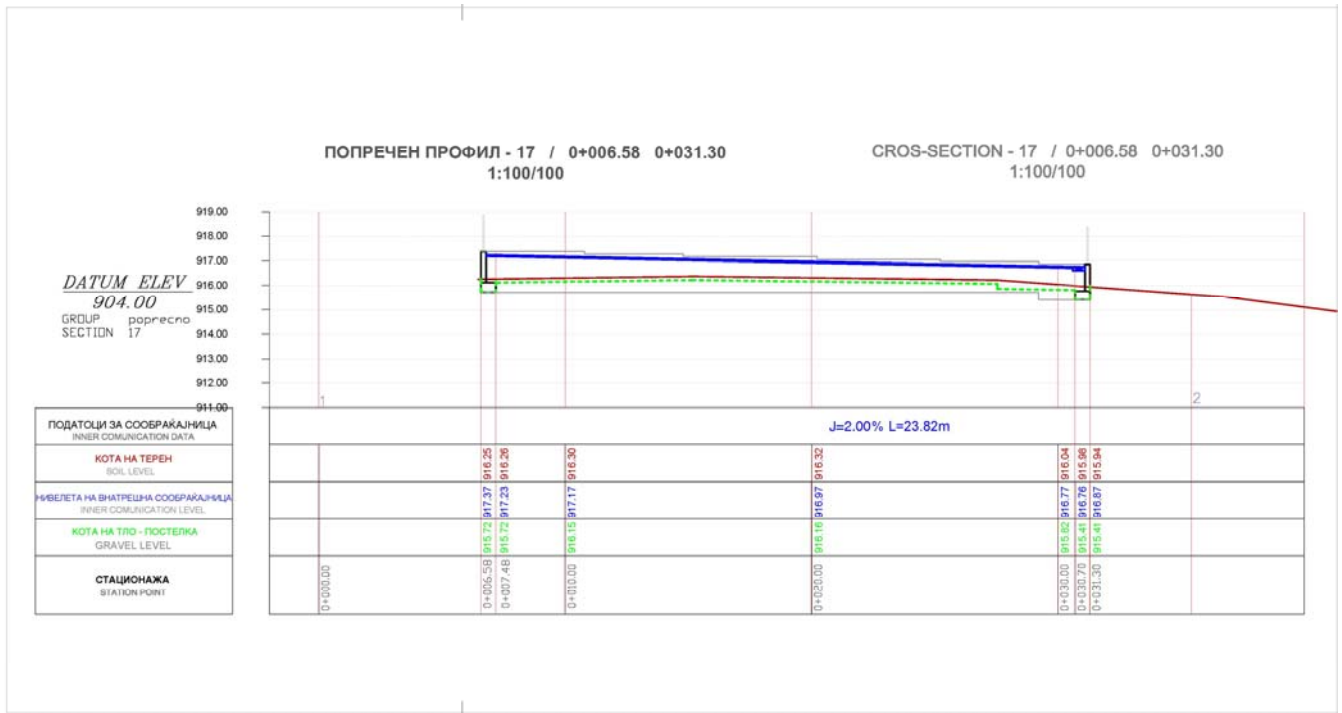
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- 2/ Site plan / Cross section net
- 3/ Cross section 13 and 17
- 4/ Cross section 11 and 12
- 5/ Cross section 3 and 4
- 6/ Cross section 2
- 7/ Cross section of Shop/storage for final compost
- 8/ Shop's/storage's for final product foundations
- 9/ Cross section and elevations of Mechanical workshop
- 10/ Mechanical workshop's foundations
- 11/ Intermediate Collecting Centres with 2 metal containers and 3 metal containers
- 12/ Water Intake / Water supply well
- 13/ Disinfecting basin

1/ Site plan / Area definition



2/ Site plan / cross section net



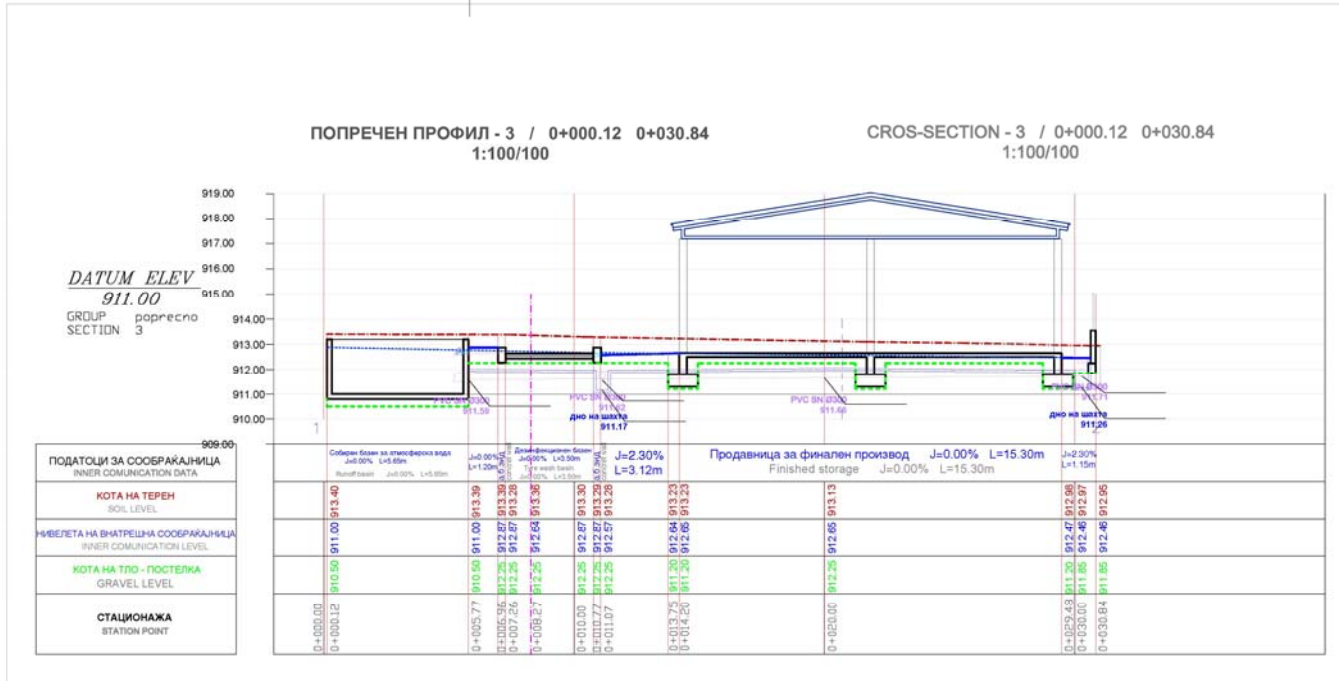
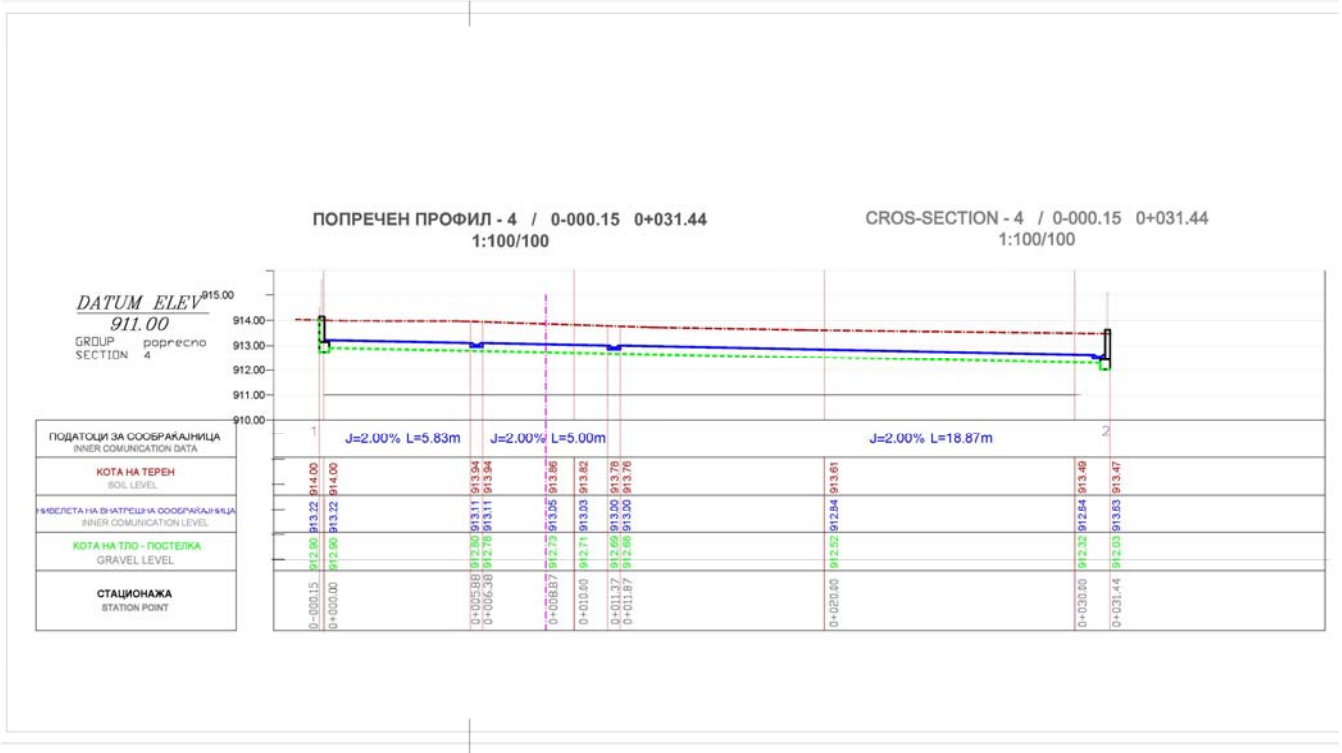


4/ Cross section 11 and 12



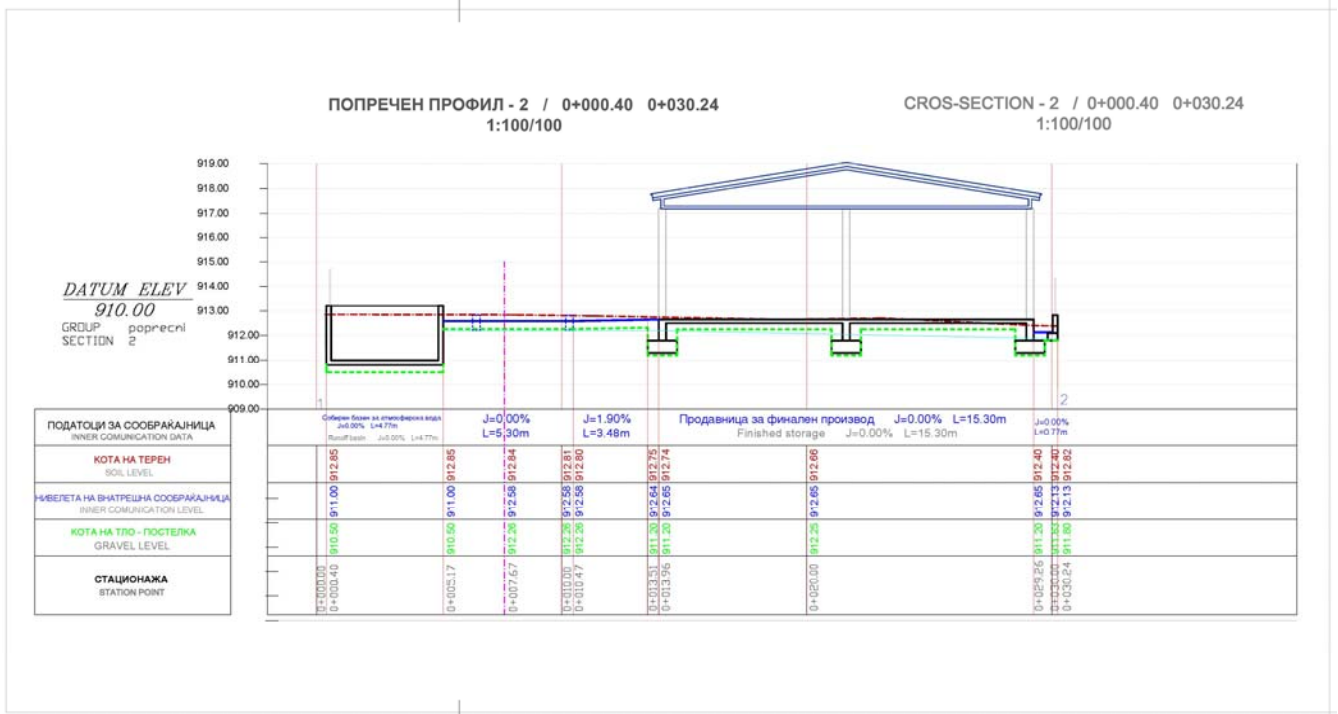


5/ Cross section 3 and 4

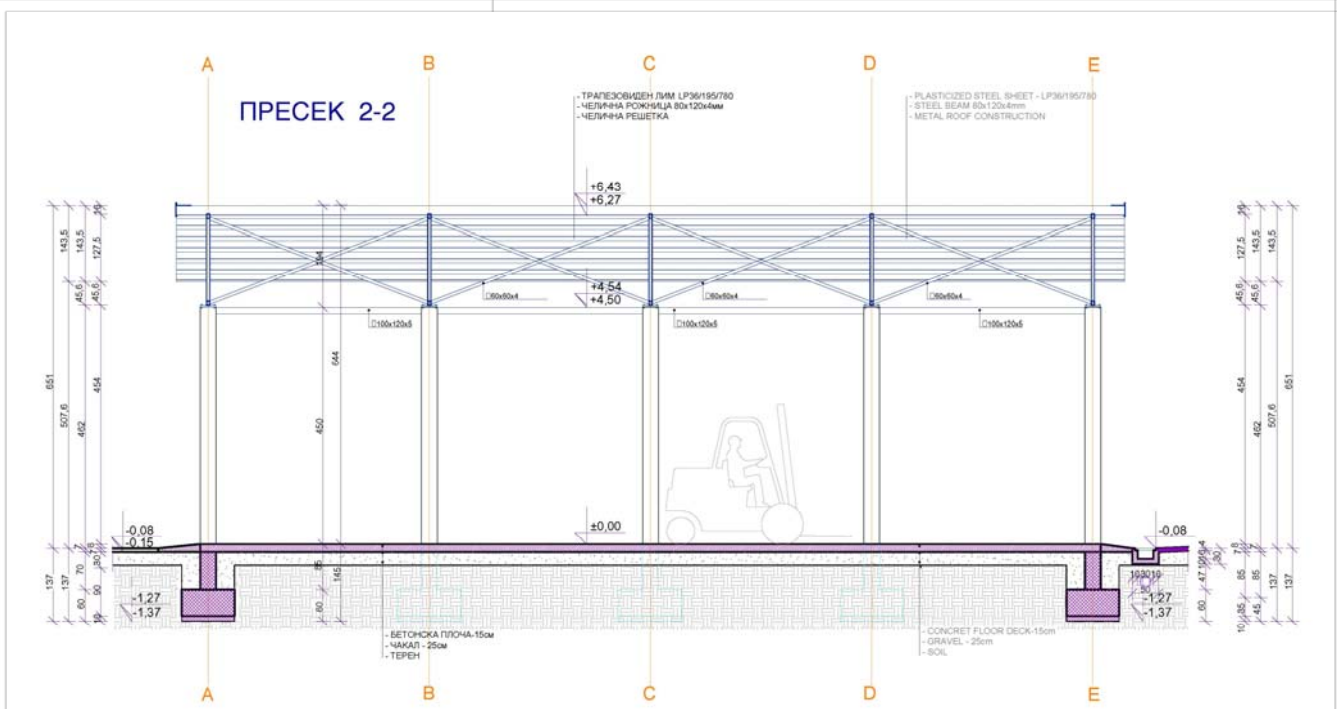
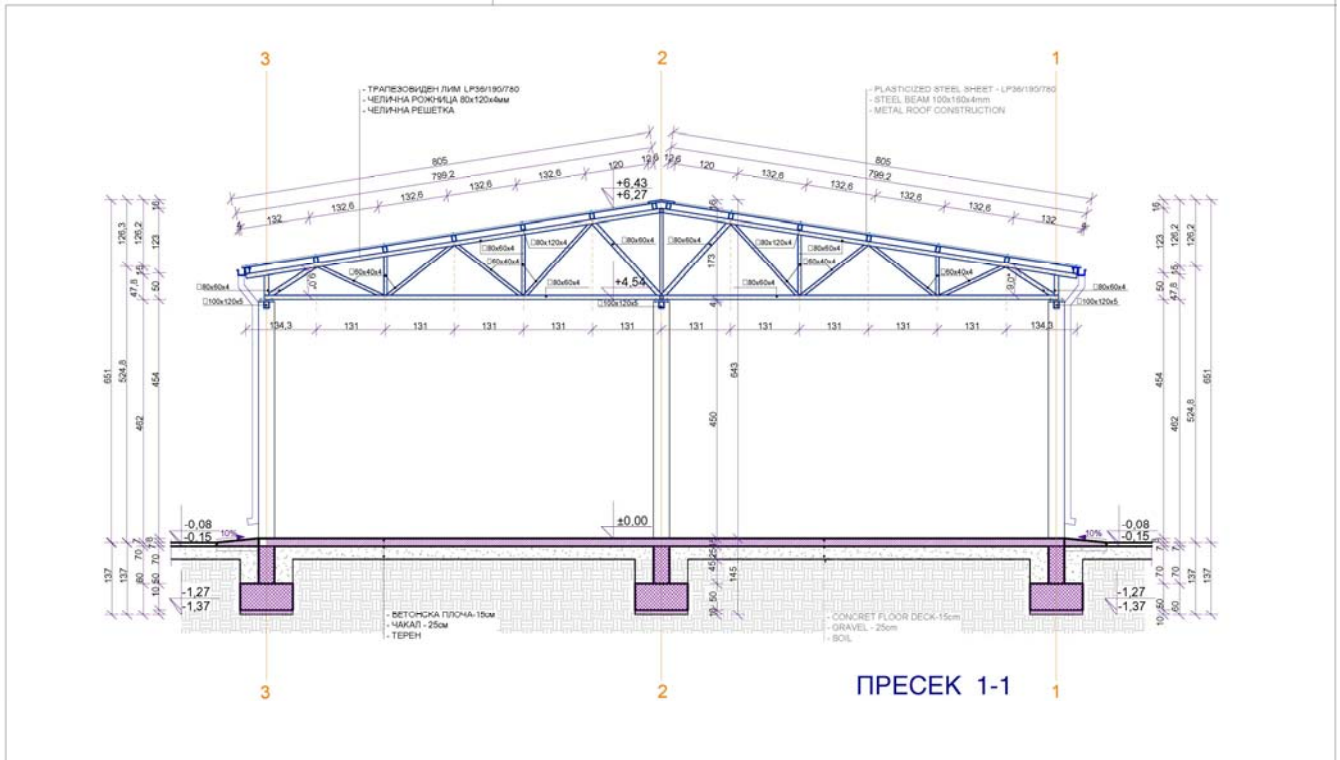




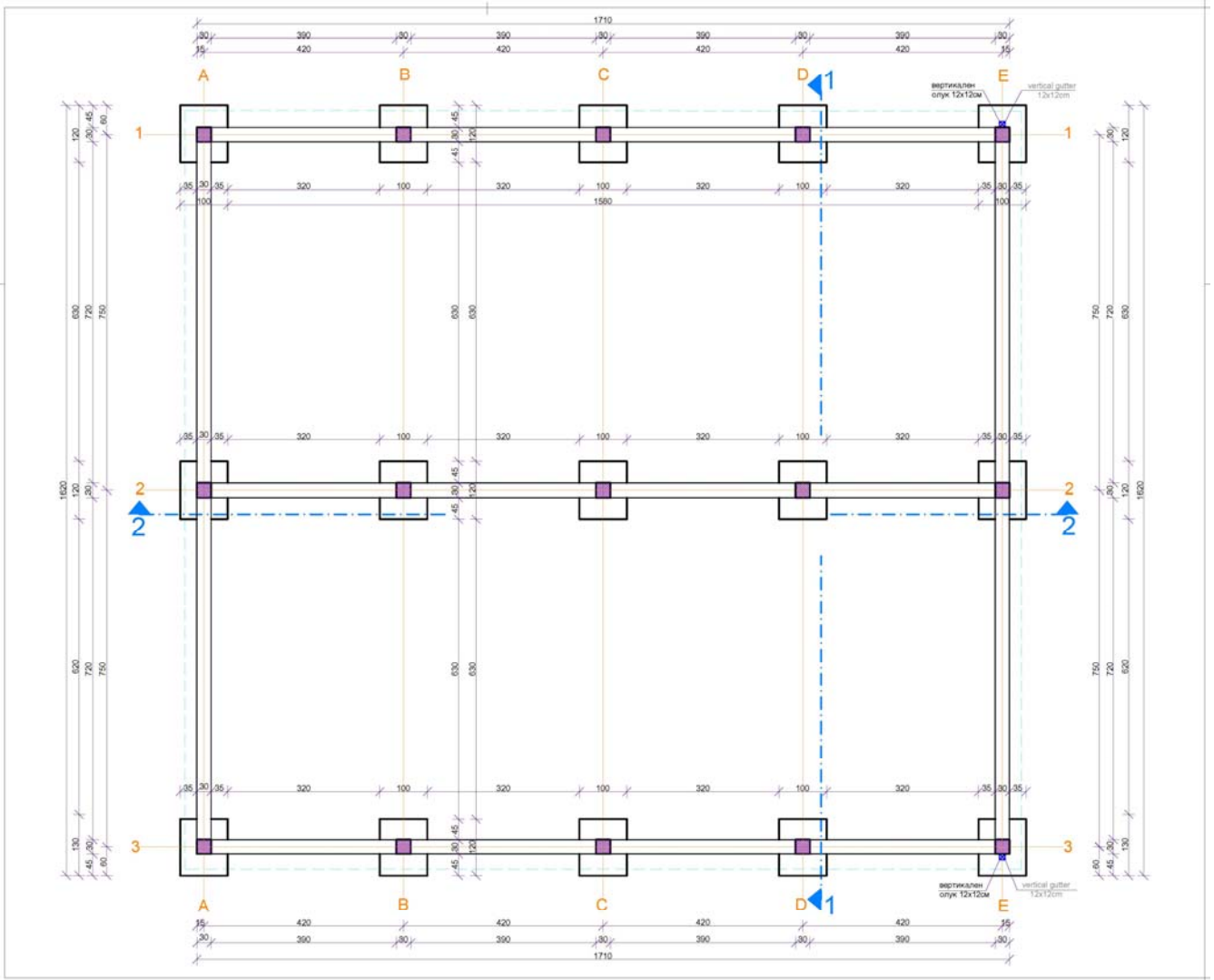
6/ Cross section 2



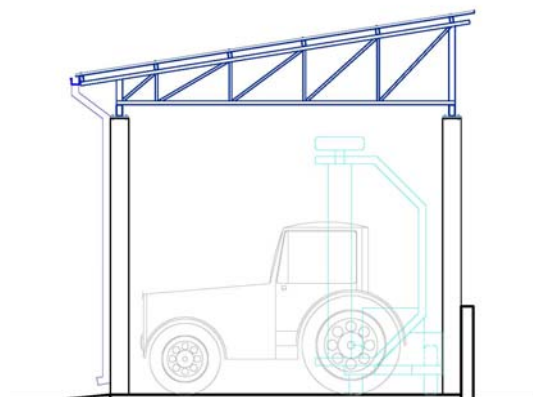
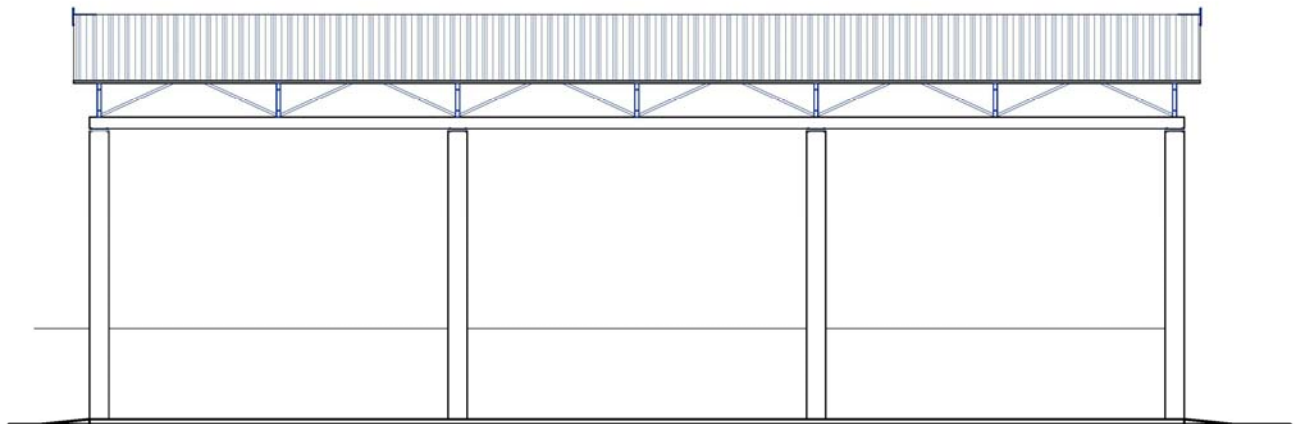
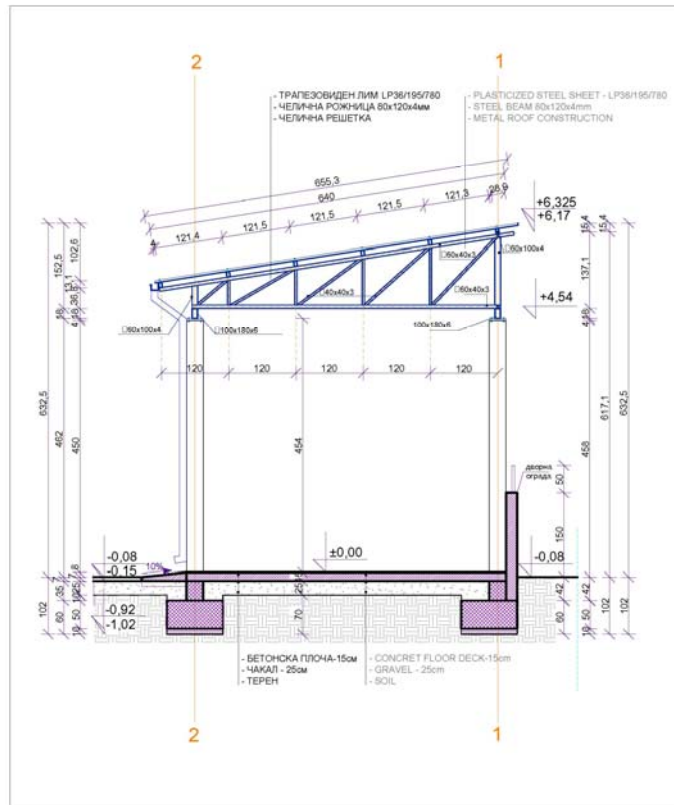
7/ Cross section of Shop/storage for final compost



8/ Shop's/storage's for final compost foundations

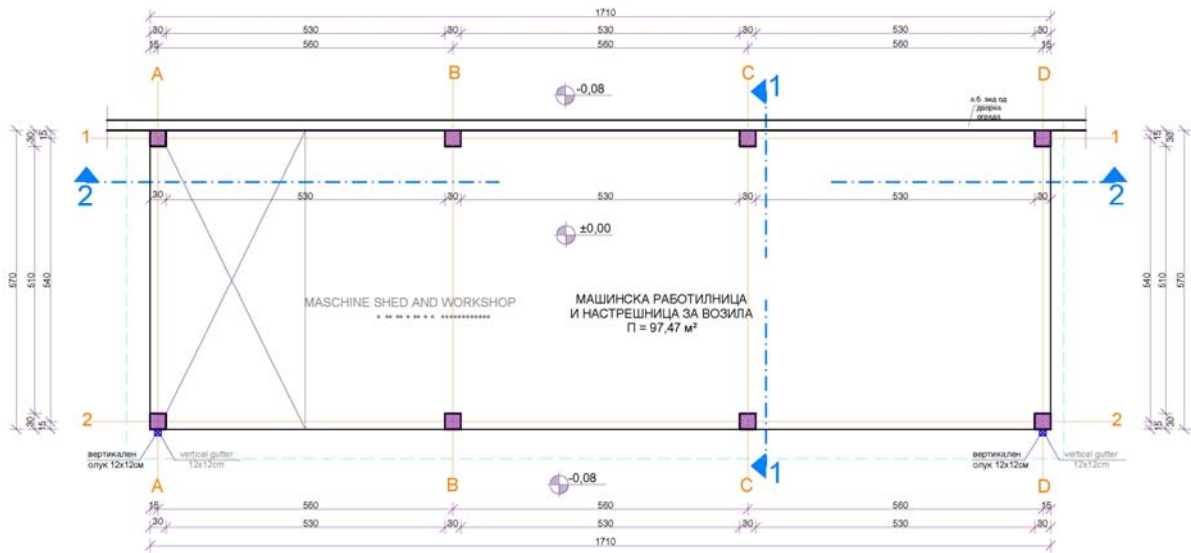
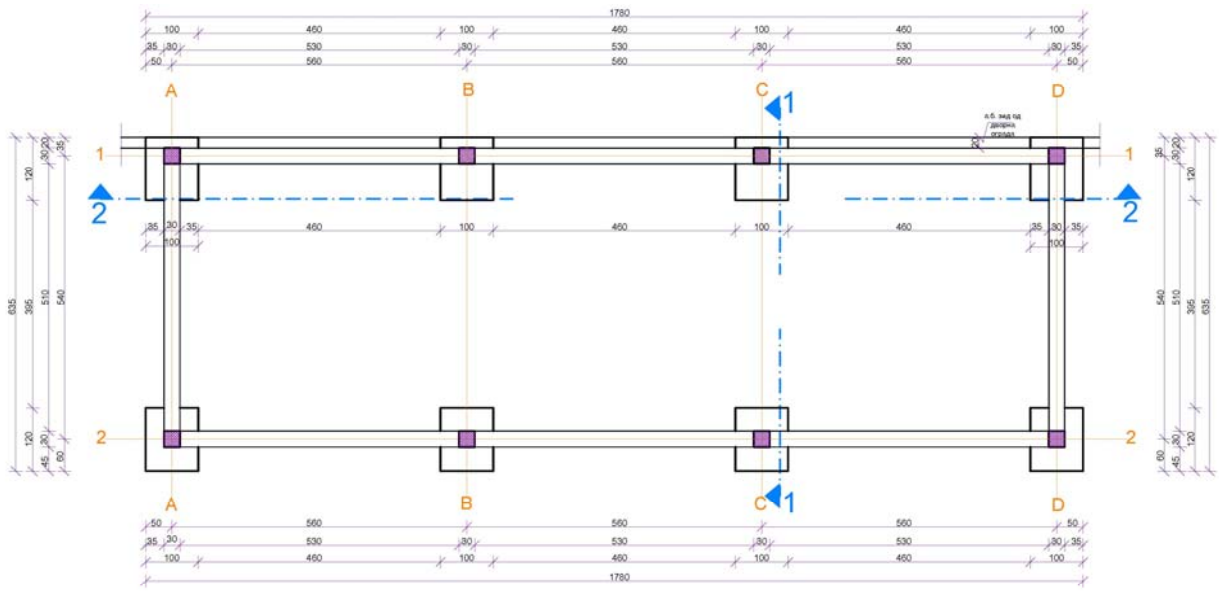


9/ Cross section and elevations of Mechanical workshop



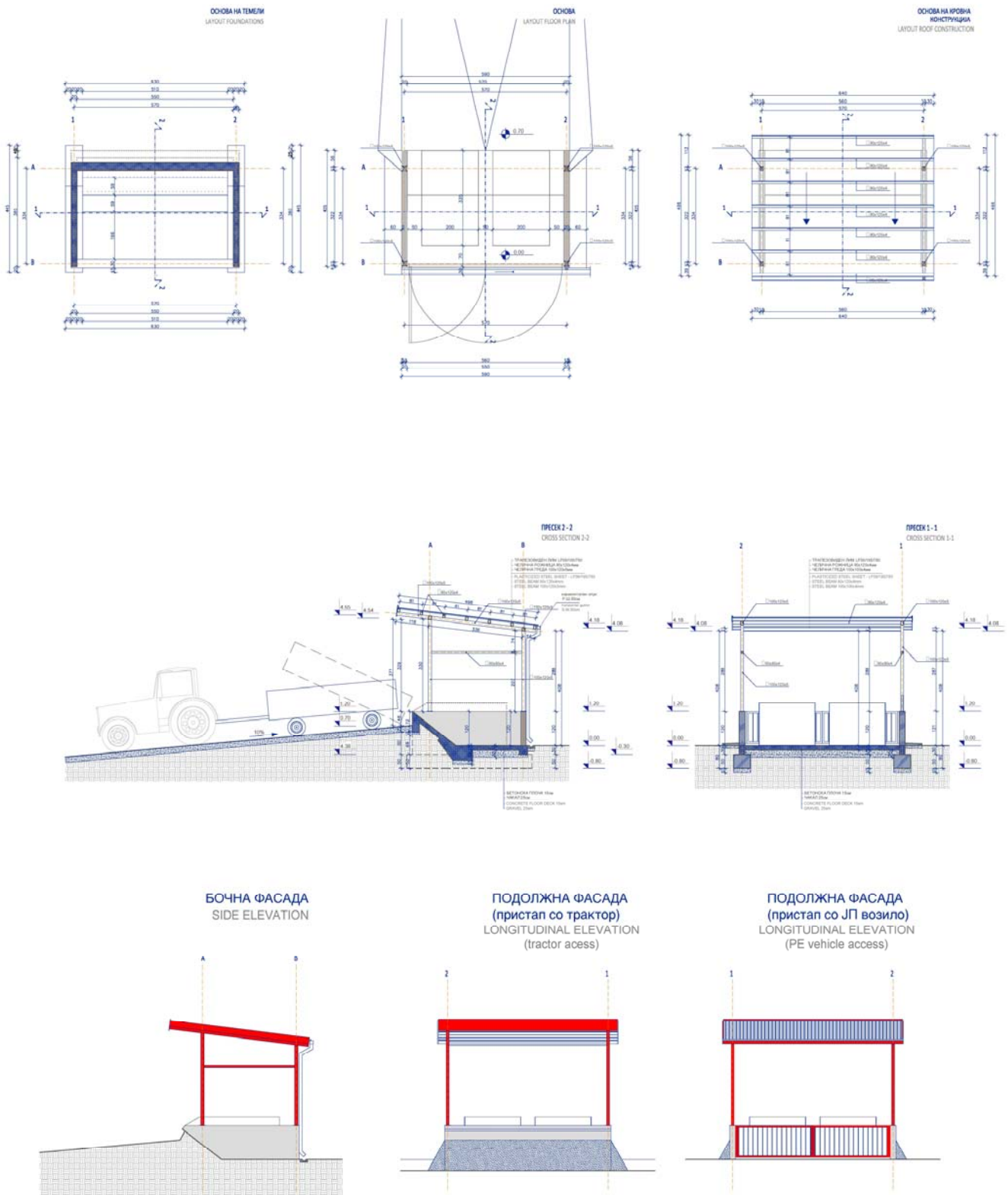
СТРАНИЧЕН ИЗГЛЕД  
SIDE ELEVATION

10/ Mechanical workshop's foundations



# 11/ Intermediate Collecting Centres with 2 metal containers and 3 metal containers

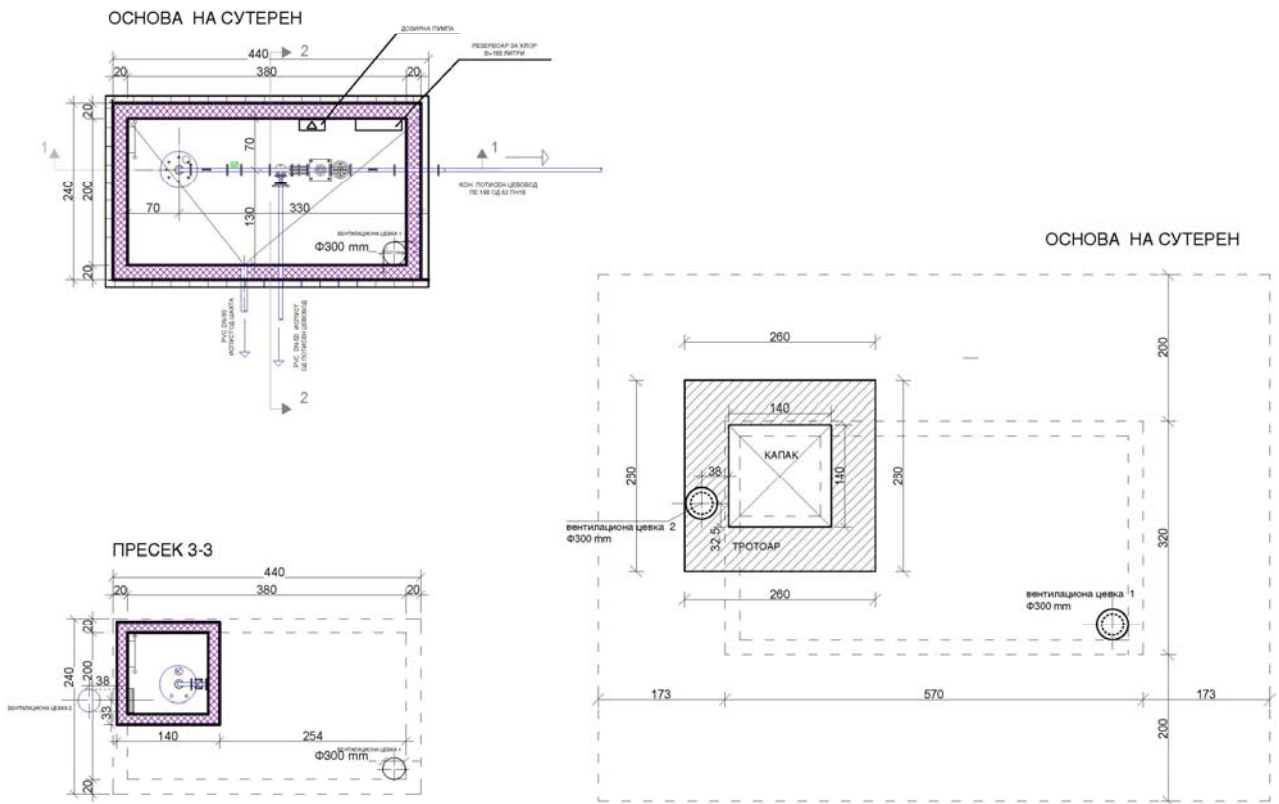
## 11.1 Intermediate Collecting Centres with 2 metal containers





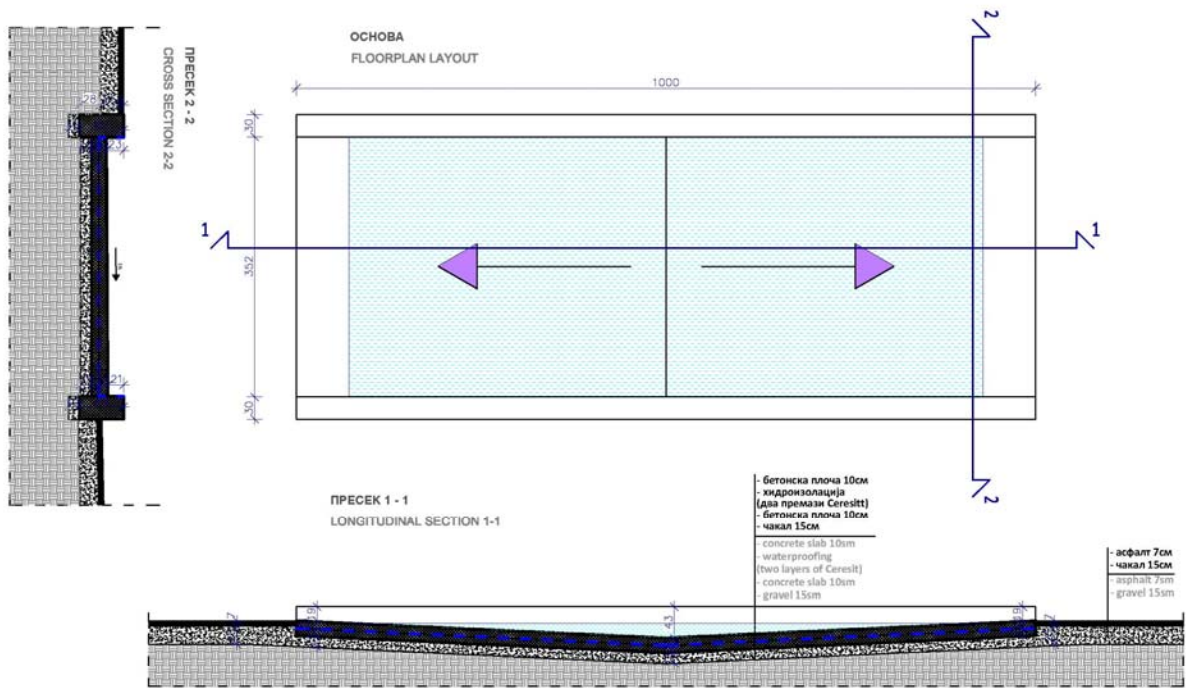


12/ Water Intake / Water supply Well



13/ Disinfecting basin

ДЕТАЛ НА БАЗЕН ЗА ДЕЗИНФЕКЦИЈА 1 : 50  
 DETAIL OF TIRE WASHER, 1 : 50



ANNEX VII  
BILL OF QUANTITIES

BOQ for Construction of the Structures on the Pilot Composting Plant and four (4) Intermediate Collecting Centres to support the establishment of Biodegradable Waste Management in Prespa Region

No.	Type of works	Unit	Quantity	Unit rate MKD	Amount MKD
<b>(I) Construction of Windrow Area</b>					
1.	<b>PRELIMINARY WORKS</b>				
1.1.	The contractor shall carry out pegging of the alignment of the tendered Design and all relevant surveying activities with special attention in transferring properly the information from the drawings. The contractor shall hand over to the Supervisor a pegged out route with all necessary topographic information in writing.	m <sup>2</sup>	4.451		
1.2.	The contractor shall carry out geotechnical investigation in accordance with the local statutory requirements. The Contractor is required to engage an approved and accredited specialist geotechnical firm with a certified laboratory to perform geotechnical investigation and provide geotechnical reports and other services as outlined hereafter	m <sup>2</sup>	4.451		
1.3.	The contractor shall carry out soil mechanic investigations to determine the bearing capacity of the soil, stability of the slopes and ground water table conform local statutory requirements.	Lump Sum	1		
1.4.	The contractor shall carry out up-grading and maintaining of a local road to bear heavy machinery needed for construction serving as Access Road to the building site during construction	Lump Sum	1		
1.5.	The contractor shall carry out compaction of the previously constructed sub-grade. The whole width of the sub-grade shall be mechanically or chemically stabilized .The excavated or filled sub-grade material shall be mechanically tamped (compacted) to ≥100% by normal Proctor to prevent filtering of rainwater through the surface. If the already tamped (compacted) sub-grade has been damaged , the Contractor is obliged to bring it to the condition required by Specification of this ITB.	m <sup>2</sup>	4.451		
1.6.	The contractor shall carry out control tests of sub-grade: (i) Compactness of embankment layers shall be tested at intervals of 50-100m by two tests in immediate vicinity; (ii) • CBR (California Bearing Ratio) for each cutting and embankment; (iii) •Determination of granular composition at each 1,000 m3 of the sub-grade	Lump Sum	1		
1.7.	Perform testing of compactness and density of the sub-base using Proctor procedure (MKS.U.B1.016). Density of applied material shall be determined on at least 5 samples using Proctor procedure.	Lump Sum	1		
1.8.	The contractor shall conduct quality control of asphalt layer consisting of (i) Previous checking of quality of main materials used, (ii) Parallel tests on main materials used, tests on produced asphalt mixture and tests during application and on samples from BNS and BNHS course.	Lump Sum	1		
1.9.	The contractor shall provide "as built" drawings subject to the Supervisor's approval in four (4) hard copies and in electronic format.	Lump Sum	1		
1.10.	Allowance for the performance security required under General conditions of the contract	Lump Sum	1		
1.11.	Allowance for the cost of all insurances required under close 23 of the General Conditions of Contract and Special Conditions of Contract	Lump Sum	1		
1.12.	Provide site office for the Supervisor including min the following: (i) Site office furniture consisting of minimum one desk, one armchair, one meeting table of diameter 1,5 along with 4 chair; (ii) Power connection for PC, Personal computer, printer with all necessary wiring;	Lump Sum	1		
2	<b>EARTH WORKS AND PAVING</b>				

2.1.	The contractor shall carry out construction and compacting of the sub-grade (the road bed). The whole width of the sub-grade formation level (Planum) shall be mechanically or chemically stabilized. Material for Sub-Grade: as per ITB Specification	m <sup>2</sup>	4.451		
2.2.	The contractor shall carry out construction of the capping layer (improved sub-grade layer) in the upper part of the sub-grade of the earthworks under sub-base layer as required in the design due to the internal industrial road and windrow area being under a traffic of heavy machinery.	m <sup>2</sup>	2.226		
2.3.	The contractor shall carry out construction of drainage and de-watering / Filtering course: Procurement and incorporation of crushed material for filtering courses, behind the walls of the fence, and below the pavements around the structures in accordance with the design.	m <sup>3</sup>	392		
2.4.	Preparation of foundation surface for formation of the sub base for application of the material for the bearing layer according to the Specification.	m <sup>2</sup>	4.451		
2.5.	Construction of sub-base. Works include: (i) Purchase of suitable quarry crushed aggregate. Materials to be reported by the Contractor to the Supervisor before start of exploitation, quality analysis shall be given and approval for usage shall be obtained; (ii) Transportation of materials; (iii) Deposit in layers, not exceeding 30 cm tamped thickness, (iv) adding and spreading uniform material as necessary to enhance the granular composition of the sub-base as per Specifications, using adequate spreading machinery; and (v) Tamping (Compacting) with rollers with smooth steel or rubber wheels, i.e. with vibro-rollers.	m <sup>3</sup>	1776		
2.6.	Construction of stabilized shoulders made of mechanically stabilized gravel or stone material, the same material as used for sub-base, covered with quarry chippings in a layer of 6-7 cm thickness and a width of 1(one) meter.	m <sup>3</sup>	197		
2.7.	Supply, laying, formation and compaction of an suitable aggregate for sub-grade ( road- bed) layer improvement, as per specification and tender drawings.	m <sup>3</sup>	27		
3.	ASPHALT WORKS				
3.1.	Cleaning of site and reinstatement of surface. Works includes removal of all surplus materials and all temporary structures from the Site. All dirt, rubbish and excess earth from the excavation to be removed and properly disposed to appropriate disposal site, subject to the Supervisor's/local authority's approval and the construction site left clean and acceptable to the Supervisor.	Lump Sum	1		
3.2.	Supply and construction of asphalt bearing/wearing course type BNHS-16 with minimum 7 cm compacted thickness, as per the specifications and approved drawings.	m <sup>2</sup>	4.451		
4.	OTHER WORKS				
	Prefabricated office&laboratory:				
4.1.	Careful clearing and cleaning around the area of the prefabricated office and laboratory (approx.. 25 m2)	Lump Sum	1		
4.2.	Manual excavation of soil category III and IV for foundations for the prefabricated office and laboratory, including formation of sides and bottom, dewatering and loading, transport and disposal of surplus material to approved areas.	m <sup>3</sup>	2,9		
4.3.	Stockpiling of the excavated material on the site for later use.	Lump Sum	1		
4.4.	Manual backfilling around the base (foundations) of the prefabricated office and laboratory in layers of 30 cm, using selected fine soil from stock piled excavated material around the walls of the construction with proper compaction to MC>95 %.	m <sup>3</sup>	1,7		



4.5.	Supply and laying of suitable quarry crushed aggregate, subject to the Project Manager's approval (grain size 0-30mm), with 10 cm thickness, under the foundations of the office and laboratory	m <sup>3</sup>	0,6		
4.6.	Supply, transportation and placing of reinforced concrete C30 (MB30) for constructions of the foundation's foot. Work to include to include formwork erection and striking.	m <sup>3</sup>	0,6		
4.7.	Landscaping the area surrounding the prefabricated office and laboratory of approximately ± 25m <sup>2</sup>	Lump Sum	1		
4.8.	Purchase, supply, delivery and put into operation of the prefabricated container-type office and laboratory with dimensions 2,4 m x 6,0 m on previously prepared foundations as per tender drawings	pcs.	1		
	Container-type toilet:				
4.9.	Purchase, supply, delivery and put into operation of the prefabricated container-type toilet with dimensions 1,5 m x 1,5 m as per tender drawings	pcs.	1		
	Disinfecting basin:				
4.10.	Application of cement based hydro insulation on the internal side of the disinfecting basin (3 layers with thickness of 3x1.5mm)	m <sup>2</sup>	238		
4.11.	Electric Power for the pump for the disinfecting basin. Electric works include supply and installation of: (i) Main distribution board (PT1) and its connection to the existing transformer; (ii) Main supply cables PP41-4x16mm <sup>2</sup> , (iii) Main supply cables PP41-4x16mm <sup>2</sup> , (iv) Cable for pumps supplying PPOO-H196, (v) Grounding lead FeZn 30x4mm	Lump Sum	1		
4.12.	Supply, delivery and installing of a drowning pump with the capacity of 2 KV and Hp=3m for the disinfecting basin, all fittings, valves, air valve, manometer, electro magnetic flow meter.	pcs.	1		
SUB-TOTAL FOR CONSTRUCTION WORKS ON WINDROW AREA					
Contingency amounting 10 percent of the FOR CONSTRUCTION WORKS ON WINDROW AREA					
TOTAL FOR CONSTRUCTION WORKS ON WINDROW AREA					
<b>(II) Construction Works on Water Intake / Water supply Well</b>					
5	PREPARATORY WORKS				
5.1.	Cleaning and landscaping the area surrounding the water-supply-well of approximately 40m <sup>2</sup> , including grass and flowers planting, to Supervisor's approval	Lump Sum	1		
5.2.	Drilling a hole in depth up to 65 meter, including placing a water collecting-drainage PE pipe, laying clay under the pipes, filter material of selected crushed stones, gravel and sand; placing a clay layer and soil on top.	m'	65		
5.3.	Supply, delivery and installing of fittings for the Water intake/Water-supply well as per Specification and tender drawings. Works to include supply, delivery and installing of: (i) well head, (ii) Q elbow DN 50, (iii) FF piece of L=500 mm, DN 50, (iv) flange PE100, (v) Automatic Air Release valve 2" DN50 PN10, (vi) Threaded HD-PE T-piece (vii) Nozzle Non-return valve DN 50, PN 10, with flanges PN 10, (viii) Flat end cap connected by sleeve joints, (ix) Oval end cap connected by sleeve joints, (x) Flange adaptor for welding with metal ring, (xi) PE 100 pipe, (xii) N piece, (xiii) EKS piece, (xiv) PVC 50 pipe, (xv) Flat rubber gaskets	pcs.	1		
5.4.	Supply, delivery and installing of a drowned pump with the capacity of 4 bar, Q=1,5l/sek and installed power of 1,1-1,5 KV with manometer and electro magnetic flow meter.	pcs.	1		
5.5.	Supply and installing of built-in iron stairs for entrance in the chamber Ø18mm, L=2m/piece.	pcs.	1		

5.6.	Electric Power for the pump for the water supply well. Electric works include supply and installation of: (i) Main distribution board (PT1) and its connection to the existing transformer; (ii) Main supply cables PP41-4x16mm <sup>2</sup> , (iii) Main supply cables PP41-4x16mm <sup>2</sup> , (iv) Cable for pumps supplying PPOO-H196 , (v) Grounding lead FeZn 30x4mm	Lump Sum	1		
5.7.	Supply, transport and installation of the metal tops (covers) - heavy type	pcs.	1		
6.	INSULATING WORKS				
6.1.	Supply and plastering -apply cement mortar 1:2 , in two layers (1st layer: 1.50 cm and 2nd layer: 0.50 cm finish by trowel) to the internal surfaces in the dry chamber.	Lump Sum	1		
6.2.	Apply cement based hydro insulation on the internal surfaces of the dry chamber and parts of all external walls above the ground (3 layers of with thickness of 3x1.5mm)	Lump Sum	1		
SUB-TOTAL FOR CONSTRUCTION WORKS ON WATER INTAKE /WATER-SUPPLY WELL					
Contingency amounting 10 percent of the CONSTRUCTION WORKS ON WATER INTAKE /WATER-SUPPLY WELL					
TOTAL FOR CONSTRUCTION WORKS ON WATER INTAKE /WATER-SUPPLY WELL					
<b>(III) Finishing works on previously constructed Collecting Reservoir for Compost Liquid Drains and Atmosphere Water</b>					
7.	INSULATING WORKS				
7.1.	Supply and plastering -apply cement mortar 1:2 , in two layers (1st layer: 1.50 cm and 2nd layer: 0.50 cm finish by trowel) to the internal surfaces in the Collecting Reservoir.	Lump Sum	1		
7.2.	Apply cement based hydro insulation on the internalto internal surfaces of the Collecting Reservoir and parts of all external walls above the ground (3 layers of with thickness of 3x1.5mm)	Lump Sum	1		
SUB-TOTAL FOR FINISHING WORKS ON Collecting Reservoir for Compost Liquid Drains and Atmosphere Water					
Contingency amounting 10 percent of the FINISHING WORKS ON Collecting Reservoir for Compost Liquid Drains and Atmosphere Water					
TOTAL FOR FINISHING WORKS ON Collecting Reservoir for Compost Liquid Drains and Atmosphere Water					
<b>(IV) Construction Works on Mechanics Workshop</b>					
8.	PREPARATORY EARTH WORKS				
8.1.	Careful clearing and cleaning the terrain around the area of the previously constructed foundation of the Mechanics shop occupying area of 120 m <sup>2</sup>	Lump Sum	1		
8.2.	Manual Excavation of soil around the previously constructed foundations and basement slab (category III and IV), including loading, transport and disposal of surplus material to approved areas within 1 km. for construction of the path around the Mechanics Workshop.	m <sup>3</sup>	22		
8.3.	Stockpiling of the excavated material on the site for later use. Work to include necessary bracing and supporting, dewatering during the construction and all necessary, subject to the Supervisor's approval	Lump Sum	1		
8.4.	Manual backfilling around the base (foundations) of the Mechanical Workshop in layers of 10 cm for formation of the path around the construction, using selected fine soil from stock piled excavated material around the construction with proper compaction to MC>95 %.	m <sup>3</sup>	11		
8.5.	Supply and laying of suitable quarry crushed aggregate, subject to the Project Manager's approval (grain size 0-30mm), with 30 cm thickness, around the basement slab and foundation for formation of the bearing layer for the path	m <sup>3</sup>	6,25		
9.	CONCRETE AND INSULATING WORKS				

9.1.	Supply, transportation and placing of water tight reinforced concrete C30 (MB30) for construction of the construction's walls above the foundations of the Mechanics Workshop with thickness of 0,3m. Work to include construction of the formwork (both sides) and striking.	m <sup>3</sup>	6,6		
9.2.	Supply, transportation and placing of reinforced concrete C30 (MB30) for construction of the columns with dimensions 0,3 x 0,3 x 4,65 m. (8 pcs..) of the Mechanics Workshop. Work to include construction of the formwork (both sides) and striking.	m <sup>3</sup>	3,35		
9.3.	Supply, transportation and placing of reinforced concrete C30 (MB30) for construction of 90 cm. wide path around the Mechanics Workshop with the width of the concrete layer of 12 cm. Work to include construction of the formwork (both sides) and striking.	m <sup>3</sup>	4,75		
9.4.	Applying horizontal and vertical insulation on the external walls of the columns in three layers and on top slab (to be protected with 3 cm thick cement mortar lining as per specifications and approved recipe).	m <sup>2</sup>	120,6		
10.	REINFORCEMENT WORKS				
10.1.	Supply, laying and securing in place of reinforcement mesh Q 188 for the construction of the wall above the foundations of the construction (according to specification)	kg.	525		
10.2.	Supply, laying and securing in place of reinforcement RA Ø 6 mm, Ø 10 mm and Ø 12 mm (according to specification) for construction of the of the columns of the construction.	kg.	925		
11.	METAL WORKS				
11.1.	Supply, laying and instalment of main steel beams/supports of the roof construction made of steel box profiles as per tender drawings of various dimensions, assembled into the construction by welding, rust protected (galvanized)	kg.	1260		
11.2.	Supply, laying and instalment of roofing steel elements of box profiles as per tender drawings of various types/dimensions, assembled into Steel-lattice-beam of the roof-construction by welding, rust protected (galvanized).	kg.	2215		
11.3.	Supply and Installation of double coated plastic still sheet roofing with the width of the steel sheet of 0,55 mm and the height of 3,6 cm	m <sup>2</sup>	151,7		
12.	MISCELLANEOUS				
12.1.	Covering (painting) the roofing construction - the steel lattice beam elements and main steel beams with anti-corrosive paint in three (3) layers	Lump Sum	1		
12.2.	Supply, delivery and installation of horizontal draining system of the atmospheric water made of various box elements made of double-coated steel plastic material	m'	18		
12.3.	Supply, delivery and installation of vertical draining system of the atmospheric water made of various box elements made of double-coated steel plastic material	m'	11		
12.4.	Supply, delivery and installation of wind protecting elements for the roof made of double-coated steel plastic sheets 55 cm wide and the width of the steel plastic of 0,55 mm	m'	49,4		
12.5.	Construction of access ramp made of concrete tiles or similar, on sand layer.	m <sup>2</sup>	8,8		
SUB-TOTAL FOR CONSTRUCTION WORKS ON MECHANICS WORKSHOP					
Contingency amounting 10 percent of the CONSTRUCTION WORKS ON MECHANICS WORKSHOP					
TOTAL FOR CONSTRUCTION WORKS ON MECHANICS WORKSHOP					
<b>(V) Construction Works on Shop for Final Compost</b>					
13.	PREPARATORY EARTH WORKS				
13.1.	Careful clearing and cleaning the terrain around the area of the previously constructed foundation of the Shop for Final Compost occupying area of 350 m2	Lump Sum	1		

13.2.	Manual Excavation of soil around the previously constructed foundations and basement slab (category III and IV), including loading, transport and disposal of surplus material to approved areas within 1 km. for construction of the path around the Shop for Final Compost.	m <sup>3</sup>	45		
13.3.	Stockpiling of the excavated material on the site for later use. Work to include necessary bracing and supporting, dewatering during the construction and all necessary, subject to the Supervisor's approval	Lump Sum	1		
13.4.	Manual backfilling around the base (foundations) of the Shop for Final Compost in layers of 10 cm for formation of the path around the construction, using selected fine soil from stock piled excavated material around the construction with proper compaction to MC>95 %.	m <sup>3</sup>	22,5		
13.5.	Supply and laying of suitable quarry crushed aggregate, subject to the Project Manager's approval (grain size 0-30mm), with 30 cm thickness, around the basement slab and foundation for formation of the bearing layer for the path for the Shop for Final Compost	m <sup>3</sup>	9		
14.	<b>CONCRETE AND INSULATING WORKS</b>				
14.1.	Supply, transportation and placing of water tight reinforced concrete C30 (MB30) for construction of the construction's walls above the foundations of the Shop for Final Compost with thickness of 0,3m. Work to include construction of the formwork (both sides) and striking.	m <sup>3</sup>	16,82		
14.2.	Supply, transportation and placing of reinforced concrete C30 (MB30) for construction of the columns with dimensions 0,3 x 0,3 x 4,65 m. (15 pcs..) of the Shop for Final Compost. Work to include construction of the formwork (both sides) and striking.	m <sup>3</sup>	6,28		
14.3.	Supply, transportation and placing of reinforced concrete C30 (MB30) for construction of 90 cm. wide path around the Shop for Final Compost with the width of the concrete layer of 12 cm. Work to include construction of the formwork (both sides) and striking.	m <sup>3</sup>	13,5		
14.4.	Applying horizontal and vertical insulation on the external walls of the columns in three layers and on top slab (to be protected with 3 cm thick cement mortar lining as per specifications and approved recipe).	m <sup>2</sup>	351,2		
15.	<b>REINFORCEMENT WORKS</b>				
15.1.	Supply, laying and securing in place of reinforcement mesh Q 188 for the construction of the wall above the foundations of the construction of the Shop for Final Compost (according to specification)	kg.	745		
15.2.	Supply, laying and securing in place of reinforcement RA Ø 6 mm, Ø 10 mm and Ø 12 mm (according to specification) for construction of the of the columns of the construction of the Shop for Final Compost.	kg.	1447		
16.	<b>METAL WORKS</b>				
16.1.	Supply, laying and instalment of main steel beams/supports of the roof construction made of steel box profiles as per tender drawings of various dimensions, assembled into the construction by welding, rust protected (galvanized)	kg.	2325		
16.2.	Supply, laying and instalment of roofing steel elements of box profiles as per tender drawings of various types/dimensions, assembled into Steel-lattice-beam of the roof-construction by welding, rust protected (galvanized).	kg.	4975		
16.3.	Supply and Installation of double coated plastic still sheet roofing with the width of the steel sheet of 0,55 mm and the height of 3,6 cm	m <sup>2</sup>	415		
17.	<b>MISCELLANEOUS</b>				



17.1.	Covering (painting) the roofing construction - the steel lattice beam elements and main steel beams with anti-corrosive paint in three (3) layers	Lump Sum	1		
17.2.	Supply, delivery and installation of horizontal draining system of the atmospheric water made of various box elements made of double-coated steel plastic material	m'	36		
17.3.	Supply, delivery and installation of vertical draining system of the atmospheric water made of various box elements made of double-coated steel plastic material	m'	20		
17.4.	Supply, delivery and installation of wind protecting elements for the roof made of double-coated steel plastic sheets 55 cm wide and the width of the steel plastic of 0,55 mm	m'	68,2		
17.5.	Construction of access ramp made of concrete tiles or similar, on sand layer.	m <sup>2</sup>	15		
SUB-TOTAL FOR INFRASTRUCTURE WORKS ON SHOP FOR FINAL COMPOST					
Contingency amounting 10 percent of the INFRASTRUCTURE WORKS ON SHOP FOR FINAL COMPOST					
TOTAL FOR INFRASTRUCTURE WORKS ON SHOP FOR FINAL COMPOST					
(VI) Construction of Intermediate Collecting Centres with 2 metal containers of the capacity of 6m <sup>3</sup>					
18. PREPARATORY EARTH WORKS					
18.1.	Careful clearing and cleaning around the area of the Intermediate Collecting Centres (approx.. 60 m <sup>2</sup> )	Lump Sum	1		
18.2.	Mechanical Excavation of soil (category III and IV), including loading, transport and disposal of surplus material to approved areas within 1 km. for construction of the foundations of the Intermediate Collecting Centres	m <sup>3</sup>	4,5		
18.3.	Wide range mechanical excavation of soil (category III and IV), including loading, transport and disposal of surplus material to approved areas within 1 km. for construction of the foundations of the Intermediate Collecting Centres	m <sup>3</sup>	6,9		
18.4.	Manual excavation of soil category III and IV for foundations, including formation of sides and bottom, dewatering and loading, transport and disposal of surplus material to approved areas.	m <sup>3</sup>	1,5		
18.5.	Stockpiling of the excavated material on the site for later use. Work to include necessary bracing and dewatering during the construction	Lump Sum	1		
18.6.	Manual backfilling around the base (foundations) of the Intermediate Collecting Centres in layers of 30 cm, using selected fine soil from stock piled excavated material around the walls of the construction with proper compaction to MC>95 %.	m <sup>3</sup>	14		
18.7.	Supply and laying of suitable quarry crushed aggregate, subject to the Project Manager's approval (grain size 0-30mm), with 30 cm thickness, under the foundation	m <sup>3</sup>	6		
18.8.	Supply and laying of suitable quarry crushed aggregate, subject to the Project Manager's approval (grain size 0-30mm), with 30 cm thickness, under the concrete slab	m <sup>3</sup>	14,23		
18.9.	Landscaping the area surrounding the Intermediate Collecting Centres of approximately ±60m <sup>2</sup>	Lump Sum	1		
19. CONCRETE AND INSULATING WORKS					
19.1.	Supply, casting and compaction of lean concrete bedding, layer 15 cm. grade MB15, to serve as structures base for concrete foundations.	m <sup>3</sup>	7,5		
19.2.	Supply, transportation and placing of water tight reinforced concrete C30 (MB30) for the slab of the Intermediate Collecting Centres with thickness of 0,15m. Work to include construction of the formwork (both sides) and striking.	m <sup>3</sup>	14		
19.3.	Supply, cast and compaction of reinforced concrete inclined slab with concrete MB 30 over a soil base 15cm thickness	m <sup>3</sup>	1,82		

19.4.	Supply, transportation and placing of reinforced concrete C30 (MB30) for constructions of the foundation's beams. Work to include to include formwork erection and striking.	m <sup>3</sup>	1,75		
19.5.	Supply and cast of concrete perimeter pavement over a layer of gravel with MB30, 10cm thickness.	m <sup>3</sup>	0,56		
19.6.	Supply, transportation and placing of water tight reinforced concrete C30 (MB30) for the foundation's walls of the construction with thickness of 0.30 m. Work to include construction of the formwork (both sides) and striking.	m <sup>3</sup>	2,1		
19.7.	Supply and construction of gutters, cast-in-situ, reinforced water-tote concrete Class C30 (MB30), placed on concrete bedding class C20 (MB20) including construction of a wash-out (discharge) concrete pipe as per Specifications and the tender drawings;	m'	20		
19.8.	Applying horizontal and vertical insulation-under the foundation, on the external walls of the foundation and on top slab in three layers. The hydro insulation applied on external walls to be protected with 5cm thick polystyrene insulating panels of heavy duty type while the hydro insulation on top slab to be protected with 3 cm thick cement mortar lining as per specifications and approved design	m <sup>2</sup>	17		
20.	REINFORCEMENT WORKS				
20.1.	Supply, laying and securing in place of reinforcement mesh Q 257 for walls and floor deck of the construction (according to specification)	kg.	450		
20.2.	Supply, laying and securing in place of reinforcement RA Ø 6 mm, Ø 10 mm and Ø 12 mm (according to specification) for construction of the foundations and hidden columns	kg.	540		
21.	METAL WORKS				
21.1.	Supply, laying and instalment of main steel beams/supports of the roof construction made of steel box profiles as per tender drawings of various dimensions, assembled into the construction by welding, rust protected (galvanized)	kg.	1217		
21.2.	Supply, laying and instalment of roofing steel elements of box profiles as per tender drawings of various types/dimensions, assembled into Steel-lattice-beam of the roof-construction by welding, rust protected (galvanized).	kg.	1969		
21.3.	Supply and Installation of double coated plastic still sheet roofing with the width of the steel sheet of 0,55 mm and the height of 3.6 cm	m <sup>2</sup>	32,1		
22.	MISCELLANEOUS				
22.1.	Covering (painting) the roofing construction - the steel lattice beam elements and main steel beams with anti-corrosive paint in three (3) layers	Lump Sum	1		
22.2.	Supply, delivery and installation of horizontal draining system of the atmospheric water made of various box elements made of double-coated steel plastic material	m'	6,42		
22.3.	Supply, delivery and installation of vertical draining system of the atmospheric water made of various box elements made of double-coated steel plastic material	m'	4,2		
22.4.	Supply, delivery and installation of wind protecting elements for the roof made of double-coated steel plastic sheets 55 cm wide and the width of the steel plastic of 0,55 mm	m'	16,42		
22.5.	Construction of access ramp made of concrete tiles or similar, on sand layer.	m <sup>2</sup>	18		
22.6.	Supply and delivery of metal containers of capacity of 6 m <sup>3</sup> suitable for loading to a truck	pcs.	2		
SUB-TOTAL FOR INFRASTRUCTURE WORKS ON INTERMEDIATE COLLECTING CENTERS WITH 2 CONTAINERS					
Contingency amounting 10 percent of the INTERMEDIATE COLLECTING CENTERS WITH 2 CONTAINERS					



TOTAL FOR INTERMEDIATE COLLECTING CENTERS WITH 2 CONTAINERS				
NUMBER OF INTERMEDIATE COLLECTING CENTERS WITH 2 CONTAINERS				2,00
TOTAL FOR TWO (2) INTERMEDIATE COLLECTING CENTERS WITH 2 CONTAINERS				
<b>(VII) Construction of Intermediate Collecting Centres with 3 metal containers of the capacity of 6m3</b>				
23.	<b>PREPARATORY EARTH WORKS</b>			
23.1.	Careful clearing and cleaning around the area of the Intermediate Collecting Centres (approx.. 90 m2)	Lump Sum	1	
23.2.	Mechanical Excavation of soil (category III and IV), including loading, transport and disposal of surplus material to approved areas within 1 km. for construction of the foundations of the Intermediate Collecting Centres	m <sup>3</sup>	6,9	
23.3.	Wide range mechanical excavation of soil (category III and IV), including loading, transport and disposal of surplus material to approved areas within 1 km. for construction of the foundations of the Intermediate Collecting Centres	m <sup>3</sup>	10,2	
23.4.	Manual excavation of soil category III and IV for foundations, including formation of sides and bottom, dewatering and loading, transport and disposal of surplus material to approved areas.	m <sup>3</sup>	2,5	
23.5.	Stockpiling of the excavated material on the site for later use. Work to include necessary bracing and dewatering during the construction	Lump Sum	1	
23.6.	Manual backfilling around the base (foundations) of the Intermediate Collecting Centres in layers of 30 cm, using selected fine soil from stock piled excavated material around the walls of the construction with proper compaction to MC>95 %.	m <sup>3</sup>	21	
23.7.	Supply and laying of suitable quarry crushed aggregate, subject to the Project Manager's approval (grain size 0-30mm), with 30 cm thickness, under the foundation	m <sup>3</sup>	9,1	
23.8.	Supply and laying of suitable quarry crushed aggregate, subject to the Project Manager's approval (grain size 0-30mm), with 30 cm thickness, under the concrete slab	m <sup>3</sup>	22,4	
23.9.	Landscaping the area surrounding the Intermediate Collecting Centres of approximately ±60m2	Lump Sum	1	
24.	<b>CONCRETE AND INSULATING WORKS</b>			
24.1.	Supply, casting and compaction of lean concrete bedding, layer 15 cm. grade MB15, to serve as structures base for concrete foundations.	m <sup>3</sup>	10,5	
24.2.	Supply, transportation and placing of water tight reinforced concrete C30 (MB30) for the slab of the Intermediate Collecting Centres with thickness of 0,15m. Work to include construction of the formwork (both sides) and striking.	m <sup>3</sup>	21,45	
24.3.	Supply, cast and compaction of reinforced concrete inclined slab with concrete MB 30 over a soil base 15cm thickness	m <sup>3</sup>	2,75	
24.4.	Supply, transportation and placing of reinforced concrete C30 (MB30) for constructions of the foundation's beams. Work to include to include formwork erection and striking.	m <sup>3</sup>	2,55	
24.5.	Supply and cast of concrete perimeter pavement over a layer of gravel with MB30, 10cm thickness.	m <sup>3</sup>	0,79	
24.6.	Supply, transportation and placing of water tight reinforced concrete C30 (MB30) for the foundation's walls of the construction with thickness of 0.30 m. Work to include construction of the formwork (both sides) and striking.	m <sup>3</sup>	3,3	
24.7.	Supply and construction of gutters, cast-in-situ, reinforced water-tote concrete Class C30 (MB30), placed on concrete bedding class C20 (MB20) including construction of a wash-out (discharge) concrete pipe as per Specifications and the tender drawings;	m'	36	

24.8.	Applying horizontal and vertical insulation-under the foundation, on the external walls of the foundation and on top slab in three layers. The hydro insulation applied on external walls to be protected with 5cm thick polystyrene insulating panels of heavy duty type while the hydro insulation on top slab to be protected with 3 cm thick cement mortar lining as per specifications and approved design	m <sup>2</sup>	26,5		
25.	<b>REINFORCEMENT WORKS</b>				
25.1.	Supply, laying and securing in place of reinforcement mesh Q 257 for walls and floor deck of the construction (according to specification)	kg.	550		
25.2.	Supply, laying and securing in place of reinforcement RA Ø 6 mm, Ø 10 mm and Ø 12 mm (according to specification) for construction of the foundations and hidden columns	kg.	720		
26.	<b>METAL WORKS</b>				
26.1.	Supply, laying and instalment of main steel beams/supports of the roof construction made of steel box profiles as per tender drawings of various dimensions, assembled into the construction by welding, rust protected (galvanized)	kg.	1717		
26.2.	Supply, laying and instalment of roofing steel elements of box profiles as per tender drawings of various types/dimensions, assembled into Steel-lattice-beam of the roof-construction by welding, rust protected (galvanized).	kg.	2048		
26.3.	Supply and Installation of double coated plastic still sheet roofing with the width of the steel sheet of 0,55 mm and the height of 3,6 cm	m <sup>2</sup>	46,4		
27.	<b>MISCELLANEOUS</b>				
27.1.	Covering (painting) the roofing construction - the steel lattice beam elements and main steel beams with anti-corrosive paint in three (3) layers	Lump Sum	1		
27.2.	Supply, delivery and installation of horizontal draining system of the atmospheric water made of various box elements made of double-coated steel plastic material	m'	8,91		
27.3.	Supply, delivery and installation of vertical draining system of the atmospheric water made of various box elements made of double-coated steel plastic material	m'	5,1		
27.4.	Supply, delivery and installation of wind protecting elements for the roof made of double-coated steel plastic sheets 55 cm wide and the width of the steel plastic of 0,55 mm	m'	19,2		
27.5.	Construction of access ramp made of concrete tiles or similar, on sand layer.	m <sup>2</sup>	27		
27.6.	Suply and delivery of metal containers of capacity of 6 m <sup>3</sup> suitable for loading to a truck	pcs.	3		
<b>SUB-TOTAL FOR CONSTRUCTION OF INTERMEDIATE COLLECTING CENTERS WITH 3 CONTAINERS</b>					
Contingency amounting 10 percent of the CONSTRUCTION WORKS ON INTERMEDIATE COLLECTING					
<b>TOTAL FOR CONSTRUCTION WORKS ON INTERMEDIATE COLLECTING CENTERS WITH 3 CONTAINERS</b>					
<b>NUMBER OF INTERMEDIATE COLLECTING CENTERS WITH 3 CONTAINERS</b>					<b>2,00</b>
<b>TOTAL FOR TWO (2) INTERMEDIATE COLLECTING CENTERS WITH 3 CONTAINERS</b>					
<b>(VIII) Construction of the fence around the Composting Plant</b>					
28.	<b>PREPARATORY EARTH WORKS</b>				
28.1.	Careful clearing of the area and marking of the construction	m'	400		
28.2.	Mechanical Excavation of soil (category III and IV), including loading, transport and disposal of surplus material to approved areas within 1 km. for construction of the foundations of the Intermediate Collecting Centres	m <sup>3</sup>	104		
28.3.	Manual excavation of soil category III and IV for foundations, including formation of sides and bottom, dewatering and loading, transport and disposal of surplus material to approved areas.	m <sup>3</sup>	22		

28.4.	Stockpiling of the excavated material on the site for later use. Work to include necessary bracing and dewatering during the construction	Lump Sum	1		
28.5.	Manual backfilling around the base (foundations) of the fence in layers, using selected fine soil from stock piled excavated material around the walls of the construction with proper compaction to MC>95 %.	m <sup>3</sup>	37,2		
28.6.	Supply and laying of suitable quarry crushed aggregate, subject to the Project Manager's approval (grain size 0-30mm), with 30 cm thickness, under the foundation	m <sup>3</sup>	72		
28.7.	Landscaping the area surrounding the Intermediate Collecting Centres of approximately ±60m <sup>2</sup>	Lump Sum	1		
29.	<b>CONCRETE WORKS</b>				
29.1.	Supply, casting and compaction of lean concrete bedding, layer 15 cm. grade MB15, to serve as structures base for concrete foundations of the fence.	m <sup>3</sup>	18		
29.2.	Supply, transportation and placing of reinforced concrete C30 (MB30) for constructions of the foundations. Work to include to include formwork erection and striking.	m <sup>3</sup>	64		
29.3.	Supply, transportation and placing of water tight reinforced concrete C30 (MB30) for the foundation's walls of the construction with thickness of 0.30 m. Work to include construction of the formwork (both sides) and striking.	m <sup>3</sup>	88		
29.4.	<b>REINFORCEMENT WORKS</b>				
29.5.	Supply, laying and securing in place of reinforcement mesh Q 83 for fence walls (both sides) according to specification	kg.	2645		
29.6.	Supply, laying and securing in place of reinforcement RA Ø 6 mm, Ø 10 mm and Ø 12 mm (according to specification) for construction of the foundations and hidden columns	kg.	1319		
30.	<b>METAL WORKS</b>				
30.1.	Supply, laying and instalment of metal poles (supports) made of steel box profiles as per tender drawings, attached into the concrete wall with height h=150 cm above the concrete, placed on 2 meter distance for assembling the mesh fence. Every four to five posts a bracing post will be placed.	pcs..	202		
30.2.	Construction (Placing and fastening ) of galvanized protective barbed wire/wire netting in rows	m <sup>2</sup>	660		
30.3.	Constriction and installation of two-part sliding lockable entrance gate of metal box profiles, rust protected, with dimensions 420/220	pcs.	1		
30.4.	Covering (painting) the metal poles (supports) of the mesh fence and the two-part sliding gate with anti-corrosive paint in two (2) layers	Lump Sum	1		
SUB-TOTAL FOR CONSTRUCTION OF THE FENCE					
Contingency amounting 10 percent of the CONSTRUCTION WORKS ON THE FENCE					
<b>TOTAL FOR CONSTRUCTION WORKS ON THE FENCE</b>					
<b>(IX) Construction of external electrical installation, internal electrical installation within the Composting plant and power connection of objects of the Composting plant</b>					
31.	<b>EXTERNA; ELECTRICAL SUPPLY</b>				
31.1.	Supply, delivery and instalment of a power high voltage transformer 50KVA, 10/0,4Kv including construction of grounding connected to transmission line passing through the municipal landfill / obtain permit from the power distribution company (ESM/EVN)	pcs.	1		
31.2.	Energy cable PP00 4x10 mm <sup>2</sup> placed in channel, connecting in RT and in pillar receptacle places.	m	360		
31.4.	Placing in channel of galvanizes band FeZn 25x4 mm as ground.	m	165		

31.5.	Grounding pillars of candelabras with galvanized band 25x4 mm average length L=4,00 m and bonding element MK.NB4.936.	pcs.	12		
31.6.	Placing in channel of safety PVC band over the energy cable.	m	225		
31.7.	Placing protective plates "GAL" in channel.	m	225		
31.8.	Purchase and installation of protective metal pipe Φ2" (under bridge or under street).	m	6		
31.9.	Purchase and installation of protective, metal, flexible, plasticized hose Φ36 mm.	m	18		
32.	LIGHTING PROTECTION AND GROUNDING SYSTEM				
32.1	Supply, delivery and installation of Fe/Zn 30x4 mm band for preparation of the grounding system	m	65		
32.2.	Excavating and covering up a trench with dimensions 0,8 x 0,3 m (soil category III) for making a grounding system	m	15		
32.3.	Supply, delivery and installation of Fe/Zn, 25x3 mm band for preparation of the lightning system	m	20		
32.4.	Supply, delivery and installation of concrete cubes (holders) for holding the Fe/Zn band	pcs.	12		
32.5.	Supply, delivery and installation of clamps type 936/II	pcs.	8		
32.6.	Supply, delivery and installation of test clamps type 93/II	pcs.	2		
32.7.	Supply, delivery and installation of protection covers of vertical bands.	pcs.	2		
32.8.	Minor unspecified material	LS	1		
33.	INTERNAL ELECTRICAL INSTALLATIONS				
33.1.	Supply, delivery and installation of plastic distribution box - min. 6 modules	pcs.	5		
33.2.	Supply, delivery and installation of single-pole 16A circuit breakers	pcs.	3		
33.3.	Supply, delivery, installation and connection of cable type PPOO 3 x 1,5mm <sup>2</sup> - 0,6/1 kV (lighting system)	m	120		
33.4.	Supply, delivery, installation and connection of cable type PPOO 3x2,5mm - 20,6/1 kV (socket, instrumentation box)	m	30		
33.5.	Supply, delivery and installation of ceiling lamp (E27, 60W) with bulb	pcs.	30		
33.6.	Supply, delivery and installation of on-wall switch for lighting system	pcs.	10		
33.7.	Supply, delivery and installation of on-wall single-phase socket	pcs.	30		
33.8.	Minor unspecified material	LS	1		
34.	ILLUMINATION				
34.1.	Mechanical excavation of soil III category in a channel for setting electric cable with dimensions 30/80 cm with needed manual additional excavation and taking the soil beside the channel.	m <sup>3</sup>	38		
34.2.	Manual placing the sand in the excavated channel in two layers per 10 cm under and above the electric cable.	m <sup>3</sup>	9,5		
34.3.	Manual excavation of soil III category for fundaments of pillars for candelabras with placing the same in the vicinity	m <sup>3</sup>	3,6		
34.5.	Mechanical and manual burring the excavated soil with compressing in layers and allocating the excess in the near surrounding.	m <sup>3</sup>	41,2		
34.6.	Performing concrete fundament MB 30 in needed falsework with dimensions 0,50x0,50x0,60 m with built-in anchor plate and nuts for pillar of candelabra.	pcs.	8		
34.7.	Purchase and installation of metal pillar H=3,50 m, receptacle with height 0,50 m, with automatic fuseC10 A, order clamps, nut for grounding and base plate.	pcs.	8		
34.8	Cable in pillar from receptacle to light PP00-Y-3x1,50 mm <sup>2</sup> .	m	32		
SUB-TOTAL FOR CONSTRUCTION OF THE ELECTRICAL INSTALLATION					
Contingency amounting 10 percent of the CONSTRUCTION OF THE ELECTRICAL INSTALLATION					

TOTAL FOR CONSTRUCTION OF THE ELECTRICAL INSTALLATION	
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GRAND SUMMARY:	
TOTAL FOR CONSTRUCTION WORKS ON WINDROW AREA	
TOTAL FOR CONSTRUCTION WORKS ON WATER INTAKE /WATER-SUPPLY WELL	
TOTAL FOR FINISHING WORKS ON Collecting Reservoir for Compost Liquid Drains and Atmosphere Water	
TOTAL FOR CONSTRUCTION WORKS ON MECHANICS WORKSHOP	
TOTAL FOR INFRASTRUCTURE WORKS ON SHOP FOR FINAL COMPOST	
TOTAL FOR TWO (2) INTERMEDIATE COLLECTING CENTERS WITH 2 CONTAINERS	
TOTAL FOR TWO (2) INTERMEDIATE COLLECTING CENTERS WITH 3 CONTAINERS	
TOTAL FOR CONSTRUCTION WORKS ON THE FENCE	
TOTAL FOR CONSTRUCTION OF THE ELECTRICAL INSTALLATION	
GRAND TOTAL NET (VAT ECLUSIVE) IN MKD:	
VAT 18% (MKD):	
GRAND TOTAL VAT INCLUSIVE IN MKD:	



**Annex VIII**

**BID SUBMISSION FORM**

To: UNDP CO Macedonia 8 ma Udarna Brigada 2 1000 Skopje  
Dear Sir / Madam,

Having examined the Bidding Documents, the receipt of which is hereby duly acknowledged, we, the undersigned, offer to construct and deliver **Construction of the Pilot Composting Plant and Four Intermediate Collecting Centres** to support the establishment of Biodegradable Waste Management in Prespa Region, under the project “00077357 - Pilot Project for Biodegradable Waste Management in Prespa Region”

in conformity with the said bidding documents for the sum of: \_\_\_\_\_ MKD  
[total bid amount in words and figures in MKD, VAT exempted)]

as may be ascertained in accordance with the Priced Bill of Quantities attached herewith and made part of this Bid.

We undertake, if our Bid is accepted, to deliver the construction works in accordance with the quality and quantity required by the Technical Specifications and the Bill of Quantities in a period of 8 months.

We agree to abide by this Bid for a period of 90 days from the date fixed for opening of Bids in the Invitation to Bid, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

We understand that you are not bound to accept any Bid you may receive.

Dated this . . . . .day of . . . . .2011

..... Signature [*in the capacity of*]

Duly authorized to sign the Bid for and on behalf of .....



**Annex IX**

**Bid Security Forms**

**BID BANK GUARANTEE**

To: UNDP  
Str. 8ma Udarina brigade 2, Skopje

We, the undersigned, [INSERT THE NAME AND ADDRESS OF THE GUARANTOR], hereby declare that we will guarantee, as principal debtor, to UNDP on behalf of [Contractor's name and address], the payment of [amount of the tender guarantee], without dispute, on receipt of a first written request from the beneficiary.

The guarantee will take effect from the [*deadline for submission*]. It will remain in force for 90 days after this deadline. It may be extended by the Contracting Authority for a further 40 days in exceptional cases, notice of which extension(s) to the guarantor is hereby waived.

Should [*Contractor's name and address*] be awarded the contract for **Construction of the Pilot Composting Plant and Four Intermediate Collecting Centres** to support the establishment of Biodegradable Waste Management in Prespa Region, under the project “00077357 - “Pilot Project for Biodegradable Waste Management in Prespa Region”, this guarantee will be extended for a further 60 days from the notification of award. It shall be released upon the signing of the contract by the bidder and upon provision of the requisite performance guarantee.

Any demand in respect of this guarantee should reach the guarantor not later than the above date. We note that you will release the guarantee and notify us of the fact at the latest within 30 days of the expiry of the tender validity period, including any extensions, in accordance with the instructions to bidders.

Any dispute concerning this guarantee shall be governed by [*enter the law applicable*] and fall within the competence of [*indicate which jurisdiction applies*].

Done at ....., ././..

SIGNATURE AND SEAL OF THE GUARANTOR

.....  
NAME OF BANK .....  
ADDRESS .....  
DATE .....

**Annex X**

**PERFORMANCE SECURITY FORMS**

**PERFORMANCE BANK GUARANTEE**

To: UNDP  
Str. 8ma Udarna brigade 2, Skopje

WHEREAS.....[INSERT NAME AND ADDRESS OF THE CONTRACTOR] (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No....., dated....., to execute.....[INSERT TITLE OF CONTRACT AND BRIEF DESCRIPTION OF WORKS], (hereinafter called "the Contract");

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized Bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby irrevocably affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of.....[INSERT AMOUNT OF GUARANTEE IN FIGURES AND IN WORDS], such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of .....[INSERT AMOUNT OF GUARANTEE] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed hereunder or of any of the Contract Documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until twenty eight calendar days after issuance of the Certificate of Final Completion.

Done at ....., ././..

**SIGNATURE AND SEAL OF THE GUARANTOR**

.....  
NAME OF BANK .....  
ADDRESS .....  
DATE .....

## Annex XI

### Model Contract for Works

#### MODEL CONTRACT FOR WORKS

Date \_\_\_\_\_

Dear Sir/Madam,

Ref.: \_\_\_\_\_/ \_\_\_\_\_/ \_\_\_\_\_ [INSERT PROJECT NUMBER AND TITLE]

The United Nations Development Programme (hereinafter referred to as "UNDP"), wishes to engage your company, duly incorporated under the Laws of \_\_\_\_\_ [INSERT NAME OF THE COUNTRY] (hereinafter referred to as the "Contractor") in order to perform **Construction of the Pilot Composting Plant** to support the establishment of Biodegradable Waste Management in Prespa Region, under the project "00077357 - "Pilot Project for Biodegradable Waste Management in Prespa Region" (hereinafter referred to as the "Works"), in accordance with the following Contract:

#### **1. Contract Documents**

1.1 This Contract is subject to the UNDP General Conditions for Civil Works, attached hereto as Annex I. The provisions of such Annex shall control the interpretation of this Contract and in no way shall be deemed to have been derogated by the contents of this letter and any other Annexes, unless otherwise expressly stated under section 4 of this letter, entitled "Special Conditions".

1.2 The Contractor and UNDP also agree to be bound by the provisions contained in the following documents, which shall take precedence over one another in case of conflict in the following order:

a) this letter;

b) the Technical Specifications and Drawings [ref. ....dated.....], attached hereto as Annex II;

c) the Contractor's Tender \_\_\_\_\_ **including the Priced Bill of Quantities** [ref....., dated .....], as clarified by the agreed minutes of the negotiation meeting<sup>1</sup> [dated.....], not attached hereto but known to and in the possession of both parties.

1.3 All the above shall form the Contract between the Contractor and UNDP, superseding the contents of any other negotiations and/or agreements, whether oral or in writing, pertaining to the subject of this Contract.

\_\_\_\_\_ [INSERT NAME AND ADDRESS OF THE CONTRACTOR]

#### **2. Obligations of the Contractor**

2.1 The Contractor shall commence work within \_\_\_ [INSERT NUMBER OF DAYS] days from the date on which he shall have been given access to the Site and received the notice to commence from the Engineer, and shall perform and substantially complete the Works by .././.... [INSERT DATE], in accordance with the Contract. The Contractor shall provide all materials, supplies, labour and other services necessary to that end.

2.2 The Contractor shall submit to the Engineer the Programme of Work referred to in Clause 13 of the General Conditions by .././.... [INSERT DATE].

2.3 The Contractor represents and warrants the accuracy of any information or data provided to UNDP for the purpose of entering into this Contract, as well as the quality of the Works foreseen under this Contract in accordance with the highest industrial and professional standards.

#### **FIXED PRICE**

#### **3. Price and Payment**

3.1 In full consideration of the complete and satisfactory performance of the Works under this Contract, UNDP shall pay the Contractor a fixed contract price of \_\_\_\_\_ [INSERT CURRENCY & AMOUNT IN FIGURES AND WORDS].

3.2 The price of this Contract is not subject to any adjustment or revision because of price or currency fluctuations or the actual costs incurred by the Contractor in the performance of the Contract.

3.3 Invoices shall be submitted by the Contractor to the Engineer upon achievement of the corresponding milestones and for the following amounts:

MILESTONE<sup>3</sup> AMOUNT DATE

Upon signature of

Contract ..... .././....

..... /./.....  
Upon substantial  
completion of Works ..... /./.....  
Upon final  
completion of Works ..... /./.....

#### **4. Special conditions**

4.1 The advance payment to be made upon signature of the contract by both parties is contingent upon receipt and acceptance by UNDP of a bank guarantee <sup>5</sup> for the full amount of the advance payment issued by a Bank and in a form acceptable to UNDP.<sup>6</sup>

4.2 The amounts of the payments referred to under section 3.6 above shall be subject to a deduction of \_\_\_\_\_ [INSERT PERCENTAGE OF TOTAL CONTRACT PRICE THAT THE ADVANCE REPRESENTS] % (... percent) of the amount accepted for payment until the cumulative amount of the deductions so effected shall equal the amount of the advance payment.<sup>7</sup> Should the cumulative amount of the deductions so made be lower than the amount of the advance payment after the date of substantial completion of the Works, UNDP may deduct the amount equal to the difference between the advance payment and the cumulative deductions from the payments due after substantial completion or may recover such amount from the bank guarantee referred to in 4.1 above.

4.3 The Performance **GUARANTEE** referred to in Clause 10 of the General Conditions shall be submitted by the Contractor for an amount of \_\_\_\_\_ **[10% OF THE TOTAL]**

4.4 **[THE USE OF THIS CLAUSE REQUIRES APPROVAL BY THE PROJECT DIRECTOR/UNDP PROGRAMME OFFICER]** The Contractor may submit invoices for materials and plant stored at the Site, provided they are necessary and adequate for the performance of the Works and they are protected from weather conditions and duly insured as per the instructions of the Engineer.

4.5 The liability insurance referred to in Clause 23 of the General Conditions shall be taken out by the Contractor for an amount of.....**[CONSULT THE ENGINEER FOR APPROPRIATE AMOUNT]**.

4.6 According to Clause 45 of the General Conditions, the liquidated damages for delay shall be \_\_\_ **[2%]** of the price of the Contract per week of delay, up to 5 weeks and up to a maximum of 10% of the final price of the Contract, which is to be considered for termination.

#### **5. Submission of invoices**

5.1 One original and one copy of every invoice shall be submitted by mail by the Contractor for each payment under the Contract to the Engineer's address specified in clause 8.2.

5.2 Invoices submitted by fax shall not be accepted by UNDP.

#### **6. Time and manner of payment**

6.1 Invoices shall be paid within thirty (30) days of the date of their receipt and acceptance by UNDP.

6.2 All payments shall be made by UNDP to the following Bank account of the Contractor:

\_\_\_\_\_  
**[NAME OF THE BANK]** \_\_\_\_\_

**[ACCOUNT NUMBER]** \_\_\_\_\_

**[ADDRESS OF THE BANK]**

#### **7. Modifications**

7.1 Any modification to this Contract shall require an amendment in writing between both parties duly signed by the authorized representatives of the Contractor and UNDP.

#### **8. Notifications**

8.1 For the purpose of notifications under the Contract, the addresses of UNDP and the Contractor are as follows:

**For the UNDP:**

\_\_\_\_\_ **[INSERT NAME OF RR OR DIVISION CHIEF]**

Chief United Nations Development Programme

Ref. \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ **[INSERT CONTRACT REFERENCE & NUMBER]**

Telex: \_\_\_\_\_

Fax: \_\_\_\_\_

Cable: \_\_\_\_\_

**For the Contractor:**

[

Insert Name, Address and Telex, Fax and Cable Numbers

]

8.2 For the purposes of communications with the Engineer, the address of the Engineer shall be as follows:

[Insert Name, Address and Telex, Fax and Cable Numbers of the Engineer]

**OR**

8.2 UNDP shall communicate as soon as possible to the Contractor after the signature of the Contract, the address of the Engineer for the purposes of communication with the Engineer under the Contract.

If the above terms and conditions meet with your agreement as typed in this letter and in the Contract Documents, please initial every page of this letter and its attachments and return to this office one original of this Contract, duly signed and dated.

Yours sincerely,

**UNDP**

Resident Representative

For [Insert name of the company/organization]

Agreed and Accepted: Signature \_\_\_\_\_

Name \_\_\_\_\_

Title \_\_\_\_\_

Date