**VOLUME 3**

**TEHNICAL SPECIFICATIONS**

**MINISTRY OF ECOLOGY, SPATIAL PLANING AND URBANISM MONTENEGRO ECO EFFICIENT BUILDING - II PHASE – WORKS**

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Abbreviations

ARE Assistant Resident Engineer

CAD Computer Aided Design

CapEx Capital Expenditures

COD Chemical Oxygen Demand

EUD Delegation of the European Union

DN Nominal Diameter

DNP Defects Notification Period under FIDIC

DWF Dry Weather Flow

EC European Commission

EEC European Economic Community

EIA Environment Impact Assessment

EPA Environmental Protection Agency

EPD European Protection Department

EU European Union

EUD European Union Delegation

EUR European currency

EP Power Company

FIDIC Fédération Internationale des Ingénieurs-Conseils

FS Feasibility Study

GIS Geographical Information System

GD Geology Department

GRP Glassfibre Reinforced Polyester

HDPE High Density Polyethylene

HQ Head Quarter

HRT Hydraulic Residence Time

IFI’s International Financial Institutions

IPC Interim Payment Certificate

IR Interim Report

IT Information Technology

LIP Long Term Investments Project

MESPU Ministry of Spatial Planning and Urbanism

MRD Maintenance, Replacement and Development (Fund)

MPR Monthly Progress Report

MSM Monthly Site Meeting

NA Not Applicable

NEAP National Environmental Action Plan

NN Not Named

O&M Operation and Maintenance

PA Public Awareness

PIU Project Implementation Unit

PLC Programmable Logic Control

PM Project Management

PMU Project Management Unit

PR Public Relations

PRAG Practical Guide to contract procedures for EU external actions

PS Pumping Station

PSC Project Steering Committee

PVC Polyvinylchloride

QA Quality Assurance

QMM Quarterly Monitoring Meetings

QR Quarterly Report

SCADA Engineery Control and Data Acquisition

SOW Scope of Work

SS Suspended Solids

TA Technical Assistance Consultant

TBN To Be Nominated

TD Tender Documents / Tender Dossier

TL Team Leader

VAT Value Added Tax

ViK Water Utility - Vodovod i Kanalizacija

WC Works Contract

WSS Water Supply and Sanitation

# 1. INTRODUCTION

The present tender dossier has been prepared for:

MINISTRY OF ECOLOGY, SPATIAL PLANNING AND URBANISM MONTENEGRO ECO EFFICIENT BUILDING - II PHASE – WORKS

No variant solutions are accepted.

The future Contractor shall provide detailed construction, test, and commission and perform staff training as specified in this Technical Specifications. The future Contractor can choose his method of organizing the processes of planning and constructing in compliance with the required conditions made by local and regional bodies, the Beneficiary and the Employer. The future Contractor shall demonstrate how he will organize the required work for project implementation.

The here defined Technical Specifications to cover the principles, responsibilities and requirements for items that will be applicable to construction, and Works pertinent to the Contract.

They shall be read in conjunction with the General Conditions of Contract (Volume II, Section 2, Appendix to Tender (Volume I, Section 2), Particular Conditions of Contract (Volume II, Section 3), the Overall Tehnical Specification (Volume III), the Financial Offer (Volume IV) and the Contractual Drawings (Volume V). Where reference is made to any national Standard/Code or European Norm the Contractor shall adopt the highest specification.

# 2. GENERAL DATA

## 2.1 Objectives of the Contract

The implementation of this Contract will be financed by the Ministry for the Environment, Land and Sea of the Republic of Italy, within bilateral cooperation between Montenegro and Italy in the field of environmental protection. Energy efficient building is aimed for Ministry of Ecology, Spatial Planning and Urbanism with a Study unit of Ecology for the University of Montenegro needs.

The End Recipient/Final beneficiary is the Ministry of Ecology, Spatial Planning and Urbanism.

The objective of the Contract is:

Completion of the construction of the Eco efficient building in Podgorica including the remaining works of the phase I for the needs of the Ministry of Ecology, Spatial Planning and Urbanism.

This includes execution of the remaining works of the phase I as well as execution of works of the phase II, as it follows:

– the remaining works of the phase I comprise: construction and finishing works, water supply, sewerage installations, power block and landscaping.

– the works of the phase II comprise: façade, thermo-technical installations, electrical (high and low voltage, lighting, various works) installations, sprinkler, water wells and transmission data and telephone devices.

Deadline for completion of works is 18 months, while Defect Notification Period (DNP) will takes 24 months.

## 2.2. Current situation

According to the Contract between the former Ministry of Tourism and Environmental Protection of Montenegro and Ministry for the Environment, Land and Sea of Italy, a unique Montenegrin–Italian financial instrument is established (EMIF – Environment Montenegrin–Italian Facility). Within this instrument, the project of construction of Eco-building of Ministry of Ecology, Spatial Planning and Urbanism is being carried out.

The implementation of the project was planned through phases:

Phase I –making of construction of energy block, wooden construction, installation of plumbing and sewer, landscaping with electrical installations of high voltage, drainage of the facility as well as final works, except façade.

Phase II –installation of façade, water tank, installation works in the building and landscaping works- installation works of low and high voltage, sprinkler system and thermo-technical installations as well as installation of equipment, devices and plants.

Detailed design “GLAVNI PROJEKAT POSLOVNOG OBJEKTA - OBJEKAT VLADE CRNE GORE - EKOLOŠKI EFIKASNA ZGRADA” has been prepared in 2011 and has been reviewed by INTER FORMA d.o.o. PODGORICA in December 2012 (Phase - Architecture, Construction, Water Supply and Sewage, Low and High Voltage Electrical Installations, Thermo Technical Installations, Sprinkler, Landscaping works, Fire Protection, Traffic Signalization).

Construction permit no. 05-5288/2 from 12.12.2011 has been issued by former Ministry of sustainable development and tourism of Montenegro.

Since the works of the first phase have not been fully realized, these remaining works together with the works of the second phase will be the subject of this contract.

**Status on the construction site:**

On the site works on the construction of reinforced concrete and steel structures are executed. Construction works are divided in phases so the continuation of works of phase I is only possible after execution of works of phase II, (construction of facade and covering the facility), which means that part of works of phase I and phase II will be done simultaneously.

## 2.3 General Data for the Project

Eco efficient building for the purpose of Government of Montenegro is located in DUP of “University centre”, urban plot no. 9. The surface of the plot is approximately 5.616m2.

The building consists of underground (garage), ground floor and two upper floors.

The gross area of building is approximately 10.020m2, of which the gross area of underground is 4.660m2, and the gross area of floors is approximately 5.360m2.

In accordance with the Design the capacity of the building is 210 employees.

The underground part of building is 98 parking places capacity and premises for technical use.

On the ground floor premises for MESPU and University are designed, precisely main hall, bar and room for reception of external mail for the Ministry and classrooms of total capacity of 100 seats, reference library and a teaching staff meeting room for the University.

On the first floor, which is the main floor of the building, 49 offices, 8 cabinets for secretaries, deputies and advisors of ministers as well as three meeting rooms are designed.

Following premises are planned on the second floor: two cabinets for the minister with offices for administrative assistants and meeting rooms, two cabinets for deputies of ministers and their secretaries, auditorium with 75 seats with four permanent halls for interpreters and technique, a conference hall within the auditorium of 30 seats, two meeting rooms with 30 seats.

On the roof of the building technical premises are planned.

Communications, sanitary pads and other supporting facilities are planned on each floor.

## 2.4 Climate

In order to apply bioclimatic strategies, an analysis of the location, the solar source, the frequency of the wind and humidity was carried out. The project of the building suitable for the climate allowing shelter from extreme weather conditions, where used ecological advantage allows a functional building. To achieve the proper construction of a suitable building climate it is essential to analyze the local weather conditions.

Extreme climatic conditions indicate the following limitations and potentials: during summer outdoor temperature reaches 18 ÷ 20 ° C (minimum night temperature) and 29 ÷ 38 ° C (maximum daily temperature). Minimum winter temperature reaches about - 4 ° C. There are of course extremely rare cases when the temperature may vary outside of the indicated, particularly during the summer period.

The climatic conditions in location of the building in Podgorica highlight the great potential in terms of solar radiation that is present mainly during the summer period. However, in the warmer months, the absolute humidity is higher for longer periods. This means that during the summer when the outdoor comfort is reduced, you need to reduce the humidity by using the units for air treatment in combination with mechanical cooling.

The initial analysis of the site, with simulated shadows using Ecotect software allows optimal design of the building to control exposure to sun, glare and optimize natural lighting.

**Bioclimatic Strategies**

Passive bioclimatic strategies

Bioclimatic architectural design strategy aims to build a building that will be integrated with the local microclimate in order to meet the requirements of energy saving and emission reduction CO2. The designer adopted passive design, energy management, water use and renewable energy strategies.

The design choices are guided by:

• Orientation: optimizing building orientation and exposure to the sun in order to increase the use of solar in the winter and reduce the risk of overheating in summer. Different exterior facade systems and glass roof are optimized on each floor.

• Chimney systems: as illustrated, roof of the building can be clearly seen as a prominent element of the proposed design. The roof has a function of the fifth facade which provides natural lighting interior spaces of control and exploitation of solar energy throughout the year.

• Finish of the cubes depends on the exposure to the sun roof and different needs for daylight interiors.

• A variety of facades of the building are the result of the connection of functional program, the need for daily lighting and optimal conditions blackout / shadow interior rooms .

• Free cooling: in order to reduce the risk of overheating during summer, night cross ventilation cools the interior space, in addition, high thermal mass of the structure and the protection of the transparent facade enhance the thermal balance of the building during extreme weather conditions.

• Green areas: internal green courtyard reduces the effect of the warm island and leads to passive cooling.

• Daylight: to reduce the use of artificial lighting, we propose taking advantage of natural daylight. The shape of the chimney and different levels of transparency of the roof filter natural light within the building. Therefore, artificial lighting is required for only 30 % of working time.

Active bioclimatic strategies

• Solar Systems: In order to reduce CO2 emissions, and therefore the impact of the environment on the roof are installed solar panels.

• Water heat pump and air conditioning system is provided in order to achieve maximum energy efficiency and low electricity consumption and the electric energy, water heat pump assisted solar energy panels allow the air conditioning system.

• The heating system built into the floor lift control air temperature, humidity and indoor air quality.

Building management system (BMS) BMS allows low operating cost, automatic control of all mechanical and electrical systems, pleasant environmental conditions, proper control of safety and security.

## 2.5 Geology

An Elaborate on geomechanical features of subject location was done by the company “GEOPROJEKT“ L.t.d. in December 2009 in Podgorica. In Elaborate is stated that the facility will be founded within the framework of geomechanical environment, equable physical and mechanical features, i.e. with complex of sandy gravel and partly weaker bounded clay or Carbonate binder. The groundwater level was measured during the execution of construction works (in November 2009.) at depth of 22 m from the ground surface. Due to this, the impact of ground water on foundation of the facility is excluded. Depending on the dimensions of the foundation and effective depth of founding, the proposed allowable voltage of the ground amounts in the range of 250 – 400 kN/m2. The expected settlement will be also within the allowable limits.

## 2.6 Seismicity

According to the map of Seismic regionalization of Montenegro presented below (Seismological bureau 1982), the seismic geologic foundations and seismic micro regionalization, an expected maximum intensity of earthquake is I = 9 MCS, which is expected for coastal area. On the seismological risk map for Montenegro the coastal area is situated in the highest seismic risk zone of the country zone IX), which corresponds to a 10% probability of a seismic event of a Mercali Scale intensity of at least IX occurring within 50 years (which would mean a return period of such an event of 500 years). The ground acceleration foreseen for this type of event ranges from 0.30 g in hard rock (which would apply to the site) to 0.45 g in soft materials. Map of maximum expected intensity of earthquakes with 63 % probability of occurrence in the territory of Montenegro during the previous 100 years is presented below:

*Seismic activity in Montenegro during 2007*



*Seismic Hazard*



*Seismic Zoning*



## 2.7 Protection of Antiquities and Fossils

In case the Contractor finds any antiquities or fossils during the construction work he shall suspend the respective work and inform the Engineer. Work shall remain suspended till relevant permissions to carry on with the work have been granted. The Contractor shall support and protect vulnerable parts of discovered antiquities and fossils to a reasonable extent.

# 3. PREPARATORY WORKS

## 3.1 Work Program

In accordance with the requirements of the Sub-Clause 8.3 of the Conditions of Contract, the Contractor shall submit a work programme to the Engineer within the period specified. The programme shall be prepared on a CPM-software of a form and version compatible with the systems operated by the Engineer and shall be submitted both in digital format and in hard copy.

The programme for the Works shall take into account the preparation of Design Documentation, obtaining permits, climatic conditions, etc. to ensure the completion of the Works in accordance with the Contract. The Contractor shall allow in his Programme reasonable amount of time for work to be carried out by and with the Public Utilities Services Authorities. The Beneficiary will provide all necessary assistance in liaising with such Authorities.

The programme shall include the following:

• A detailed work programme in form of a Gantt chart which clearly indicates individual functions, actions and tasks and shows the period for delivery of construction materials, construction period, testing, commissioning and all other such operations as may be applicable with key dates; Indicated shall be the sequence of each activity, the proposed start and completion dates of each activity, the rate of progress and the cumulative quantity or percentage of work expected to be achieved on each activity by the end of each month;

• A complete resource schedule showing the number of units and allocated times for each unit of construction plant & machinery, materials and labour allocated to each part of the Works;

• The time requirements for work by others, including those of the Employer and by the various utility companies;

• Mobilization/Demobilization Schedule;

• Schedule of Subcontractors;

• Possibility to indicate actual progress against the programmed progress for each activity,

• A Pert chart with all task linkages and the critical path clearly indicated;

During the contract period, the programme shall be updated monthly and the programme thus presented shall clearly present comparison of the actual progress with that planned. The programme shall be attached to the monthly progress report with a clear statement on the progress. These programmes shall indicate the use of materials and deployment of plant and labour, in addition to showing anticipated constructional progress. Where the inputs of others (including the Employer and his Representative and/or the Engineer) are required, target dates should be shown and adequate notice should be given to those concerned.

This planning must include the implementation of all the agreements made with the authorities who are involved and responsible for traffic, transport and existing services like water supply, power, telephone, firefighting, drainage and such like. Any consent of the Employer to this planning will not exempt the Contractor of his responsibility to complete the Works within the time as agreed and stated in the Contract.

The Contractor shall take the initiative to inform the local authorities in due time about his programme.

The Contractor shall attend co-ordination meetings between the Employer and other authorities and shall supply all relevant information and data in his possession.

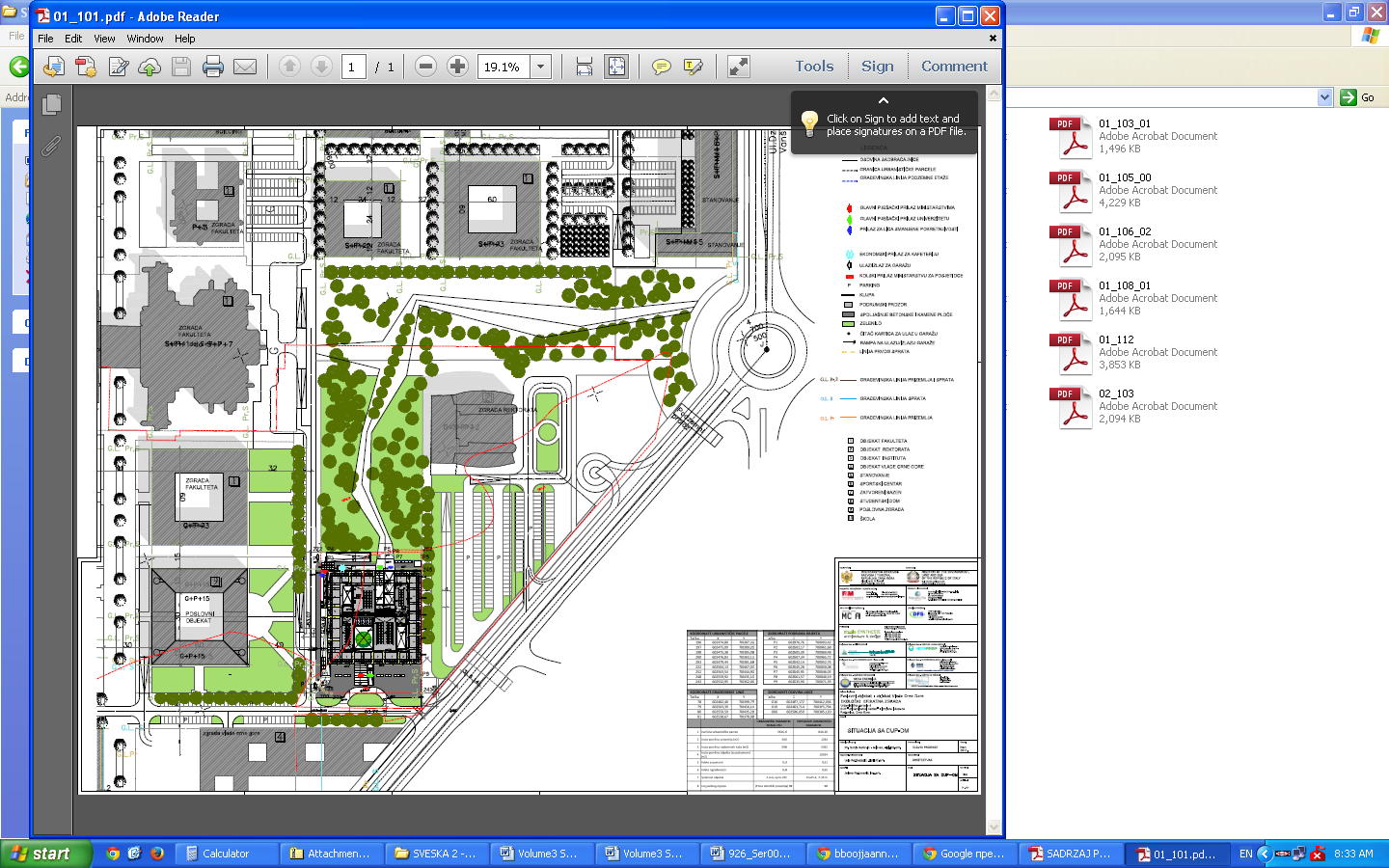
The possible simultaneous construction of adjacent works under separate contracts may require the Contractor to adapt his planning to that of other Contractors. The Employer will inform the Contractor in due time about the conditions to be expected during the period of interference of work. Such adaptations as far as are required in the interest of and at the request of Employer shall not entitle the Contractor to additional payments and time extension.

For any operations that may result in a safety hazard (eg. deep excavation, pile driving, concrete casting of foundation etc.), the Contractor shall submit in writing the method statements for such operations for approval by the Engineer not less than 30 days prior to the planned commencement of such work.

Programmes shall allow for the 21 days review period prior to construction. Where desired, the Contractor may present the Program (and updates) in electronic format provided the Contractor ensures, at his own cost, that the Engineer has the necessary software and hardware to be able to utilize the information as presented.

## 3.2 Situation Plans

In Volume 5, the proposed locations for the Works are shown in the respective layout drawings.



## 3.3 Statutory Services

The Infrastructure Authorities are public institutions responsible for the public utility services of electricity, water, sewerage, drainage, telephone (including optical cables) and roads. The Contractor shall acquaint himself with the actual location of all existing public utilities such as sewers, water, drains, cables for electricity, telephone lines, optical cables, etc., before commencing any activities likely to affect the existing utilities.

Some of the existing infrastructures are provided in the tender document Volume 5 as basic information.

The Contractor however shall at his own costs but with the assistance of the Beneficiary obtain such information directly from the responsible authorities as early as possible and shall execute his own investigations on site.

## 3.4 Photographic survey

The Contractor shall make a digital photographic survey of the condition of the original state of the working location before starting any Works on it. These shall be recorded and filed including the date of the photograph on each image in digital form.

## 3.5 Provision of Temporary Facilities

### 3.5.1 Temporary Diversions of Utilities

If in the opinion of the Contractor and Engineer it is necessary to make temporary diversions of any services in connection with the Works, the Contractor shall arrange after written approval by the Engineer with the relevant authority for the construction of those diversions.

The Contractor may at his own cost and subject to the approval of the authority concerned, make such temporary diversions as may facilitate the carrying out of the Works. If the Authorities request that any services shall be temporarily supported then the Contractor shall provide the necessary supports in a careful manner in accordance with the request and full satisfaction of the Engineer. If a decision is made to relocate permanently the services mentioned above by the relevant Authorities, the Contractor shall render every help to the Authorities including the removal of the road surfacing, excavation and, on completion of the works, reinstatement of the working area. The Contractor shall submit for approval full particulars, including drawings of any of the site installations and Temporary Works. If required the Contractor shall also submit calculations of the stresses, strains and deflections which will arise in false work or other Temporary Works and these calculations shall be accompanied by detailed Working Drawings to show the Contractor's proposals. Approval by the Engineer of the Contractor's proposals, calculations or drawings shall not relieve the Contractor of any of his duties or responsibilities under the Contract. It shall be the Contractor’s responsibility to handle, maintain, support and reinstate all the remaining services encountered to the full satisfaction of the Engineer and the relevant authority. The Contractor shall indemnify the Employer and shall be responsible for all claims whatsoever arising from any damage, injury etc. caused to the services as a result of his construction activities associated with this Contract.

### 3.5.2 Provision of Temporary Services

When the execution of the Works requires the temporary disconnection of existing public or domestic utilities, the Contractor shall provide the affected users with temporary services in at least the same standard as the original services.

When the Contractor is forced to disconnect power or telephone connections the relevant authority shall provide temporary connections at the Contractors expense. Upon completion of work the Contractor shall replace all severed connections, with the assistance of the concerned authority where necessary, and restore to operating order the existing facilities. Temporary facilities shall be provided by the Contractor, only for as long as required after which he shall dismantle and remove the same from their place of use as speedily as possible. Re-usable components shall be safely stored by the Contractor in his stockyard. No valve or other controls in public service facilities shall be operated by the Contractor without approval of the Engineer and the relevant authorities. All users affected by such operation shall be notified by the Contractor at least one day before the operation and advised of the probable time when service will be restored. Notwithstanding approval by the Engineer of any design for the Temporary Works, the Contractor shall be entirely responsible for their efficiency, security, and maintenance and for all obligations and risks in regard to such Temporary Works specified or implied in the Contract. All temporary diversions of utilities and provision of temporary services shall be covered by the unit rates of the Breakdown of Prices.

### 3.5.3 Detours and Traffic Control

The Contractor of this Work has to deal closely with the Engineer in order to streamline the works in public roads and to minimise any detour of traffic and to reduce the nuisance to the public. The Contractor shall seek information on and comply with all requirements and recommendations of the police regarding traffic arrangements and road safety measures. The Contractor shall provide all barriers and traffic sign as required by the Authorities.

The access rights of the public shall be considered as important at all times. Unless otherwise authorized by the Engineer, Police or District Traffic Commission, the Contractor shall not obstruct traffic passing through streets and thorough fares on which the Works are being carried out unless an approved detour is provided. The Contractor shall program his work in such a way that, wherever the temporary closure of street sections to public thoroughfare cannot be avoided, the duration of traffic diversion can be kept as short as possible. No streets shall be closed and no detours shall be introduced and no traffic diverted until the Contractor's proposals have been approved by the Engineer and the appropriate authorities, such as the Police Department in Podgorica. Safe and adequate pedestrian and vehicular access shall be provided and maintained to fire hydrants, houses, commercial and industrial establishments, churches, mosques, schools, parking bays, service stations, hotels, fire and police stations, hospitals, and establishment of similar nature. Access to above mentioned places and areas shall be continuous and unobstructed unless otherwise approved by the Engineer. Safe and adequate pedestrian zones and public transportation stops, as well as pedestrian crossings of the Works at intervals not exceeding 100 m, shall also be maintained unless otherwise approved by the Engineer.

Detours shall be selected in such a way that the inconvenience to the affected traffic as well as to the inhabitants of the affected areas is kept to a minimum. The Contractor shall be responsible for obtaining the permission of the Engineer and the Police for activities he intends to carry out in public roads. Three copies of the Contractor's proposals to the relevant authorities shall be submitted to the Engineer. One copy of all obtained approvals shall be submitted to the Engineer. The Contractor's attention is drawn to the fact that processing of the documentation required by the local authorities prior to the cutting of existing public roads takes at least 30 days. All traffic signs and control devices to be furnished and installed by the Contractor shall be approved by the Engineer for their location, position, visibility, adequacy and manner of use under specific job conditions. Particular attention has to be paid for the traffic control by night. All traffic control devices necessary for the initial stage of construction shall be properly placed and operational before any construction is allowed to start. When work of a progressive nature is involved, the necessary signs shall be moved concurrently where they are needed. If the Engineer determines that proper provisions for safe traffic control are not being provided or maintained, he may restrict construction operations affected by such defective signs or devices until such provisions are established or maintained, or may altogether order suspension of the Work until a proper traffic control is achieved. In case of serious or will full disregard by the Contractor of the safety of the public or his employees, the Engineer may take necessary steps to rectify the situation and deduct the cost thereof from monies due or becoming due to the Contractor. The Contractor shall be responsible for all resulting delays. The Contractor shall designate or otherwise employ personnel to furnish continuous surveillance of the traffic control operations. The designated personnel shall be available day and night to respond to calls involving damage due to vandalism or traffic accidents. At sections where traffic is in operation and when ordered by the Engineer, the movements of the Contractor's equipment from one place of work to another shall be subject to traffic control. During rush hours movement of larger vehicles, such as trucks, cranes, dumpers, etc. through main thoroughfare are not permitted by the police. Spillage resulting from hauling operations along or across the road way shall be removed immediately at the Contractor's expense.

## 3.6 Demolition and Alternations

The demolition of structures includes the demolishing of all kinds and grades of bricks, wooden structures, plain concrete and reinforced concrete, pipes, all requisite shoring and strutting or other supports incidental to demolition works, the removal of debris from site, final site clearance and making good of disturbed parts.

The demolition works to be carried out under this Contract on the sites for constructing the Works may comprise water lines, sewers, conduits, manholes, walls, asphalted road surfaces, fences and pavements.

Before moving equipment into the Site and commencing operations the Contractor shall establish to the Engineer's satisfaction that the method of demolition proposed by the Contractor is such that he can ensure the safety of structures adjacent to those to be demolished.

All materials arising from the demolition and clearance of water lines, sewer network lines, buildings, structures and other objects mentioned above shall become the property of the Contractor and shall be disposed off site. Disposal of the material shall be according to the respective regulations. Disposal certificates need to be presented.

Where required or directed by the Engineer, the existing structure will be temporary reinforced to assure the stability. The Contractor will submit for the Engineer's approval the methods applied for demolishing and the proposed temporary safety measures. The Engineer's approval shall not relieve the Contractor of any of his responsibilities under the Contract.

## 3.7 Access to Adjoining Property

Contract should perform all activities and precautions in order to protect already executed works (adjoin property). The Contractor will be responsible for damages caused on structures in precedent executed under contract for construction of the Eco efficient building phase I.

# 4. GENERAL CONSTRUCTION REQUIREMENTS

## 4.1 Warranty for Materials Incorporated in the Works

A warrant made out in the name of beneficiary shall be provided by the manufacture of the materials listed below. The warranty shall include appropriate dimensioning of components, correct choice of materials (including auxiliary) and workmanlike installation for the periods shown.

Table 2: Warranty Periods

Description/Subject

Warranty Period

[Years]

Special components and auxiliary equipment included in or attached to installations structures – **2 years.**

Construction and finishing works on the façade and covering of building as well as construction and finishing works on landscaping – **10 years.**

Installation works (Thermo-technical installations, power block, high and low voltage electrical installations, water supply and sewerage installations and Sprinkler installations) – **2 years.**

The warranty period shall commence after the date stated on the Taking Over Certificate.

## 4.2 Method Statements

The initial and monthly programmes shall be submitted with a construction and installation method statement. These shall make due allowance for all requirements and restrictions imposed by the Contract. Each method statement shall comprise a step-by-step schedule of specific operations or activities with descriptions, dates, times and duration of each step. Sketches, diagrams or other supportive detail as necessary to enable a clear understanding of the method and significance of each step of work or operation shall support the method statements. Each method statement shall be submitted to the Engineer for review at least 28 days prior to the programmed activity commencement.

The method statements shall include, but not be limited to:

1. Detailed methodology for all operations;

2. A statement giving the numbers and categories of supervisory and technical staff and skilled and unskilled workers to be employed on the Works;

3. Construction equipment to be used (Details of plant, machinery, equipment and tools, which the Contractor proposes to use in the execution of the Works);

4. A statement identifying proposed locations and sizes for the Contractor’s site installations. (Layouts of compounds, storage and welfare facilities);

5. Hours of working.

6. Risk assessment

7. Temporary works proposed;

8. Measures for controlling noise and vibration.

9. Sources of materials.

10. Methods of movements and storage of bulk materials and spoil.

11. Measures for controlling dust.

12. Temporary lighting measures.

13. Details of all disposal sites.

14. Site safety procedures.

Method statements shall be submitted to cover the use of materials or working practices that are not covered by codes or standards mentioned elsewhere in this Specification.

## 4.3 SI-Units

SI units (Système International d'Unités) of measurement shall be used throughout this Contract. All calculations and technical information shall be in SI units.

The Contractor shall transfer all information and data originating in another system into the SI System.

## 4.4 Safety and Public Convenience

**Health and Safety**

General

The Contractor shall pay careful attention to safety procedures and comply with the requirements of European Directives 92/57/EEC dated 24.06.1992 and 89/391/EEC dated 12.06.1989 and Montenegrin Law on health and safety at work(Official Gazette of Montenegro, No. 34/14 dated 08.08.2014 and 44/2018, with addenda, if any), concerning the Health and Safety Protection and all relevant national health and safety regulations. The Contractor's attention is drawn to the number of hazards that are likely to be encountered when carrying out the works that could affect the health and safety of his operatives, the Beneficiary’ employees and members of the general public.

The following areas of work will involve serious hazards; hence appropriate actions shall be taken to reduce the risks as far as practicable:

• Excavations (e.g. support to prevent earth movement, contact with underground / overhead services, stops to prevent dumpers, barriers / warning signs for pedestrians);

• Working at height (e.g. falls, falling materials);

• Heavy lifting (e.g. suitable equipment, stable ground, trained driver/ slinger/banksman);

• Vibrating equipment;

• Dangerous substances' storage, handling and use (e.g. chemicals, explosives); and

• Controlled waste materials' handling.

In addition to the requirements of Sub-Clause 4.8 of the Particular Conditions of Contract, the Contractor shall comply with all statutory and other regulations concerning the safety of all persons on the site or in the vicinity of any of the Contractor’s operations. He shall obtain copies of all the relevant regulations and shall make them available for inspection on site. The Contractor's Safety Officer shall have the qualification and the authority to issue instructions to the Contractor's personnel regarding protection measures to prevent accidents. The Contractor shall at all times in the conduct of his work and that of his Subcontractors adhere to the established rules and regulations concerning all safety matters at Site to the extent that such provisions do not conflict with the applicable laws.

The Contractor shall appoint a “Safety Officer” whose role shall be to promote, monitor and enforce safe working practices on the Site. The Safety Officer shall be a senior member of the Contractor’s staff and shall be approved by the Engineer prior to taking up the role.

Health and Safety shall be an agenda heading at the regular monthly site progress meeting. The Contractor shall carry out a safety audit of the Site at intervals not exceeding six months.

The Contractor shall ensure that all persons entering the working sites have received the appropriate safety briefing and have signed the record of briefing declaration.

The Contractor shall be responsible for the safe conduct of the Works. He shall ensure that all operations are carried out safely and that any person made responsible for the safe conduct of any part of the operations is properly trained and carries out their duties in a proper manner.

Where any part of the Works is not already covered by the Contractor’s Safety Policy, or there is a high risk activity, the Contractor shall, before commencing work on that part of the Works or activity, submit to the Engineer a safe system of working statement. He shall immediately submit to the Engineer any subsequent additions to, or amendments of, this statement. No work covered by any safe system of working statement shall be commenced unless the Engineer has indicated that he has no objection to the methods proposed. The Contractor is warned that any failure on his part to observe the requirements of the agreed safety plan will be grounds for the Engineer or his authorised representative, to issue a Stop Notice on that part of the Works where the safety breech has occurred. Such notice shall be effective immediately and will only be lifted when the Contractor has put in place the necessary safety measures.

The Contractor will not be entitled to any compensation or extension of time as a result of the issue of a Stop Notice resulting from his failure to provide agreed safety measures.

**Safety Officer**

The Contractor shall appoint a Safety Officer who shall be responsible for co-coordinating and controlling the health and safety on Site. The Safety Officer shall be suitably qualified for this work and shall have the authority to issue required instructions and take protective measures to prevent accidents.

The safety officer shall maintain the Accident Register of any accidents occurring on any part of the site that require any form of medical attention.

All employees shall be briefed before starting work on site safety procedures and the need to report and record any accidents and verify the entry in the register. The register shall be available for inspection by the Employer, Engineer and any statutory authority at any time. All Employees shall sign a declaration that they have received the site safety briefing and safety instruction for the areas of the site that they will enter and the work that they will undertake. The Contractor is warned that the signature of the safety briefing acknowledgement by anyone will not relieve the Contractor of possible liability in the case of any subsequent accident to that person.

**Hazard Identification and Risk Assessment**

The Contractor shall undertake and present a Hazard Analysis and Risk Assessments comprising, but not limited to, a Hazardous Operations Analysis study, design risk assessments, method statements for safe construction, operation and maintenance of the works at the appropriate stage in the project. This will require the Contractor to carry out soil investigations (e.g. by means of trial pits) ahead of any excavation to ensure that buried hazardous substances are identified and that appropriate working methods area greed and approved in advance of the main works being carried out.

**Accident Reporting**

The Contractor shall notify the Engineer immediately of any accident that occurs in which the Contractor is directly involved, whether on or off site, which result in any injury to any person whether directly concerned with the site or a third party. Such initial notification may be verbal and shall be followed by a written comprehensive report in English and Montenegrin within 24 hours of the accident. The Contractor shall also report any such incident to any such authority as may be required by law. Further it’s required to maintain a Register of Accidents.

**Site Safety**

The Contractor shall at all times in the conduct of his work and that of his Subcontractors adhere to the established rules and regulations concerning all safety matters on Site such as the recommendations contained in the "Manual of Accident Prevention in Construction", published by the Associated General Contractors of America, Inc., or other internationally recognized recommendations to the extent that such provisions do not conflict with the applicable laws. The Contractor's Safety Officer shall have the qualification and the authority to issue instructions to the Contractor's personnel regarding protection measures to prevent accidents.

During construction the Contractor shall erect, maintain and subsequently remove sufficient barricades, guards, lighting, sheeting, shoring, temporary sidewalks and bridges, danger signals as well as temporary covering of potential accident areas. If and where required, the Contractor shall erect and maintain suitable and approved temporary fencing to enclose such areas of construction and areas of land occupied by the Contractor within the Site as may be necessary to implement his obligations under the Contract. Where temporary fencing has to be erected alongside a public road, foot-path, etc., it shall be of the type required by and shall be erected to the satisfaction of the authority concerned.

**First Aid**

On site suitable number of First-Aid kits in accordance with European Standard, the national occupational health standards and to the satisfaction of the Engineer has to be provided by the Contractor.

**Confined Space Working**

The Contractor’s attention is drawn to the hazards of working within chambers, shafts, channels or tanks and poorly ventilated areas. The Contractor shall supply the necessary safety equipment, which shall be available on the Site, before such work is commenced.

**Working near power lines**

The Contractor shall be responsible for ensuring that all persons working in the vicinity of power lines are aware of the relatively large distance that high voltage electricity can "short" to earth when cranes or other large masses of steel are in the vicinity of power lines.

**Fire Prevention**

During the performance of the Contract, the Contractor shall make arrangements to the satisfaction of the Engineer for the protection of the Permanent Works and any Temporary Works and any adjacent property from fire and, if required, he shall give the Fire Authority admittance to all facilities periodically to inspect the fire prevention arrangements.

The Contractor shall perform all work in a fire-safe manner. He shall supply and maintain on the site adequate fire-fighting equipment. The Contractor shall comply with all current applicable fire regulations as well as the hygienic and technical working conditions.

Special arrangements will be necessary for the storage of highly flammable liquids on the site. The Contractor shall remove all rubbish and material of a flammable nature and take such other steps as the Engineer may require but this shall not relieve the Contractor of any of his obligations under the Contract.

**Prevention of Noise and Disturbance**

The Contractor shall in general comply with the requirements contained in the following paragraphs.

Noise and disturbance shall be kept to the reasonable minimum. The Contractor’s attention is drawn to the close proximity of some Working Sites to buildings in continuous use. All plant and tools used at such sites above or near ground level shall be silenced or of a silent type.

The Contractor shall take all necessary steps to ensure that his workmen carry out their duties in a quiet manner particularly when working at night. No work is allowed at public holidays or any religious festival.

The Contractor shall obtain the Engineer’s consent to the details and arrangement of all plant before installation. All plant shall be kept in good condition and safe working order.

Operation of any particular item of plant shall be stopped whenever, in the opinion of the Engineer, it is causing unreasonable noise or disturbance. The Contractor shall immediately take steps to eliminate such noise or disturbance or replace the plant.

Where compressors or generators are to be used for less than one month suitable baffles or other provisions to reduce noise emission shall be provided with suitable acoustic baffles to reduce the emission of noise. Acoustic screening shall be provided for outside plant equipment to the satisfaction of the Engineer.

If instructed by the Engineer, the Contractor shall take noise intensity readings and shall submit the results to the Engineer. The Contractor shall comply with any additional measures required by the Engineer to keep noise and disturbance to the minimum.

**Street Clean Up During Construction**

The Contractor shall clean all spilled dirt, gravel, or other foreign material caused by the construction operations from all streets and roads at the conclusion of each day's operation. Cleaning shall include washing with water, power brushing, and use of manual labour as necessary to achieve the necessary standard comparable with adjacent streets unaffected by the works. All such spillage or droppings shall be cleared to the satisfaction of the Engineer and appropriate Public Authority. The Contractor shall indemnify the Employer against all claims by the third parties, which may arise out of the Contractor’s failure to comply with this Section.

**Protection of Adjoining Property**

The Contractor shall be responsible and take all measures in order to protect adjoining property. The Engineer may make his own opinion and if required may order arrangements for protection or repair of such likely unavoidable damage in which event the Contractor shall complete the activities.

The measurement for payment of the repair of the damages to the building, if ordered, shall be made at actual quantities of activities carried out. All costs related to the assessment, protection, etc. are deemed to be included in the unit rates of other items.

Procedure for Complaints and Claims for Damage Details of all claims or warnings of intended claims which the Contractor may receive in respect of matters against which he is required by the Contract to indemnify the Employer shall be notified without delay to the Engineer, who shall likewise pass to the Contractor any such claims or warnings which may be submitted directly to the Engineer or Employer. A similar exchange of information shall also be made in relation to all complaints which may be received.

The Contractor shall notify the Engineer in writing immediately following any damage or injury arising out of the execution of the Works.

**Damage to Access Roads**

The Contractor shall ensure that damage to any public or private roads, footpaths and tracks used by any vehicles or equipment proceeding to or from the Site is kept to a minimum and he shall be responsible for the cost of all repairs necessary to restore such roads, tracks or footpaths to the satisfaction of the Engineer and the owner and/or controlling authorities.

**Reinstatement upon Completion**

The place of use shall be cleared and reinstated immediately to at least the condition existing before the temporary facilities were provided, and to the satisfaction of the Engineer.

## 4.5 Quality Control, Sampling and Testing

**Responsibilities and Procedures**

The Contractor shall employ a quality assurance system for all phases of the project including procurement, construction, testing, defects liability etc. The QA system shall be in accordance with the general requirements of ISO 9001 or similar.

All manufactures and sub-contractors shall also employ quality assurance systems in accordance with the general requirements of ISO 9001 or similar. In addition to any specific obligations for sampling and testing the Contractor shall be responsible for routine inspection sampling and testing of all materials, workmanship, plant and measuring devices, in order to control the quality of work and to ensure compliance with the Specifications and with approved samples. The Contractor shall be responsible for establishing and maintaining procedures for quality control, which will ensure that all aspects of the Works comply with the specifications of the Contract.

The Contractor shall appoint a suitably qualified member of his staff to be responsible for all aspects of quality control and to maintain effective liaison with the Engineer. Such person or persons shall be vested with the authority to reject work already carried out when such work does not meet the specified standards. The Contractor’s quality control personnel shall maintain close liaison with the Engineer at all times. The Contractor shall establish an efficient, comprehensive records facility and library.

Books, Drawings, publications and manuals shall be indexed and their distribution controlled.

**Sampling and Testing**

Sampling and testing of materials includes the provision of samples of materials and workmanship as well as the testing and quality control for all building materials.

The Contractor shall provide for the approval of the Engineer, samples of all construction materials and manufactured items required for the Permanent Works. All samples rejected by the Engineer shall be removed from Site. All approved samples shall be stored by the Contractor in a sample room, at a location approved by the Engineer, for the duration of the Contract, and any materials or manufactured items subsequently delivered to Site for incorporation in the Permanent Works shall be of a quality at least equal to the approved sample. The approved samples may only be disposed of with the Engineers approval.

Samples shall be submitted and tests carried out sufficiently early to enable further samples to be submitted and tested if required by the Engineer. Samples for testing will generally be selected by the Engineer from materials to be utilized in the project and all tests will be under the supervision of the Engineer.

Material requiring testing shall be furnished in sufficient time before intended use so as to allow for testing. No materials represented by tests may be used prior to receipt of written approval of said materials.

The Contractor shall give the Engineer at least 14 days’ notice in writing of the date on which any of the materials will be ready for testing or inspection at a certified laboratory.

The Contractor shall in any case submit to the Engineer within 7 (seven) days after every test such number of certified copies of the test readings as the Engineer may require.

Approval by the Engineer as to the placing of orders for materials or as to samples or tests shall not prejudice any of the Engineer's powers under the Contract.

The provisions of this Clause shall also apply to materials supplied under any nominated subcontract.

In addition to any special provision made herein as to sampling and testing materials by particular methods, samples of materials and workmanship proposed to be employed in the execution of the Works may be called for at any time by the Engineer and these shall be furnished without delay by the Contractor at his own cost. Approved samples will be retained. The Engineer will be at liberty to reject all materials and workmanship that are not equal or better in quality and character than such approved samples. The tests required for quality control shall include but not be limited to:

a. tests conducted at the premises of the Contractor, Subcontractor, manufacturer or supplier which are normally or customarily carried out at such premises for the items or materials being supplied for the Works;

b. tests which are normally or customarily conducted on the items or materials being supplied for the Works by the Contractor, Subcontractor, supplier or manufacturer but which have to be conducted at an approved laboratory because the necessary testing facilities are not available on the premises of the Contractor, Sub-Contractor, supplier and manufacturer;

c. tests on locally obtained materials or items either on the Site or at an approved laboratory for the purpose of obtaining the approval of the Engineer to the classification, use and compliance with the Specifications of such items or materials;

d. routine quality control tests conducted by the Contractor to ensure compliance with the Specifications;

e. regular testing of concrete and other materials as specified in the relevant Chapters of the Technical Specifications;

f. standard shop and Site acceptance tests, including trial assemblies of manholes and pipes.

**Certification**

All materials and assembling parts selected under this Contract must be of first quality, truly circular, and of uniform thickness, free from scale, lamination, honeycombs and other defects, and shall be designed and suitable for the stated pressures and temperatures. The Contractor shall provide certification fulfilling the requirements indicated in these Specifications.

• Manufacturer's certificate;

• Laboratory testing certificate

• Certificate of Origin issued by the Chamber of Commerce of the related country or equivalent;

All materials shall be certified for use and shall contain no ingredients that may migrate into water, air or ground in amounts that are considered to be toxic or otherwise dangerous for health.

Materials shall be factory tested and shall be subjected to tests. The number and selection of samples for testing, the test procedure and the requirements shall all be as specified in the referred relevant standards.

All imported goods shall have relevant approval certificates prior to their use in the Beneficiaries’ country. The cost of samples, their transportation to the laboratory and their testing shall be deemed to be included in the unit rates and shall not be paid for separately.

**Employer Inspection**

The Employer or the Beneficiary or the Engineer, their authorized representative shall be entitled to inspect any material and quality control tests. Such inspections shall in no way relieve the Contractor of the responsibility to provide products that comply with the applicable standards within this Specification.

Alternatively, the Contractor may submit to the Engineer, certificates from approved laboratories certifying that the materials have been subjected to and have satisfactorily undergone the required tests according to the specified standards. In that case the Engineer shall be entitled (but shall not be bound) to renounce any further testing.

Should the Employer elect not to inspect the manufacturing, testing or finished material, it does not mean in any way that he has approved the product.

The cost of transportation of the Employer and/or Engineer to the factory and testing sites shall be deemed to be included in the unit rates and shall not be paid for separately.

The Employer reserves the right to employ an independent testing institute to carry out acceptance tests.

Failures discovered during this inspection have to be corrected by the Contractor free of charge. In case of disagreement an independent testing institute will be called in as a mediator. These costs are to be paid by the losing party.

**Inspection and Acceptance**

The Contractor shall be responsible for ensuring that all inspections and tests in connection with quality control or otherwise are properly carried out whether on site or elsewhere, and that where necessary the appropriate remedial measures are taken.

The Engineer will require to inspect work being prepared and to witness tests. The Contractor shall give the Engineer adequate notice of the programs of work and testing to enable the Engineer to arrange such inspections.

Manufactured items and materials delivered to the site shall be inspected by the Contractor on arrival.

Any defects shall be notified to the Engineer. Minor defects to surface finishes and the like in manufactured items shall be made good in an approved manner to the satisfaction of the Engineer. Items with more serious defects shall be returned to the suppliers for correction or replacement as appropriate.

Furthermore the Engineer reserves to himself the fabric inspections of materials at the production works. The contractor shall provide unrestricted access at any time to any production plant.

Inspections and tests carried out by or on behalf of the Engineer shall not relieve the Contractor of his responsibilities in connection with quality control.

The Engineer will not inspect any item of fabricated or finished work until such time as the Contractor shall have forwarded to the Engineer the approved Working Drawings covering the items to be inspected, together with four copies of the respective orders.

**Materials/Plant Certificates**

Quality Control records, test certificates, reports and daily records of on-site testing and inspection shall be kept on forms approved by the Engineer.

Test result shall be certified by the appropriate responsible member of the Contractor’s staff. All test certificates and inspection records (including any from suppliers or other outside testing agencies) shall be clearly identified with the appropriate part of the Works to which they refer, and shall include information required by the relevant Reference Standard or Specifications Section, and they shall be submitted to the Engineer.

The timing for submission of certificates shall be as follows:

• Manufacturer’s and supplier’s test certificates shall be submitted as soon as the tests have been completed and in any case not less than seven days prior to the time that the materials represented by such certificates are needed for incorporation into the Permanent Works;

• Certificates of tests carried out during the construction or on completion of parts of the Permanent Works shall be submitted within 7 days of completion of the test. Where certificates are required by the Specifications or relevant Reference Standard, the original and two copies of each such certificate shall be provided by the Contractor.

Certificates shall be clearly identified by serial or reference number and shall include information required by the relevant Reference Standard or Specification clause.

The timing for submittal of certificates shall be as follows:

a. manufacturer's and supplier's test certificates shall be submitted as soon as the tests have been completed and in any case not less than 7 calendar days prior to the time that the materials represented by such certificates are needed for incorporation into the Permanent Works

b. certificates of tests carried out during the construction or on completion of parts of the Permanent Works shall be submitted within 7 days of the completion of the test. No materials, articles or items of fabricated or finished work to be supplied by the Contractor or Subcontractors which have been inspected and tested by the Engineer shall be dispatched unless a Passing Certificate has been requested by the Contractor from the Engineer and subsequently been issued by the Engineer to the effect that the same are approved. Neither the Contractor nor Sub-Contractors shall make use of any materials or articles ordered by them for the purpose of fabrication until a Passing Certificate covering the said materials and articles has been issued by the Engineer.

**Construction Completion Reports**

The Contractor shall submit construction completion reports, which shall be structured to incorporate test records for both site and factory tests and inspections. The structure and format shall be agreed with the Engineer.

Quality Control records, test certificates, reports and daily records of on-site testing and inspection shall be kept on forms approved by the Engineer. Test results shall be certified by the responsible member of the Contractor's staff. All test certificates and inspection records (including any from suppliers or other outside testing agencies) shall be clearly identified with the appropriate part of the Works to which they refer, and they shall be submitted to the Engineer together with the respective Passing Certificate. Once each month, or at such other intervals as the Engineer may require, the Contractor shall submit in an approved form a summary of all quality control inspections and tests performed at Site and elsewhere in the intervening period.

Test results shall be summarized in tabular form or graphically or both in a way that best illustrates the trends, specific results and specification requirements. Where the tests show that the specified requirements were not achieved, the report shall describe the action that was taken.

Each report shall also contain a forecast of quality control work likely to be carried out during the period to be covered by the succeeding report.

The Contractor shall keep detailed and up-to-date inventories in an approved form of goods and materials already approved by the Engineer for which Passing Certificates have been issued as well as of all other goods and materials subject to quality control which are on order, delivered, found faulty, lost during the work or found to be surplus to requirements. The Engineer shall have access to these records at all times.

**Construction Diary**

The Contractor shall keep a Daily Construction Diary (Log Book-Works Dairy) at each location where major construction activities are taking place. This Daily Construction Diary shall be as set out in the Montenegrin Construction Act (Rulebook on the method of keeping and contents of the Building Log Book and Works Register/Pravilnik o načinu vođenja i sadržini građevinskog dnevnika i građevinske knjige, Official Gazette of Montenegro, No. 68/18, including addenda, if any) in a form approved by the Engineer and shall contain, but not be limited to, the following major items of information:

a. name of Contractor and Package No.

b. date;

c. weather conditions (max./min., temperature, hours and intensity of rainfall);

d. work carried out during the day per Section (description, quantities);

e. major equipment used per section (on contractual work, on extra work ordered, approximate operating time on either);

f. strength of labor force per Section (on contractual work, on extra work ordered, hours worked on either);

g. delays (cause, effects such as idle time etc.);

h. unusual events (floods, fires, storms, accidents, etc.);

i. visitors at Site.

Each daily log shall be signed by the responsible Site Manager of the Contractor and "noted" by the Engineer.

## 4.6 Protection of the Environment

The Contractor shall familiarize himself with and observe the relevant environmental regulations in the Beneficiaries’ country.

In the case of conflict between Contractor’s proposal and the national regulations, the Engineer shall be contacted to ascertain the appropriate approach and the Engineer will decide which measures shall be taken.

The Contractor shall be responsible for minimizing the negative environmental impact during construction and operation.

### 4.6.1 Mitigation measures for environmental protection during the construction period

The Contractor shall implement effectively the Environmental Plan and comply with all applicable environmental documentation, which for example applies to any operation licensing.

# 5. PROJECT IMPLEMENTATION

## 5.1 Implementation concept

The detailed implementation stages shall be worked out by the tenderer and be submitted with his offer and (during project implementation) regularly updated, for information and approval by the Engineer.

The tenderer is advised to consider the given provisions for each unit in the respective items above.

# 6. FACILITIES FOR THE ENGINEER

The future Contractor shall provide the following facilities to the Engineer. None of the mentioned elements shall be transferred to the Engineer and at the end of the Contract all shall be returned to the Contractor.

The Contractor shall design and erect at locations agreed with the Employer and the Engineer the following facilities for the use of the Employer and the Engineer:

Facilities for the Engineer

Room Size (appr.) Furniture

Fix Office at a construction site

Together with necessary circulation space, covered entrance porch and covered parking for three vehicles.

1 Office with 1 room 15 m2 3 Desk ≥ 2 m2, with file drawer and drawers, all lockable, incl. keys;

1 low table ≈ 1 m2;

6 chair with rolling casters, 2 armchairs;

1 file cabinet, steel, lockable incl. keys, 50 x 150 cm, 50 cm deep;

1 bookshelf, 1 m x 2 m, 30 cm deep;

1 coat rack;

1 waste basket

1 AC/Heater

1 fire extinguisher, wall mounted and 1 first aid kit

All external doors shall be fitted with a secure lock for which a minimum of six keys shall be provided.

All windows shall have glass, anti-mosquito gauze and venetian blinds. Lighting shall be of the fluorescent strip type. All offices shall have at least two grounded electrical sockets, rooms exceeding 10 m2 floor areas having at least one additional socket per 5 m2 of floor area or part thereof. Sufficient air-conditioning shall be provided.

The Contractor shall provide external lighting for the office and arrange for collection and disposal of rubbish. The Contractor shall supply, install and maintain in the offices, equipment and furniture which shall be new, undamaged and complete with all necessary keys.

The Contractor shall supply, install and maintain furniture such as desks, cupboards, drawing tables and plan chests, stools and shelves, etc. in the numbers, trademarks and quality as approved by the Employer and the Engineer.

The Contractor shall provide, maintain and at the end the project recover of at least the following main equipment, subject to approval by the Employer and the Engineer:

1 No. AC units of sufficient capacity equal to the gross volume of the room, complete with all supports, electrical and plumbing work;

1 No. Multifunctional Laser/Printer/Scanner/ Copy size A4 with scale up/down function, minimum 12 pages/min, automatic paper feeding;

1 No. Desktop Computers; system specification shall be in accordance with market availability at the time of delivery, fully equipped with licensed software Microsoft Windows, Microsoft Office (Microsoft Word, Microsoft Excel, and Microsoft PowerPoint) and AutoCAD.

1 No. A3 Colour printer;

The facilities shall be installed, furnished, equipped and ready for occupation and use and fully serviced within 30 days of the commencement of the works.

The Contractor shall provide the following clothing for the sole use of the Engineer and their staff and visitors (sizes to be advised by Engineer).

4 No of Safety helmets;

4 No Pairs of Boots;

4 No of Waterproof Overalls;

4 No Pairs of Safety Gloves;

4 No Sets of Approved Reflective or Fluorescent Clothing.

Surveying equipment shall be provided for the sole use of the Engineer and his staff for the duration of the Contract and when appropriate have a Manufacturer’s or Agent’s specified tolerance certificate at the date of issue. All field test equipment for verification of compaction of the backfilled material shall be provided for the sole use of the Engineer and his staff. The Contractor is required to provide the survey instruments on the first day of the Contract until completion of the Works.

The Contractor shall be in charge with all costs of the above-mentioned facilities.

The Contractor shall keep the offices in a satisfactory clean and fully habitable condition including the provision of soap, towels, disinfectant, toilet paper, etc., and shall maintain and repair all services, furniture and equipment.

He shall provide for collection of refuse, and shall pay all charges and rental in connection with the provision of electricity, water, sewerage and telephone (local and regional calls, but not international).

All stationary supplies shall be the Contractor's responsibility.

The Contractor shall insure the offices including the contents irrespective of whether or not provided by the Contractor, against loss or damage by accident, fire and theft for the duration of the Contract.

# 7. OPERATION OF THE SYSTEM AND FACILITIES

**Tests on Completion**

The pre-commissioning tests will be carried out when all Works are finished, tested, found in compliance with the contract conditions.

After the completion test for all installation works system is validated, the period for system shall start. This period will be finished after the CCTV completion inspection. At this point in time the system is ready for taking over procedure as stipulated in particular conditions of the contract.

After approval of Engineer and issue of the Taking over certificate, the system can be formally handed over to the Beneficiary.

**As-Built and Record Drawings**

The Contractor shall also perform the As Build Design which is presenting the actual building conditions as they are erected on the site. The as-built drawings shall include all buildings and civil engineering works and include site layout, requirements and Drawings.

The copies of each set of drawings in English and Montenegrin language shall be supplied to the Engineer prior to the commencement of the Tests on Completion for consent of the Engineer.

It shall incorporate all the modifications/revisions affected during construction. Each copy shall be durably bound in a volume or volumes depending on bulk. All material except drawings shall be A4 size. Drawings shall be on A1/A2/A3 size sheets and shall preferably not exceed 297 mm in height folded and shall be bound into volumes. Volume titles shall be clearly inscribed on the front cover and on the spine of the cover. Drawings shall be marked “AS-BUILT”, the cover of each binder shall be finished with a black waterproof and greaseproof material and the title printed gold block in well readable lettering on the front and on the spine.

In addition the Contractor shall arrange the complete as-built documentation in English and Montenegrin language as Adobe-Reader file with adequate structure of the contents and additional, corresponding computer files and submit it on CD.

All drawings shall be filed on CD as AutoCAD Drawings, DWG format and in Adobe pdf-format. The CD shall be handed over to the Engineer in two copies.

**Operating and Maintenance Manuals**

Operation and Maintenance Manuals shall be prepared and provided by the Contractor.

The Contractor shall prepare and submit for the approval to Engineer O&M procedure manuals in English and Montenegrin language which shall describe the complete functions and requirements for functioning, maintenance, safety, record keeping, and emergency response in potential situations.

The manuals shall deal separately with operation and maintenance.

All information in these manuals shall apply specifically to the materials being supplied. The documentation shall be free from irrelevant matters such as the manufacturer’s general literature. (In this case complete O&M documentation will be rejected!).

The manuals shall be arranged to provide separate volumes for each principal section of the works.

Manuals shall relate to as-built conditions and shall include all necessary drawings and diagrams for a proper understanding of the constructed plants and components.

They shall include at least, but not limited to the following information’s:

• Descriptive overview of the systems;

• Description of all materials supplied including manufacturers' leaflets, which are to be scheduled for easy reference;

• Schedules and manufacturer's catalogues for all materials supplied,

• Procedures to deal with breakdown and emergencies, including fault finding charts;

• Safety requirements & measures;

Full maintenance instructions for all equipment including planned maintenance schedules or charts giving monthly, annually and overhaul instructions, together with required tools and machines. These should also include details of routine maintenance work that will be within the competence of the normal maintenance staff, and notification of maintenance work that will have to be done by beneficiary.

Site test reports for all systems. Site test process reports for proving tests, commissioning reports and suppliers test certificates;

A copy of each manual, in draft form, shall be submitted 1 month before commissioning is started. The final version, modified if necessary in accordance with the requirements of the Engineer, and taking into account any changes made during commissioning, shall be presented before the issuing of the Taking over certificate.

Six hardcopies of each set of manuals, both in English and Montenegrin language shall be issued to the Engineer before the Works are taken over. In addition the Contractor shall arrange the complete O&M documentation in English and Montenegrin language as Adobe-Reader file with adequate structure of the contents and additional, corresponding computer files and submit it on CD.

Each hardcopy shall be durable and permanently bound within a stiff binder of a design to be approved by the Engineer. They must each permit the subsequent incorporation of revisions to be necessary during the Defects Liability Period.

**Training**

The Contractors scope of works includes training of the Beneficiary's personnel and the assistance (supervision) of operation of the constructed system after the communication that requisites for training are fulfilled. Assistance to the operation of the system shall mean occasional visits by the Contractor’s personnel to verify the efficient operation of the system.

# 8. SUMMARY LIST OF STANDARDS

Standards are indicated for each type of works in the detailed description of works contained in Volume 4. Where such standards and codes are national, or relate to a particular country or region, other authoritative standards which ensure an equal or higher quality than the standards and codes specified will be accepted subject to the Engineer's prior review and written approval.

Nevertheless with respect to safety, health and working protection the related standards and laws which are directly linked to local legal provisions, the local law respectively the relevant binding local standards and norms shall be applied.

The work must be performed according to the most recent relevant international codes, standards, accident prevention regulations and the local rules and regulations.

The engineering documentation shall correspond with ISO standards. Used symbols on drawings etc. conforming to the following Systems and Standards (DIS = Draft International Standard).

All materials and equipment supplied and all work carried out as well as calculation sheets, drawings, quality and class of goods, methods of inspection, specific design features of equipment and parts and acceptances of partial works shall comply in every respect with the technical codes of the International Organization for Standardization (ISO) and of the International Electrotechnical Commission (IEC).

The Bidder must clearly state his proposals concerning the use of Standards and Codes.

It is the Contractor’s responsibility to provide sufficient evidence that any national or other standard the Contractor proposes (other than those mentioned above) will ensure an equivalent or higher standard.

Immediately after the Effective Date of the Contract the Contractor shall supply an indexed list of all standards, codes and associated standards referred to, to which the work is to be performed The quality control systems and plans shall be according to ISO 9000 and subject to approval of the Engineer.

This Section includes reference to publications for guidance on current practice on some topics. The editions of approved Standards used shall be those current 28 days prior to the date for the return of tenders.

The Contractor may be required to supply any of the Standards or publications listed in this section for the use of the Engineer’s Representative (with English language translations where appropriate).

Where following standards and codes are national, or relate to a particular country or region, other authoritative standards which ensure an equal or higher quality than the standards and codes specified will be accepted subject to the Engineer's prior review and written approval:

EN 1610 Construction and testing of drains and sewers

EN 16961 Thermoplastics pipes and fittings with profiled outer and smooth inner surfaces

EN 295 Vitrified clay pipes and fittings and pipe joints for drains and sewers - Performance requirements

DIN EN 12666 Plastics piping systems for non-pressure underground drainage and sewerage

DIN EN 681 Elastomeric seals - Material requirements for pipe joint seals used in water and drainage applications

EN 1446 Plastics piping and ducting systems. Thermoplastics pipes - Determination of ring flexibility

EN 13508 Condition of drain and sewer systems outside buildings

DIN EN 476 General requirements for components used in discharge pipes, drains and sewers for gravity systems

DIN EN 752 Drain and sewer systems outside buildings

DIN EN 13476 Plastics piping systems for non-pressure underground drainage and sewerage - Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE)

EN 124 Gully tops and manhole tops for vehicular and pedestrian areas. Design requirements, type testing, marking, quality control

DIN EN 13101 Steps for underground man entry chambers - Requirements, marking, testing and evaluation of conformity

DIN EN 13108 Bituminous mixtures - Material specifications

DIN EN 1338 Concrete paving blocks - Requirements and test methods

DIN EN 1340 - Concrete kerb units - Requirements and test methods

EN 598 Ductile iron pipes, fittings, accessories and their joints for sewerage applications. Requirements and test methods

EN 681- Elastomeric seals - Material requirements for pipe joint seals used in water and drainage applications - Vulcanized rubber

ISO 9001 Quality management systems

EN ISO 9969 Thermoplastics pipes -- Determination of ring stiffness

ISO 1083 Spheroidal graphite cast irons - Classification

DIN 4124 Excavations and trenches - Slopes, planking and strutting, breadths of working spaces

DIN 18134 Determining the deformation and strength characteristics of soil by the plate loading test

DIN V 54841 Plastic Warning Devices For Buried Cables And Pipelines

DIN 18920 “Protection of trees, plants and vegetation during construction”

DIN 4095 Planning, design and installation of drainage systems protecting structures against water in the ground

DIN 19537 High-density polyethylene (HDPE) pipes and fittings for drains and sewers;

DIN 8061 Unplasticized polyvinyl chloride pipes - General quality requirements and testing

DIN 1986 Drainage systems on private ground

DIN 601 Hexagon head bolt with nut

DIN 4034 Precast unreinforced and reinforced concrete manholes and inspection chambers

DIN 1164 Special cement

DIN 4030 Assessment of water, soil and gases for their aggressiveness to concrete; principles and limiting values

DIN 488 Concrete steel

DIN 4060 Pipe joint assemblies with elastomeric seals for use in drains and sewers

DIN1045 Concrete, reinforced and prestressed concrete structures

DIN 1048 Testing concrete; testing of hardened concrete (specimens taken in situ)

DIN 18014 Foundation earth electrode - General planning criteria

DIN 19584 Manhole covers

DIN 1221 Dirt trap for manhole covers

DIN V 1264 Steps for underground man entry chambers - Application in construction works for wastewater disposal

DIN 19555 Step irons for straight manhole steps in in-situ concrete manholes

CEN/TR 14920 Jetting resistance of drain and sewer pipes - Moving jet test method

Worksheet ATV-DVWK-A 127 - Directive for the statistical calculation of sewage pipes and pipelines Worksheet ATV-DVWK-A 139 - Installation and inspection of waste water pipelines and canals Advisory Leaflet ATV - M 143-6E - Inspection, Repair, Rehabilitation and Replacement of Sewers and Drains, Part 6: Leak Testing of Existing, Earth Covered Sewers and Drains and Shafts Using Water, Air

Overpressure and Vacuum

Worksheet ATV-DVWK\_A 157 - Sewer System Structures

German Standard ZTVE-StB 94 “Additional technical contractual conditions and guidelines for earthworks in road construction”

German Standard ZTVT-StB 95 “Additional technical contractual conditions and guidelines for substrata in road construction”

German Standard ZTV-Asphalt-StB “Additional technical specifications and guide lines for asphalt in road construction“

A) Electrical: International Electrotechnical Commission (IEC).

B) Instrument: ISO 3511/1-4: Process measurement control, functions and instrumentation – symbolic representation.

C) ISO 4067-1: Graphical symbols for plumbing, heating, ventilating and ducting.

D) ISO 4067/2: Simplified representation of sanitary appliances.

E) ISO 8545: Graphical symbols for automatic control.

F) ISO/DIS 4067/4: Symbols for refrigerant plants.

German DIN Standards

The German Standards referred to have been issued by DeutschesInstitutfürNormung, Burggrafenstrasse 4-10, 10787 Berlin, Germany.

List of German Standards referred, but not limited to:

DIN 488 Reinforcing steel

DIN 1045 Structural use of concrete, design and construction

DIN 1048 Testing methods for concrete

DIN 1055 Design loads for buildings

DIN 1084 Quality control of concrete

DIN 1164 Cement

DIN 1187 Unplasticised polyvinyl chloride (PVC-U), drainpipes

DIN 1212 Step irons for staggered manhole steps; brim shaped step irons

DIN 1229 Gully tops and manhole tops for vehicular and pedestrian areas

DIN 1388 Universal WC flush down type made of sanitary porcelain material

DIN 1626 Welded circular unalloyed steel tubes subject to special requirements, technical delivery conditions

DIN 1910 Welding

DIN 1986 Drainage Systems on Private Ground

DIN 4021 Soil; exploration by excavation and borings

DIN 4032 Concrete pipes and fittings

DIN 4033 Sewers and sewage pipelines; code of practice for construction

DIN 4034 Precast un-reinforced and reinforced concrete components

DIN 4035 Reinforced concrete pipes

DIN 4095 Subsoil, drainage for the protection of structures

DIN 4099 Welding of reinforcing steel

DIN 4226 Aggregates for concrete

DIN 4235 Compacting of concrete by vibrating

DIN 4279 Pressure test for pressure pipes

DIN 18121 Moisture Test

DIN 18122 Consistency Test

DIN 18123 Grading Tests

DIN 18124 Density Test (solid volume without voids)

DIN 18125 Density Test for Soils (including voids)

DIN 18126 Subsoil: Testing procedures and testing equipment, determination of density of non-cohesive soil, and maximum and minimum compactness

DIN 18127 Proctor Test

DIN 18134 Loading Test

DIN 18196 Earthworks soil classification systems and foundations for civil engineering representative purposes

DIN 18201 Tolerances in building: Terminology, principles, application, and verification

DIN 18203 Tolerances in building precast concrete reinforced concrete and prestressed concrete components

DIN 18330 Masonry works

DIN 18331 Concrete and reinforced concrete

DIN 18332 Natural stonework

DIN 18333 Artificial stonework

DIN 18334 Carpentry

DIN 18336 Waterproofing against moisture

DIN 18337 Waterproofing against pressurised water

DIN 18338 Roofing

DIN 18339 Plumbing works

DIN 18350 Plastering

DIN 18352 Tiling

DIN 18353 Screeding works

DIN 18354 Bituminous paving

DIN 18355 Joinery

DIN 18361 Glazing

DIN 18363 Painting works

DIN 18365 Flooring

DIN 18379 Ventilation works

DIN 18381 Sanitary installations

DIN 18550 Mortar

DIN 19531 Unplasticized polyvinyl chloride (PVC-U), socket pipes and fittings for discharge systems inside buildings

DIN 19555 Step irons for single line installation

DIN 19597 Manhole tops A 15

DIN 19695 Direction for transporting and storing of concrete pipes, reinforced concrete pipes, prestressed concrete pipes and fittings and concrete manhole shaft rings

DIN 28600 Ductile Iron Pressure Pipes and fittings, technical specification

DIN 28603 Ductile Iron Pipes and fittings, TYTON Sockets (equivalent to EN 545)

DIN 28610 Ductile Iron Pressure Pipes with sockets and inner cement lining, technical data and application (equivalent to EN 969)

DIN 50049 Documents on material tests: suggestions for the configuration of documents

DIN 52123 Testing of bitumen and polymer bitumen sheeting and felts

DIN 52143 Bitumen roofing felt with glass fleece base

DIN EN 32 Wall hung wash basins

DIN EN 87 Ceramic floor and wall tiles; definitions, classification characteristics and markings For approval proposed Standards shall be translated into English language.

German DWA/ATV/DVGW Standards

The regulations referred to have been issued by the GFA-GesellschaftzurFörderung der Abwassertechnike.V., Theodor-Heuss-Allee 17, D – 53758 Hennef, Germany; but not limited to:

ATV – DVWK - A 124 Planung und Bau von Abwasserpumpanlagen, Juni 2000

ATV - A 127 Richtlinie für die statische Berechnung von Entwässerungskanälen und - leitungen

ATV - A 128 Standards for the Dimensioning and Design of Stormwater Structures in Combined Sewers, April 1992

ATV - A 166 Structures for central Stormwater treatment and -retention

Constructive Design and Equipment, November 1999

ATV - A 111 Guidelines for the Hydraulic Dimensioning and Performance Verification of Stormwater Overflows in Sewers, February 1994

ATV DVWK Advisory Leaflet M 177 Dimensioning and Design of Stormwater Overflows in Combined Sewers, Juni 2001

GW 310/II M Sicherung an Knickpunkten von Druckrohrleitungen

The Standards referred to have been issued by the German Bundesministerium für Verkehr (BMV), FGSV Verlag, Köln, Germany ZTV Asphalt – StB 94 Zusätzliche Technische Vertragsbedingungen für den Bau von Fahrbahndecken aus Asphalt

EN and ISO Standards

The EN Standards referred to have been issued by the European Comité of Standardisation, but not limited to:

EN 124 Gully tops and manhole tops for vehicular and pedestrian areas; Design requirements, type testing, marking The ISO Standards referred to have been issued by the International Standards Organization, Case

Postale 56, CH-1211, Geneva 20, Switzerland

ISO 3452 Non-destructive testing-penetrate inspection-general principles

DIN EN ISO 12994 Part 1 until DIN EN ISO 12994 Part 8 Corrosion protection of steel by coating and protective layers

British Standards

The British Standards referred to have been issued by the British Standards Institution, 2 Park Street, London W1A 2BS. List of British Standards referred, but not limited to:

BS 21 Requirements for pipe threads for tubes and fittings where pressure tight joints are made on the threads (metric dimensions)

BS 405 Requirements for uncoated expanded metal carbon steel sheets for general purposes

BS 534 Requirements for steel pipes, joints and specials for water and sewage

BS 729 Requirements for hot dip galvanised coatings on iron and steel articles

BS 1243 Requirements for metal ties for cavity wall construction

BS 1369 Steel latching for internal plastering and external rendering

BS 1485 Requirements for zinc coated hexagonal steel wire netting

BS 3600 Requirements for dimensions and masses per unit length of welded and seamless steel pipes and tubes for pressure purposes

BS 3601 Requirements for carbon steel pipes and tubes with specified room temperature properties for pressure purposes

BS 3692 Requirements for ISO metric precision hexagon bolts, screws and nuts. Metric units.

BS 4131 Requirements for terrazzo tiles

BS 4254 Requirements for two-part polysulphide-based sealants

BS 4315 Methods of test for resistance to air and water penetration

CESWI Civil Engineering Standards for the Water Industry, 6th Edition, UK Water Industry Research Ltd, June 2004, ISBN 1 898920 51 6