ΜΕΤΡΟ ΘΕΣΣΑΛΟΝΙΚΗΣ
ΑΤΤΙΚΟ ΜΕΤΡΟ Α.Ε.

TITLE OF THE TENDER: **"PROCUREMENT AND INSTALLATION OF THE BUILDING AUTOMATION AND CONTROL SYSTEM (BACS) IN THE THESSALONIKI METRO EXTENSION TO KALAMARIA"**
RFP-327/17 Α.Σ. 48966

TECHNICAL DESCRIPTION
OF THE BUILDING AUTOMATION AND CONTROL SYSTEM (BACS)
IN THE EXTENSION TO KALAMARIA

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1. INTRODUCTION

This document provides the Technical Description of the Project concerning the supply, installation, modification/upgrading, testing and commissioning of a Building Automation and Control System (BACS) for the Metro Extension to Kalamaria. This system will monitor and control the Electromechanical Systems of the structures, located within Stations, ventilation shafts and tunnels in the Extension to Kalamaria at a local level – from the Station Master Room (SMR) of each new station – and at central level from the Operations Control Center (OCC) and the Emergency Control Room (ECR) in Pilea Depot. This document includes the basic technical requirements and information related to the design and construction of the Project clarifying also the scope of the Project. This Technical Description provides a further analysis to the Specifications of the BACS system.

The project of the THESSALONIKI METRO Extension to Kalamaria consists in an underground line, approximately 4.77km long that extends as an independent branch from PATRIKIOU Station of the Base Project up to MIKRA Station. The Project includes two single-track tunnels, 5 new Stations (Nomarchia, Kalamaria, Aretsou, Nea Krini, Mikra), 3 shafts (Kritis & Pontou Shafts and the Terminal Shaft), 3 railway crossovers, 2 tunnels' pumping stations at minimum height locations along the longitudinal profile of the tunnel and a trumpet forestation.

2. SCOPE OF THE PROJECT

The Building Automation and Control System (BACS) is an automated control system that monitors and controls the tunnel ventilation system, the Heating, Ventilation, Air-conditioning (HVAC) system and other Electromechanical (E/M) systems in structures (lifts, escalators, fire fighting, lighting, etc.) within stations, shafts and tunnels at local level from the workstations in each Station Master Room and at central level from the workstations in the OCC. BACS system is also connected – in terms of operation – with other Electromechanical systems (fire detection, safety control system, fare collection gates, etc.).

One of BACS' main operations is the activation of response and smoke extraction scenarios in case of fire in stations or tunnels.

This is ensured from the workstations in the Operations Control Centre (OCC) and from all Station Master Rooms through a system exclusively intended for the activation of fire scenarios at Safety Integration Level – SIL 2, as well as from the wall-mounted Fireman Box located in each station where fire scenarios applicable to each separate station can be executed.

It is possible to activate all emergency scenarios from the workstations in the OCC, while emergency scenarios related to each separate station, its adjacent stations, and the corresponding tunnel sections can be activated from the workstations in each separate station (Station Master Room).

Locally in all stations and shafts there are PLCs inside switchboards controlling the E/M equipment operation. The PLCs communicate with the workstations in the SMR through a local LAN network, to which the PLCs are connected, while communication with the OCC is ensured through the WAN network.
For safety reasons, in the area of the depot a second OCC (Emergency Control Room) is provided, which, in case of emergency, can perform the same functions with the OCC.

The scope of this Project also includes all necessary upgrading, modifications – to the extent required - to the BACS system equipment destined to be installed in the Base Project, which is described in the corresponding Detailed Final Designs.

The Project shall also include the design, construction, supply and commissioning of the Fireman Boxes, as well the design, construction, supply and wiring of the PLC Panels related to the E/M systems covered by this Contract.

This Technical Description is described in detail in the Design, Performance, Material and Workmanship Specifications.

The term "Contractor" means the Contractor of this Tender for the BACS System of the Metro Extension to Kalamaria. Moreover, "Lead Contractor" means the Contractor that has undertaken the execution of the Project related to the Metro Extension to Kalamaria (Civil Works and E/M works).

3. DESCRIPTION OF THE WORKS OF THE BACS CONTRACTOR

The scope of works of the BACS Contractor shall include, without however being limited to, the following works. Namely:

- Preparation of the Detailed Final Design for all necessary works related to the installation and commissioning of the new BACS system, in such a way so as to ensure that no disturbance is caused to the Metro revenue service and in full compliance with the Project Time Schedule.
- More precisely, the design concerning the Interface between the BACS system to be installed and the Base Project BACS equipment to be installed at local and central level, where required, will be part of the Detailed Final Design.
- Supply of all necessary data and information concerning both the Communication Protocols and the parameters related to the entire software for reasons related to the interconnection of the systems with equipment items of other Contractors, as required for the execution of the Project.
- Coordination of all works, including interconnections, and prompt provision of clarifications to AM, if requested.
- Supply, installation, testing and commissioning of the entire BACS equipment.

- Supply, installation, testing and commissioning of all necessary equipment for the interface between the BACS system and the Base Project BACS system central servers to be installed, as explained in detail in the document "Technical Specifications".
- As part of the Detailed Final Design it will be required to clearly define the energy consumption requirements of the entire BACS equipment for the power supply of the system from the Station UPS system.
- Design, construction, supply, installation and commissioning of the Fireman Boxes.
- Design, construction, supply, internal cabling and commissioning of the PLC panels controlling the operation of the foreseen E/M systems in all stations and shafts of the Metro Extension to Kalamaria.
- Supply and installation of fiber optics, ring-type, for the local LAN network in all stations, shafts and tunnels.
- Worksite acceptance tests and commissioning of the BACS system.
- Participation in the Testing and Commissioning of E/M systems of other Contractors, where required.
- Participation in the Trial Run and provision of supporting services.
- Maintenance services throughout the warrantee period.
- Provision of the necessary spare-parts, tools and testing equipment.
- Training of the maintenance and operation personnel and provision of a certificate attesting that the personnel in question is capable of operating and performing maintenance works to the system as well as of making interventions to the system's software when required.
- Provision of the necessary, properly structured, documentation, including the Operation and Maintenance Manuals, as well as of the "as-built" documentation.

Moreover, the Contractor shall:

- participate in all meetings with AM, as required, during the Detailed Final Design stage and the stages related to the construction, testing, installation and commissioning of the equipment,.
- proceed with the risk assessment, safety assessment, safety validation of the BACS System he offers, including all relevant interfaces, while he shall also provide the necessary evidence proving that the system complies with the Safety Integration Level required for the purposes of this system under any operation conditions. The Contractor shall provide general and software-specific safety analyses for the systems he makes available.
- provide RAMS performance certificate as per European Standard EN50126.
- compile and implement a Health and Safety Plan.

4. GENERAL DESCRIPTION OF THE BACS SYSTEM

4.1 Base Project

The Base Project central BACS system is foreseen to be installed in the OCC/ECR at Pylea Depot and shall control all the Tunnel Ventilation and HVAC systems, as well as the other E/M systems (lighting switchboards, escalators, pumps, etc.), via a SCADA system under the trade name "Cimplicity" made by the company GE.

All emergency scenarios (those demanding SIL2 safety level) shall be activated and monitored from a second independent SCADA system in the OCC / ECR and also in each Station Master Room, as regards the emergency scenarios for the concerned station and its adjacent stations and the relevant tunnel sections.

4.2 Extension to Kalamaria

The Contractor shall interconnect and commission the new local and central equipment of the stations and tunnels of the Extension to Kalamaria with the original "Cimplicity" central control and monitoring system, as well as with original, independent SIL2 SCADA system for incorporation of the new emergency scenarios.

It is imperative to ensure the smooth migration upon activation of the BACS system operation, without interrupting the operation of the original "Cimplicity" system and of the second original central system SIL2 for the activation of the emergency scenarios and/or any other piece of equipment it controls.

At local level, the Contractor shall be obliged to supply, install and commission all necessary equipment (PLC, server, workstation, fiber optics, etc.) required for collecting all control points (I/O) of the E/M equipment and for transferring same to the OCC/ECR via the WAN network.

The Contractor should also secure that, at local level, the new PLCs to be installed shall communicate Peer-to-Peer with the Base Project PLCs to be installed, as required, in line with the designs about the Tunnel Ventilation and HVAC systems.

The exact number of the necessary digital/ analogue monitoring and control points of the Extension to Kalamaria shall be finalized by the Contractor during the Detail Final Design stage in cooperation with the Lead Contractor. It is clarified that cabling and connections of all auxiliary power and control cables routed from the local ventilation panels and the E/M equipment panels to the corresponding machinery and up to the terminal blocks in the PLC panels already constitute part of the scope of works of the Lead Contractor.

A Fireman Box (FB) will be installed at the concourse or street level of each station, easily accessible to firemen. The supply and installation of the FB is included in the scope of the Contractor's works.

5. TECHNICAL DATA TO BE DELIVERED BY AM TO THE CONTRACTOR

AM shall deliver the following technical data to the Contractor. Namely:

1. BACS Technical Description.
2. BACS Technical Specifications.
3. Coordination drawings of the E/M facilities in Kalamaria Extension.
4. Detailed Final Designs for the BACS system of the Base Project.