

## TERMS OF REFERENCE

### **Individual Consultant for Telescope Rehabilitation in Abastumani Astrophysical Observatory**

#### **1. Introduction**

**The Municipal Development Fund of Georgia (MDF)** is a Legal Entity under Public Law (LEPL) of Georgia with the objective to assist enhancement of institutional and financial capacities of local self-governmental bodies, invest in local infrastructure and services, and improve of main economic and social conditions for the local population. MDF implements significant infrastructural projects such as: urban renovation of the cities, arrangement of infrastructure at tourist and cultural heritage monuments, construction and rehabilitation of schools and kindergartens, improvement of infrastructure aimed at preventing the natural disasters, creation of sustainable economic base for IDPs, rehabilitation of WS and WSSs, construction of shelters for homeless animals, arrangement of the cable ways, renovation of sports infrastructure, and enhancement of the component in support of State and Private Sector Investments (PPI).

MDF is the implementing agency of the Third Regional Development Project (RDP3) financed by the World Bank Group and the Government of Georgia (GoG).

The main objective of the Project is to support infrastructure, which will contribute to improvement of living conditions of the towns and promote tourism-based economy in the selected regions, including Abastumani in the Samtskhe-Javakheti region.

Development of Abastumani as a tourism destination is one of the flagship investments under the Project. Two important projects have recently been completed: These are the Rehabilitation of the selected Historic Heritage Houses, rehabilitation of the main Observatory building, landscaping of the area and rehabilitation of the cable car that connects the town with the Observatory premises. The Project aims to further support the development of the resort with planned investments still to be implemented in the town. Sustainability and Operationalization of the Abastumani Observatory building is one of the planned interventions.

#### **2. About Abastumani Astrophysical Observatory**

Nowadays, Abastumani serves as one of the last enclaves of a strong scientific community within Georgia and a potential tourist attraction due to its history and nature. Abastumani has a potential to become a place of inspiration for future generations of astronomers, scientists and researchers, and this transformation can start by modernizing the Abastumani Observatory area and making it more attractive and engaging for various domestic and international visitors from the targeted tourism markets.

The Abastumani Astrophysical Observatory renamed in 2004 as Evgeny Kharadze Georgian National Astrophysical Observatory, was founded in 1932 on Mount Kanobili (1650 m above the sea level), near the resort of Abastumani, in the Samtskhe-Javakheti region in South-Eastern Georgia. Currently, the Observatory is an independent LEPL operating under the Ministry of Education and Science of Georgia.

The observatory is located about 250 km away from the capital city Tbilisi, being distant from the air pollution and sky illumination together/along with excellent natural conditions (hilly landscape covered with coniferous forest) makes this place being among one the best observatories in the Euro-Asian continent. Weather is stable, with no harsh and sudden changes.

The Abastumani Observatory is running wide-profile research, spanning different fields of Astronomy and Astrophysics from Asteroid to most distant Black Holes.

The following telescopes are installed on mount Kanobili (by installation date):

1. 0.33 m Reflector - 1932, (oldest exhibit of the Museum)
2. 0.40 m Zeiss Refractor - 1936
3. 0.44 m Zeiss Schmidt Camera - 1938
4. 0.70 m Maksutov Meniscus Telescope - 1955
5. 0.60 m Chromospheres/photosphere telescope - 1957
6. 0.44 m Horizontal solar telescope - 1966
7. 0.115 m Lyot-type coronagraph - 1966
8. 0.48 m Cassegrain Reflector - 1968
9. 0.53 m Coronagraph - 1975
10. 0.40 m Zeiss Double Astrograph - 1978
11. 1.25 m Ritchey–Chrétien Reflector - 1977

### 3. Scope of the assignment

The objective of this assignment is to prepare a Detailed Implementation Plan to fully operationalize the 125 cm Ritchey–Chrétien telescope( $f/13$ ) located in the main building of the Abastumani Observatory Complex. Detailed Implementation Plan shall be developed through a detailed inspection and analysis of the conditions of mechanical, optical and electronic parts of the telescope along with a public digital museum to be arranged in the same building.





To achieve the set objective, the Consultant shall perform the following services:

1. Audit the existing observatory telescope's stress-induced fractures near the support points in the primary mirror segments. The cracks are believed to result from deficiencies in the original design and implementation of the adhesive joints connecting the Invar support components to the mirror. Stresses caused by temperature cycling over 40 years of service may have driven cracks that developed at the glass-metal interfaces. Inspect the electronic parts of 125-cm RCh, 70-cm meniscus telescopes and 40-cm double astrograph and preparing detailed recommendations for their rehabilitation.
2. Audit the existing observatory telescope equipment's other sub-segments to identify obsolete/non-operational spare parts, technical problems and deficiencies ranging from drives and motors to precision optics (temperature compensation for secondary mirror) and instruments to thermal and HVAC systems and develop guidelines for rehabilitation process and upgrade or construction of new instruments (focal reducer to  $f=1/4$ ; spectrograph and two band imaging polarimetry; CCD cameras) to mount/attach on/to the 125-cm telescope very needed to effectively use observatory telescopes.
3. Inspect the Telescope, evaluate the systems, dome and whole building conditions, assess life safety and disabled access compliance, identify required repairs, and propose capital and operation and maintenance (O&M) cost.
4. Prepare and submit to the MDF Employers Requirement for consulting services for elaboration of the detail design package for the Telescope rehabilitation.
5. Evaluate and determine the possibility whether one company shall perform the design and full installation works for the telescopes and the domes, or the works shall be split into packages.
6. Perform supervision services during the implementation of the planned rehabilitation works in a close collaboration with Scientific-Technical Council of Observatory.
7. Perform other relevant duties to fully achieve the set objective under this ToR.

#### 4. Deliverables, Reporting Requirements and Timing for the Consulting Services

- **Inception Report shall include:**

- (i) General approach to the project as a Project Scope Statement;
- (ii) Detailed identification and description of problematic sections;
- (iii) Proposals covering preliminary conclusions based on the analyses; identification of actual and anticipated difficulties, their causes and the remedies proposed to solve them;
- (iv) Overview of the telescope technical conditions, indicators used to gauge technical and science performance of the Observatory and operating modes and operating conditions, as well as the various tasks and functions in operating the Observatory
- (v) Implementation timeline presented in a form of a Gant Chart;
- (vi) Risk Register including List of Risks, Categories, and responses for mitigation under each;

- **Draft Interim Report shall include:**

- (i) Detail stages of modernization for upgrades of the instruments of Observatory operations;
- (ii) Proposal for rehabilitation methods;
- (iii) Rough cost estimation of all recommended technical solutions;
- (iv) Recommendations for implementation of all technical solutions;
- (v) The Consultant must develop AAOTT Condition Assessment Report and recommend at least two design configuration solutions according to the key priority elements and cost efficiency consideration.
- (vi) Telescope Dome Condition Assessment Report: Detailed Implementation Plan, Preparations of the Technical Specifications;
- (vii) Telescope Floor (See annex 1) rehabilitation methods;

- **Final Report shall include:**

- (i) Employers Requirements for Supply and Installation of equipment, civil works or renovation works to be performed which will be required to operationalize the Telescope;
- (ii) Detailed Implementation plan for operationalization of the Telescope;
- (iii) Detailed Implementation plan for operationalization of the Telescope Dome;
- (iv) Develop the necessary methodology for digitization of the control panel
- (i) Detailed tender documentation that includes BoQ  
Develop the necessary methodology for Telescope Floor rehabilitation; which may include but not limited to:
  - Description and assessment on the current situation;
  - Tentative schedule of works;
  - Technical specifications;
  - Materials specifications;
  - Maintenance guidelines;

**The deliverables will be submitted according to the following schedule:**

- Inception Report shall be submitted in 1 month from the commencement of services;

- Draft Interim Report shall be submitted in 2 months from the commencement of services;
- Final Report shall be submitted in 3 months from the commencement of services;

The Consultant will be recruited by MDF as an individual Consultant on an intermittent basis. The tentative duration of the Contract is 15 months, out of which 3 months is for the reports preparation, as in the deliverables section and 12 months for author supervision.

Reporting and all deliverables documents must be submitted to MDF in English and Georgian. The Consultant should provide translators if required to have good communication with the Client and the Stakeholders during field visits or meetings organized as part of the assignment process.

All reports and deliverables developed during this assignment will require Georgian National Astrophysical Observatory (GENAO) clearance. MDF will be responsible to make all reports and deliverables available to the GENAO and to manage their clearance, step by step as defined along the ToR.

## **5. Author Supervision**

The Consultant shall perform author supervision during the implementation of the rehabilitation works. The Consultant shall supervise the Telescope and Dome installation process and coordinate with the company responsible for supply and installation of the digital as well as non-digital equipment. Author supervision depends on the duration of the rehabilitation works which will last approximately for 12 months, and will be performed according to the steps outlined in the Employers Requirement document. The Consultant shall prepare consolidated Monthly Progress Reports. The reports shall provide a brief but comprehensive end-of-month progress assessment for all supervision tasks, as well as any required updates to the Work Program

## **6. Support services for the Consultant**

MDF will make the following resources available to the Consultant:

- (i) All relevant data, documents, studies and reports related to the project.
- (ii) Suitable office space. The Consultant shall use the existing facilities at Abastumani Astrophysical Observatory.
- (iii) Appropriate and suitably qualified counterpart staff.

## **7. Qualification and Experience of the Consultant**

Required Expert skills:

- (i) Master Degree in Civil Engineering/Astronomical instrumentation.
- (ii) Work experience with large telescopes (diameter>4m) is preferred.
- (iii) Over 3 years of experience in project management.
- (iv) Over 10 years of experience in design, construction, installation, operation and maintenance of telescopes (including robotized telescopes).
- (v) The curriculum vitae of the Consultant should contain information at least on two projects he/she has successfully completed in the last 10 years, with names and addresses of the clients.
- (vi) Minimum 3 years of international experience in field of astronomical instrumentation and telescope system engineering.
- (vii) Fluency in written and spoken English. Good communication and reporting skills

## **Stakeholder List**

- Beneficiary – Astrophysical Observatory under the Ministry of Education and Science,
- Adigeni Municipality
- Client - The MDF

The Client is the Municipal Development Fund of Georgia (MDF), while the Beneficiary of the services is the Georgian National Astrophysical Observatory (GENAO). All contract-related matters shall be addressed to the MDF. All content-related questions shall be cleared by the MDF through GENAO, as the beneficiary of services. Structural units and members of the GENAO shall be involved free of charge at all stages of the consultancy. GENAO will be available to support the Consultant at all stages with the provision of information and other support as needed to ensure timely delivery of the reports.

## **8. Lump Sum Payment**

### **Payment Milestones**

1<sup>st</sup> payment - 20% of the Contract Amount, including local taxes shall be paid to the Consultant upon submission of the Inception Report, acceptable to the "Scientific-Technical Council of Observatory" and MDF;

2<sup>nd</sup> payment - 30% of the Contract Amount, including local taxes shall be paid upon submission of the Draft Interim Report, acceptable to the "Scientific-Technical Council of Observatory" and MDF;

3<sup>rd</sup> payment - 40% of the Contract Amount, including local taxes shall be paid upon submission of the Final Report, acceptable to the "Scientific-Technical Council of Observatory" and MDF;

4<sup>th</sup> Payment – 10 % of the Contract Amount, including local taxes - Author's supervision

Annex 1: Telescope Floor

