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## **TERMS OF REFERENCE (TOR)**

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### **SUPPLY, DELIVERY, INSTALLATION, TESTING, COMMISSIONING AND MAINTENANCE OF EARTHQUAKE SENSORS, RAIN GAUGE, ALTERNATIVE RAIN RADAR ANALYTICS, AND DATA DISPLAY SYSTEM**

#### **I. RATIONALE AND BRIEF BACKGROUND**

The Republic Act No. 10121 known as the Philippine Disaster Risk Reduction and Management Act of 2010 defines Early Warning System as the set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss.

In addition, as a directive of Section 105.2 - Earthquake Recording Instrumentation of the National Structural Code of the Philippines (NSCP) and section 102 of the National Building Code of the Philippines, otherwise known as P.D. 1096, is hereby directed that the guidelines and implementing rules on earthquake recording instrumentation for building approved by DPWH should be strictly implemented and executed.

Based on the two main laws mentioned above a people-centered early warning system necessarily comprises four (4) key elements: knowledge of the risks; monitoring, analysis of the hazards; communication or dissemination of alerts and warnings; and local capabilities to respond to the warnings received. The expression "end-to-end warning system" is also used to emphasize that warning systems need to span all steps from hazard detection to community response.

Given that Quezon City is highly susceptible to evolving disaster risks due to multiple hazards such as extreme rain and earthquakes, it is therefore a must to continuously improve on this matter and invest on modern technologies that will promote knowledge building, awareness raising, and disaster preparedness not just for the QC DRRMO but to the citizens of Quezon City. As such an earthquake, rain monitoring system with supporting rain analytics would indeed further capacitate disaster preparedness of the city.

## **II. PROJECT DESCRIPTION**

The objective of the project is to enhance the capabilities of QCDRRMO by adding monitoring systems for natural disasters related to earthquakes and heavy rain. The project will include:

- Two (2) seismic accelerograph to monitor motion and earthquake events
- Ten (10) rain gauge to monitor the precipitating rain in a specific location
- Alternative rain radar analytics (using new rain attenuation method) to monitor the precipitating rain in a wider area to serve as supporting analysis and backup rain monitoring system
- Data display system for visualization, reporting and SMS/Viber alerting
- Integration to command center systems

With additional measuring infrastructure, analytics, data processing & display and alerting system, the QCDRRMO plans to extend its capabilities by disseminating sets of information to the barangays, citizens and other stakeholders via social media, web applications and messaging platforms.

Since these are critical systems for earthquake and rain monitoring, the QCDRRMO recommends a system that is already existing and proven working by other private companies and Local Government Units in Metro Manila. The QCDRRMO is confident that the proposed systems are automated, faster to implement, easy to manage, scalable, and cost-effective.

The system will further:

- Supplement planning, monitoring and decision making of QCDRRMO through the use of seismic accelerograph and high-quality rain monitoring systems and analytics to achieve local monitoring.
- Produce critical data that can enhance its command center systems.
- Respond to the impacts of earthquake and rain to any location in Quezon City.
- Enable efficient dissemination of earthquake and rain alerts to areas in Quezon City.
- Gain access to historical data that can be used for research and planning purposes.

III. PROJECT SCOPE OF WORK

✓ The QCDDRRMO plans to install two (2) seismic accelerographs in two (2) locations to monitor its seismic activities, ten (10) rain gauge in ten (10) locations to monitor the precipitating rain and a rain monitoring analytics in the form of alternative rain radar (using new rain attenuation method) to monitor the precipitating rain in a wider area.

All systems have a capability of triggering alert notifications in the form of email, SMS, and messaging applications (Viber, Telegram) if a certain threshold is reached. In addition, all historical datasets should be stored for possible research and planning purposes.

System Output

- Real-time monitoring of seismic and rainfall events
- Integration of data display system to existing QCDDRRMO web-based applications
- Historical data dashboard for research and planning purposes
- Smart dissemination of seismic and rainfall events to selected recipients
  - SMS, Viber, Telegram Alerts delivered to specific recipients

Technical Specifications

1 Lot	Description	Delivery Time
1 Lot	<div>1. Seismic Accelerograph (2 set)</div> <ul style="list-style-type: none"><li>• Seismic Accelerograph<ul style="list-style-type: none"><li>◦ STAND-ALONE System</li><li>◦ complete Plug &amp; Play System</li><li>◦ highly UserFriendly<ul style="list-style-type: none"><li>• Touch Screen Monitor</li><li>■ Back-up Internal Battery</li><li>• Internal Alarm</li><li>■ Real time Data in figures</li></ul></li></ul></li><li>• Sensor/Accelerometer<ul style="list-style-type: none"><li>• STAND-ALONE System</li><li>• Complete Plug &amp; Play System</li><li>• Tri -axial sensor</li><li>• Features.</li><li>• Earthquake Alarm Systems</li></ul></li></ul>	15 Calendar Days

	<ul style="list-style-type: none"><li>■ Ready Connectivity, Interfacing, Integration with BMS, FDAS, Public Announcement System — 10 Output Contact with individual settings based on EQ Level</li><li>■ Automatic Shut-Off Feature for Elevators,</li><li>■ Electrical Power Main Switch, LPG Pipes/Valves, etc.</li><li>■ IP67 Waterproof + Dustproof</li></ul> <ul style="list-style-type: none"><li>• Installation</li><li>• Coring Works</li><li>• Warranty &amp; Support<ul style="list-style-type: none"><li>o warranty and maintenance including replacements of all parts for ten (10) years</li><li>o Replacements should be delivered within 30 calendar days</li></ul></li></ul>	
	<p><b>2. Rain Gauge (10 set)</b></p> <ul style="list-style-type: none"><li>• PAGASA certified equipment</li><li>• World Meteorological Organization (WMO) Standard</li><li>• Power supply through solar</li><li>• Plug and play</li><li>• No programming and complex wiring</li><li>• Real-time access to data from any web browser</li><li>• Enables to monitor data 24/7 via web browser or smartphone</li><li>• Alarm capabilities via text/email</li><li>• LCD display for easy field deployment</li><li>• Cloud-based data access option</li><li>• Smart Sensor Connectors: 10 inputs</li><li>• Logging Rate: Configurable for as low as one (1) second</li><li>• Accuracy: 0-250mm/hr: +/-2%</li><li>• Accuracy: 250-500mm/hr: +/-3%</li><li>• Installation</li><li>• Warranty &amp; Support<ul style="list-style-type: none"><li>o Warranty and maintenance including replacements of all parts for ten (10) years</li><li>o Replacements should be delivered within 30 calendar days</li></ul></li></ul>	10 Calendar Days

	<b>3. Alternative Rain Radar Analytics license</b> (1 set) <ul style="list-style-type: none"> <li>• Data processing of K/Ka-Band frequency of available satellite terminals covering Metro Manila and other regions</li> <li>• Data Processing and conversion of signal to rain intensity (mm/hr)</li> <li>• Output is Rain (mm/hr) with update rate of 5min and resolution of 5kni in Quezon City and surrounding areas</li> <li>• Three (3) Years License</li> </ul>	10 Calendar Days
	<b>4. Data Processing &amp; Display System Software</b> <ul style="list-style-type: none"> <li>o Earthquake visualizations</li> <li>• Rain visualizations</li> <li>• Processing, storage and display of two (2) seismic accelerograph</li> <li>• Processing, storage and display of ten (10) rain gauge</li> <li>• Processing, storage and display of real time rain through conversion of signal to rain intensity for wide area</li> <li>• Consolidated data feed (w/ API) and visualizations for integration to existing command center systems</li> <li>• Consolidated data feed with programmed thresholds for dissemination through email, sms, viber, telegram</li> <li>• Historical data dashboard for research and phoning purposes</li> <li>• Three (3) year license for cloud-based data processing &amp; display system software</li> </ul>	5 Calendar Days
	<b>5. Training for ten (10) QCDRRMO personnel</b> <ul style="list-style-type: none"> <li>• 1 Day Equipment Maintenance Training</li> <li>• 1 Days System Admin Training</li> <li>• 3 Days End User Training</li> </ul>	5 calendar days
	<b>TOTAL CALENDAR DAYS</b>	45 calendar days

#### **IV. AREA OF COVERAGE**

The earthquake equipment will be installed at two (2) locations and the rain gauge at ten (10) locations in Quezon City. The locations of seismic monitoring and rain monitoring equipment will be identified by the Emergency Operations Center (EOC) during the start of implementation. All locations will have an area for the installation and power supply.

#### **V. PROJECT STANDARDS AND REQUIREMENTS**

- Bidder should have completed, a single contract that is similar to this Project or related to Supply, Delivery, Installation, Testing, Commissioning and Maintenance of natural disaster monitoring equipment and meteorological data processing, equivalent to at least fifty percent (50%) of the ABC five (5) years from the date of submission and receipt of bids, a contract similar to the Project.
- Bidder should have at least 2 field staff for the equipment installation and on-going support and maintenance for three (3) years.
- Bidder should have at least one (1) Meteorologist and one (1) Data Science resources for Training and continuous consultation within the project as this is a science-based data driven project. Bidder must also submit their resume. It shall show relevant trainings and experiences.
- Bidder should have demonstrated experience and capacity to manage environmental monitoring and meteorological data processing systems in a highly urbanized city (HUC) in Metro Manila.
- Authority to sell from the manufacturer or exclusive/authorized distributor of the machine being offered.
- Certification for the availability of parts of the machine for the next ten (10) years
- Affidavit of undertaking stating compliance with the Section VI, IX, XI and XII of the GUIDELINES AND IMPLEMENTING RULES ON EARTHQUAKE RECORDING INSTRUMENTS FOR BUILDINGS as mandated by NCBDO Memorandum Circular 01, Series of 2015 of DPWH.

**VI. PROJECT DURATION**

Delivery and Installation of the Goods and Services is required by forty-five (45) calendar days upon issuance of Notice to Proceed. Below is the project timeline that the Bidder needs to complete.

Item	Duration
Project Implementation and Delivery and installation of two (2) sets of Seismic Accelerograph, ten (10) sets of Rain Gauges, one (1) set of alternative rain radar analytics system	35 calendar days
Installation and Setup of Data Processing & Display	5 calendar days
Training	5 calendar days
<b>TOTAL</b>	<b>45 CALENDAR DAYS</b>

**VII. APPROVED BUDGET FOR THE CONTRACT**

The source of fund for this project is under the Continuing Appropriation Fund. The Approved Budget for the Contract is at Fifteen Million Pesos (Php 15,000,000.00).

The project cost shall be fixed and there shall be no price adjustments applicable for the duration of the contract except when operations costs are increased by more than 10% as a result of extraordinary circumstances as determined by National Economic Development Authority (NEDA). Pursuant to the provisions of RA 9184 and its IRR on contract price escalation, all contract price escalation shall be approved by the Government Procurement Policy Board (GPBB).

**VIII. BASIS OF PAYMENT**

Below are the deliverables that will be used as the basis for trill payment.

Item	duration	Percentage of Payment
Project Implementation Plan	5 calendar days	15%
Delivery installation, setup of two (2) sets of Seismic Accelerograph, ten (10) sets of rain gauges, and one (1) set of alternative rain radar system	30 calendar days	60%
Installation and Setup of Data Processing & Display	5 calendar days	20%
Training	5 calendar days	5%
<b>TOTAL</b>	<b>45 calendar days</b>	<b>100%</b>

**IX. PENALTIES FOR BREACH OF CONTRACT**

Failure to deliver the services according to the standards and requirement set by the City shall constitute and offence and shall subject the Contractor to penalties and/or liquidated damages pursuant to RA 91. 84 and its revised Implementing Rules and Regulations.

**X. CANCELLATION FOR OR TERMINATION OF CONTRACT**

The guidelines contained in RA 91 b4 and its revised IRR shall be followed in the termination of any service contract. In the event the City terminated the Contract due to default insolvency, or for cause, it may enter into negotiated procurement pursuant to section 53 (d) RA 9184 and it's IRR.

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