



Republic of the Philippines

DEPARTMENT OF SCIENCE AND TECHNOLOGY

Philippine Atmospheric, Geophysical and Astronomical Services
Administration (PAGASA)

TERMS OF REFERENCE

Rehabilitation of Korea International Cooperation Agency-Early Warning System 2 (KOICA-EWS2) Project for Mitigation of Disaster in Metro Manila (Pasig-Marikina River Basin)

A. OVERVIEW

The Operation of PAGASA's Flood Forecasting and Early Warning System (FFEWS) for Pasig-Marikina River Basin has become operational since 2011. This is thru the project entitled ***"The Establishment of an Early Warning and Monitoring System for Disaster Mitigation in Metro Manila or EWS2"*** funded by the Korean Government thru Korea International Cooperation Agency (KOICA). Flood monitoring equipment's were deployed within Pasig-Marikina River comprising of 5 Raingauge Stations, 10 Water level Gauging Stations, 4 Automatic Weather Stations and 20 Warning Post Stations which becomes the highlight of the project. The entire system has been very effective in providing alarm/warning to the flood prone communities within the aforementioned river basin. The communities became dependent on the data as well as the warning broadcasted by the system in the area. The warning has become the basis of the affected residents to evacuate during the periods of flooding.

However, in the recent year, the equipment started to malfunction and shows some inconsistencies that prevented the hydrologist to gather real time information from the remote sites which hinder the issuances of timely and accurate flood warning.

The rehabilitation of the FFEWS for Pasig-Marikina River Basin will replace the damaged/deteriorated equipment and automatically transmit the data remotely from the site to the data server in the Command Center without delay. It is expected that the operation of the system will be normalized as it is integrated and crucial in the current set-up of the operational flood forecasting system for Metro Manila.

The scope of work shall include the supply, delivery, installation, integration, testing, training and commissioning of a complete telemetered hydrological monitoring network for Pasig-Marikina River Basin.

B. APPROVED BUDGET FOR THE CONTRACT

The Approved Budget for the Contract (ABC) is Thirty-Eight Million Five Hundred Thousand Pesos (**PhP 38,500,000.00**) inclusive of VAT and all applicable government taxes.

C. QUALIFICATIONS OF BIDDER

(Please refer to Section II, Instructions to Bidders, the Bid Data Sheet and Checklist of Eligibility Requirements).

D. DELIVERY PERIOD AND PLACE OF DELIVERY

The winning bidder shall supply, deliver, install, integrate, test, conduct training and commission all facilities which is required in the TOR for the Flood Forecasting and Early Warning System in Pasig-Marikina River Basin within one hundred eighty (180) calendar days commencing from the date of receipt of the Notice to Proceed (NTP).

E. BID PROPOSAL CONTENTS

Bidders shall respond paragraph by paragraph to the following specifications/scope of work and shall clearly indicate compliance (please see Section VII. Compliance Matrix). The bidder should include additional materials and activities he deems necessary to properly complete the project. Use additional sheets, if needed. The bidder should include in this proposal descriptive literatures of all equipment/ materials to be supplied in original format, plans, drawings and diagrams/ configurations. These details permit PAGASA to fully evaluate cost tradeoffs.

Submittals

1. **List:** List of equipment and breakdown of their corresponding prices using the required bidding forms (*Please refer to Financial Component*).
2. **Engineering Drawings and Diagrams:** The bidder shall submit detailed method of installing the equipment with but not limited to corresponding system and network diagrams. These will enable the end-user to install the equipment in accordance with the manufacturer's standard in order not to void the equipment warranty. The methodology of installation requirement will require these set of documents:
 - GANTT chart of project implementation timeline with descriptions of timeline tasks, including but not limited to -
 - o Design verification – Bidder should provide engineering calculations using his proposed equipment ratings, to provide assurance on availability of sensor data from the sites to the FFWC, even during inclement weather conditions
 - o Supply – Equipment ordering, assembly, and delivery to sites
 - o Installation of equipment at project sites
 - o On-site testing of installed equipment
 - o System integration of installed equipment
 - o Installed equipment acceptance procedure
 - Radio Frequency Propagation Path Profiles – As part of design verification, the bidder should submit RF Path Profiles of all two-way radio links in the network – from each sensor site to the relays, and to the FFWC (Use the data from the site tabulation page). The path profiles should show the power settings of the two-way radios, antenna gain, fade margins, azimuth orientation, and antenna heights for each link.
 - Engineering calculations – The calculations should show that, at the bidder's proposed setting of his equipment and using the solar panel, battery, charger/controller specifications, the sensors and relay sites can operate solely on batteries 24/7 for at least seven days without sunlight charging. Use five hours of sunlight available per day and set the radio usage at 5% TX – 5% RX – 90% standby.
 - Project organizational chart
 - Biodata of project personnel with copies of relevant training certificates

3. **Performance Testing:** Prior to acceptance, the winning bidder shall provide actual equipment testing (table testing) wherein specifications will be clearly shown. A hard copy of the test results shall be provided together with the end-user approval and shall form part of the acceptance and completion certificate.
4. If the contractor has to deviate from the installation procedures and/or the set-up and to some certain accessories of the system as against to the bid offer, the contractor has to submit a letter in advance to the end-user justifying the deviations. If a certain component shall be replaced, it should be of higher or better specification.

F. TECHNICAL SPECIFICATIONS

The winning bidder shall supply, deliver, install, test, integrate (configure), conduct training and commission the Hydrological Monitoring Facilities for the Flood Forecasting and Warning System in Pasig-Marikina River Basin with the following minimum specification.

Item	Qty	Description
I	19	❖ Site Controller <ul style="list-style-type: none"> ➤ Processor : ARM Cortex-A5 533MHz ➤ Memory : DDR2 256MB ➤ Storage : 256MB ➤ OS: Linux 3. 10. X ➤ Communication Interface <ul style="list-style-type: none"> ■ 10/100/1000 Mb Ethernet 1port ■ 10/100 Mb Ethernet 1port ■ USB 2.0 2port ■ Console RS-232C 1port ■ Keypad Port 1port ■ Automatic switch from VHF to GSM if fail. ➤ Analog Interface <ul style="list-style-type: none"> ■ 24bit AD Converter (single-15Port, Differential 7port) ■ Reference Voltage output 2port ■ Current output 4port ➤ Digital Interface <ul style="list-style-type: none"> ■ TTL I/O 8port ■ Pulse counter 4port ■ RS-232 4port ■ RS-422/485 4port ➤ Input voltage : 9~28.8 VDC ➤ Operating Temperature : -40 ~ +80 °C
II	20	❖ Remote Terminal Unit (RTU) <ul style="list-style-type: none"> ➤ Processor : ARM Cortex-A5 533MHz ➤ Memory : DDR2 256MB ➤ Storage : 256MB ➤ External Storage : microSD over 2GB ➤ OS: Linux 4. 4. X ➤ Communication Interface <ul style="list-style-type: none"> ■ 10/100/1000 Mb Ethernet 1port ■ 10/100 Mb Ethernet 1port ■ USB 2.0 2port, ■ Console RS-232C 1port

		<ul style="list-style-type: none"> ■ TTL I/O 1port ■ AUDIO output 1port ■ Automatic switch from VHF to GSM if fail. ➤ SNR : 96dB ➤ THD : -86dB ➤ AUDIO connector : XLR(STEREO) ➤ Internal speaker : 2.5W(Max) ➤ Input voltage : 9~28.8VDC ➤ Operating Temperature : -40 ~ +80 °C
III	4	<ul style="list-style-type: none"> ❖ Water Level Sensor <ul style="list-style-type: none"> ➤ Type : radar sensor(Non-contact microwave method) ➤ Measuring range : 35M ➤ Temperature of ambient : -40°C ~ +60°C ➤ Material Housing : Plastic ➤ Deviation : +/- 2mm ➤ Flange : PE ➤ Antenna : SUS316L ➤ Process connection : JIS100A ➤ Cable entry : 1/2" NPT ➤ Horn antenna size : Ø 75mm ➤ Power Supply : 9.6 ... 48 V DC ➤ Output Current : 4 ~ 20mA ➤ Measuring frequency : 26 GHz ➤ Digital Communication : HART ➤ Protection : IP66 ➤ Explosion class : Weather proof
IV	39	<ul style="list-style-type: none"> ❖ Digital VHF Modem <ul style="list-style-type: none"> ➤ Frequency coverage : 136~174 MHz ➤ Number of channels : 128 channels ➤ Type of emission : 8K30F1D, 4K00F1D (4FSK) ➤ Channel spacing : 12.5/6.25kHz ➤ Over-the-air data rate : 9600/4800bps ➤ Power supply requirement : 13.2V DC ➤ Antenna impedance : 50 Ω (BNC) ➤ Operating temperature range : -30°C to +60°C ➤ RS-232 connection rate : 1200, 2400, 4800, 9600, 19200, 38400 baud ➤ Transmitter <ul style="list-style-type: none"> ■ Output power : 25W, 10W, 6W ■ FSK error : 2.5% typ. (DN/DVN) ■ Frequency stability : ±1.0ppm ➤ Receiver <ul style="list-style-type: none"> ■ Sensitivity : -4dBμV/-5dBμV emf typ. (DN/DVN) ■ Adjacent channel selectivity : 64dB/60dB typ. (DN/DVN) ■ Spurious response : 76dB/70dB typ. (DN/DVN) ■ Intermodulation : 68dB/66dB typ. (DN/DVN)
V	4	<ul style="list-style-type: none"> ❖ Digital VHF Repeater (Relay Station) <ul style="list-style-type: none"> ➤ Processor : ARM Cortex-A5 533MHz ➤ Memory : DDR2 256MB ➤ Storage : 256MB ➤ OS : Linux 3. 10. X ➤ Communication Interface <ul style="list-style-type: none"> ■ 10/100/1000 Mb Ethernet 1port ■ 10/100 Mb Ethernet 1port

			<ul style="list-style-type: none"> ■ USB 2.0 2port ■ Console RS-232C 1port ➤ Digital Interface <ul style="list-style-type: none"> ■ RS-232 2port ■ RS-422/485 1port ➤ VHF Modem <ul style="list-style-type: none"> ■ Frequency Range : 136~174MHz (128 channels) ■ Over-the-air data rate : 9600/4800bps ■ Max RF output power : Max 25W ➤ Input voltage : 12 VDC ➤ Operating Temperature : -40 ~ +80 °C
VI	4	❖	<p>Antenna Systems</p> <ul style="list-style-type: none"> ➤ Relay stations antennas (Omni Antenna) ➤ Frequency Band : VHF ➤ Directivity : Omni-Directional ➤ GAIN : 6dBi ➤ Max Power : 200W ➤ VSWR : 1.5:1 ➤ Connector : N type Connector ➤ Gauging stations (Yagi Antenna) ➤ Gain : 10dBi ➤ VSWR : 1.5:1 ➤ Pattern : Directional ➤ Water proof and dust protection ➤ Connector type : N type Connector ➤ Maximum power : 100W
VII	3	❖	<p>Power System</p> <ul style="list-style-type: none"> ➤ Power Supply (Relay Station) ➤ Input Power : DC 22~29V, 24V Lead-acid battery ➤ Output Power : 48V(10A), 12V(25A), 5V(10A) ➤ Function <ul style="list-style-type: none"> ■ Low voltage battery protection ■ Input power monitoring ■ Individual output power monitoring ■ Individual output power control ■ Status reporting using TCP/IP network ■ Status control using TCP/IP network ■ Recovers output power automatically after fault condition
VIII	3	❖	<p>UPS (Batteries for Relay Station)</p> <ul style="list-style-type: none"> ➤ Poles : 2P ➤ Rated Ampere : 12V100A ➤ Rated Voltage : 12V ➤ Outline : 330(length) X 171(width) X 217(height) ➤ Weight (kg) : 25.6kg
IX	1	❖	<p>P2P (For Relay Station)</p> <ul style="list-style-type: none"> ➤ RF BANDS: Wide-band operation 4.9 to 6.05 GHz (Allowable frequencies and bands are dictated by individual country regulations. The most common bands are listed here.) 4.940 – 4.990 GHZ (Public Safety) 5.15 – 5.25 GHZ 5.25 – 5.35 GHZ 5.470 – 5.725 GHZ 5.725 – 5.850 GHZ 5.825 – 6.050 GHZ ➤ CHANNEL SIZES : 5, 10, 15, 20, 30, 40, and 45 MHz channels Channel sizes depend on individual country regulations ➤ SPECTRAL EFFICIENCY : 10 bps/Hz maximum ➤ CHANNEL SELECTION : By Dynamic Spectrum Optimization or

		<p>manual intervention; automatic selection on start-up and continual self-optimization to avoid interference</p> <ul style="list-style-type: none"> ➤ RECEIVER SENSITIVITY : -98 dBm with 5 MHz channel ➤ MODULATION / ERROR CORRECTION : Fast Preemptive Adaptive Modulation featuring 13 modulation / FEC coding levels ranging from BPSK to 256 QAM dual payload MIMO ➤ ANTENNA <ul style="list-style-type: none"> ■ Integrated: Flat panel – 23 dBi ■ Connectorized: Can operate with a selection of separately-purchased single- and dual-polarity antennas through 2 x N-type female connectors (local regulations should be checked prior to purchase) ➤ RANGE : Up to 124 miles (200 km) ➤ SECURITY : FIPS-197 compliant 128/256-bit AES Encryption (optional) <ul style="list-style-type: none"> ■ Identity-based user accounts ■ Configurable password rules ■ User authentication and RADIUS support ■ Event logging and management; optional logging via syslog ■ Disaster recovery and vulnerability management ➤ PROTOCOL : IEEE 802.3 ➤ USER DATA THROUGHPUT : Dynamically variable up to 450 Mbps <ul style="list-style-type: none"> ■ Maximum conditions – 2x2, 45 MHz channel1 , 256 QAM ■ Flexible spectral efficiency / capacity licensing model: ■ Lite Capacity: Up to 125 Mbps ■ Mid Capacity: Up to 250 Mbps ■ Full Capacity: Up to 450 Mbps ■ Also available with licenses limiting maximum channel bandwidth ➤ LATENCY : 1 – 3 ms one-direction latency ➤ QoS : 8 Queues ➤ PACKET CLASSIFICATION : Layer 2 and Layer 3 IEEE 802.1p, MPLS, Ethernet priority ➤ PACKET PERFORMANCE : Line rate (>850K packets per second) ➤ TIMING TRANSPORT : Synchronous Ethernet; IEEE 1588v2 ➤ FRAME SUPPORT : Jumbo frame up to 9600 bytes
X	39	<p>❖ GSM Modem with Antenna</p> <ul style="list-style-type: none"> ➤ Frequency Range : Quad band GSM 850/900/1800/1900 MHz ➤ Command Sets : Hayes 3GPP TS 27.007, TS 27.005 ➤ Protocol stack : TCP/UDP/POP3/HTTP/FTP/SMTP ➤ GPRS : Multi-slot Class 12 (quad band), Downlink and Uplink 85.6 Kbps MAX ➤ CSD : 9.6Kbps, non-transparent, V.110 ➤ SMS : MT, MO, Cell Broadcast, Text and PDU mode ➤ Character framing : 7E1 and 8E1 (Serial Interface) ➤ RF antenna socket : 50 Ohm SMA antenna ➤ Power connector : RJ45 connector (nonstandard) ➤ SIM card slot : Push-Push type ➤ Serial interface : RJ45 connector for RJ232 (Female type) ➤ Power Supply Input : 5- 32 VDC ➤ Operating Temperature : -30°C to +85°C ➤ Antenna : <ul style="list-style-type: none"> ■ Frequency Range : 824MHz~960MHz /1710MHz~1990MHz ■ Antenna terminal : SMA Plug ■ Gain : 3 DB

XI	2	❖ Speaker (1 Set : 4EA) <ul style="list-style-type: none"> ➤ Speaker Input : 100W ➤ Frequency : 250Hz-5KHz ➤ Impedance : 100Ω ➤ Weight : 4kg ➤ Material : ALNICO
XII	4	❖ Automatic Weather Station Sensors <ul style="list-style-type: none"> ➤ Wind direction sensor <ul style="list-style-type: none"> ■ Sensor type : Wind Vane ■ Operation range : 0~ 359° ■ Starting threshold : Less than 0.5 m/s ■ Resolution : 1.4° ■ Damping ratio : 0.4 ■ Signal output : RS-232 ■ Accuracy : Better than ±0.7° ■ Operating power : 12±1 VDC, 35mA typical ■ Operating temperature : -40 ~ +80°C ➤ Wind speed sensor <ul style="list-style-type: none"> ■ Sensor type : 3-Cup anemometer ■ Operating range : Up to 75m/s ■ Starting threshold : Less than 0.5 m/s ■ Resolution : 0.1 m/s ■ Signal output : Frequency generation in proportion to wind speed ■ Accuracy : ±3% or ±0.3m/s, whichever is greater ■ Operating power : 11 to 15VDC, 25mA Typical ■ Operating temperature : -40 ~ +80°C
XIII	10	❖ Amplifier (Must be compatible with existing amplifier and controlled by RTU) <ul style="list-style-type: none"> ➤ Rated output : 480W ➤ Impedance/Output Power : 70V(10.2 Ω) 100V(20.8 Ω) ➤ SNR : More 100dB ➤ T.H.D + N : 0.5% Below (AES17, 1/7 Power,1kHz) ➤ High Pass Filter(1W, ±3dB) : 60Hz~20kHz ➤ Power : AC 220-240V, 50/60Hz, DC 24V
XIV	4	❖ Servers (Mobile Server, GIS Server, EWS-Standby Server, COM-Server) <ul style="list-style-type: none"> ➤ Specifications: <ul style="list-style-type: none"> ■ Form factor : Rack Type ■ Processor : Gold 6126 2.6GHz, 12C/24T ■ Memory : 32GB ■ HDD : 2x600GB 10K RPM SAS 12Gbps 512n 2.5in Hot-plug Hard Drive ■ Dual, Hot-plug, Redundant Power Supply (1+1), 750W ■ 1 Broadcom 5720 QP 1Gb Network Daughter Card ■ 1 Ready Rails Sliding Rails Without Cable Management Arm ■ 1 Unconfigured RAID ■ 1 OME Server Configuration Management

		<p>3yr Warranty</p> <ul style="list-style-type: none"> ■ OS : Linux <p>➤ Configuration</p> <ul style="list-style-type: none"> ■ Bidder must make a system configuration in servers that will be integrated with the existing KOICA EWS-3 (Tullahan River Basin). ■ The Target servers will be used as the GIS server, Mobile Server, EWS-Standby Server and Communication Server of Data gathering.
XV		<p>Flood Forecasting and Warning Center Software</p> <ul style="list-style-type: none"> • General <ul style="list-style-type: none"> - The bidder should have the capability to modify these software interfaces to assure lower cost and ease of software changes and maintenance in the future. - The bidder shall provide sample screen formats of the software interfaces as seen on the LED monitor at the FFEWS command center. - The software interfaces should follow standards for existing FFEWS used by DOST-PAGASA. • Data fields of station messages are: <ul style="list-style-type: none"> - MESSAGE COUNT, STATION ID, STATION TYPE, UPDATE INTERVAL, YYMMDD, HHMMSS, VALUE, BATTERY VOLTAGE • Software Interface at command center <p>The DBMS is MySQL Relational Database Management System (RDBMS) and should be able to process entries for the following entities.</p> <ul style="list-style-type: none"> • Entities in the RDBMS should include definitions for <ul style="list-style-type: none"> - Stations - Sensors - Sensors in each station - Users - Stations assigned to users - Sensor readings in each station • Required entries to setup sensors at each remote sensor site <ul style="list-style-type: none"> - Output unit of sensor - Calibration information - Precision of measurement - Range of measurement - Threshold values of sensor readings - Normal, average, and high sensor readings • Required entries to setup a remote station <ul style="list-style-type: none"> - Geographical coordinates - Station name, description, and location • Required entries to setup groups of remote stations <ul style="list-style-type: none"> - Incoming communications port - Outgoing communications port • Required entries to setup users <ul style="list-style-type: none"> - User level definitions - Stations allowed to be accessed • Sensor data, received over a period of time, can be extracted to a csv file or at a format specified by PAGASA. • System maintenance functions <ul style="list-style-type: none"> - Sensor data, at specified time intervals, should be sent to PAGASA HMD

		<p>via VHF or GSM Modem.</p> <ul style="list-style-type: none"> - On command, change preset sensor reading intervals from every 10minutes. - Remote client access is controlled via user ID's and password. - Access of remote clients may be limited to select sites and features of the FFWC software. - Allow authorized users to download data to an Excel file. <ul style="list-style-type: none"> • Data Gathering software, running at the server, has to put sensor data and equipment status data of the sites to FFEWS database server in the FFEWS command center in PAGASA. Also it must be integrated with existing Data Gathering Software. • Hydrometeorological Data available for Pasig-Marikina-Tullahan River Basin should be integrated to the HMD's existing Hydrometeorological Data Base (Aquarius Software) thru the Aquarius Acquisition Service <u>API Method using the industry standard SOAP web services.</u> • Early Warning Software controls all issuing of the warning post broadcasting and monitoring the water level and rain gauging data and must be integrated with existing Tullahan FFEWS.
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Required equipment of each site.

WARNING POST							
Seq.	Station Location	RTU (WP Control Unit)	Amplifier	Speaker	GSM Modem	VHF Radio	Civil Works
1	BURGOS	1	1		1	1	1
2	DE LA COSTA SUBD.	1			1	1	1
3	EASTWOOD	1			1	1	1
4	FORT SANTIAGO	1			1	1	1
5	GUADALUPE	1	1	1	1	1	1
6	MARCOS H-WAY	1	1		1	1	1
7	MERCURY AVENUE	1	1		1	1	1
8	NANGKA	1	1		1	1	1
9	NAPINDAN II	1			1	1	1
10	PEOPLE'S PARK	1			1	1	1
11	RODRIQUEZ I	1	1		1	1	1
12	RODRIQUEZ II	1	1		1	1	1
13	ROSARIO LS	1			1	1	1
14	ROSARIO JS	1			1	1	1
15	SAN JUAN Pumping Station	1			1	1	1
16	SAN MATEO I	1			1	1	1
17	SAN MATEO II	1	1	1	1	1	1
18	STO NIÑO	1	1		1	1	1
19	TUMANA	1			1	1	1
20	WAWA DAM	1	1		1	1	1
SUBTOTAL		20	10	2	20	20	20

WATER LEVEL						
Seq.	Station Location	Site Controller	Sensor	GSM Model	VHF Radio	Civil Works
21	BURGOS	1	1	1	1	1
22	MARCOS H-WAY	1		1	1	1
23	MINDANAO AVE.	1		1	1	1
24	NAPINDAN I	1	1	1	1	1
25	NAPINDAN II	1	1	1	1	1
26	ROSARIO JS	1	1	1	1	1
27	ROSARIO LS	1		1	1	1
28	SAN MATEO I	1		1	1	1
29	STO NIÑO	1		1	1	1
30	TUMANA	1		1	1	1
SUBTOTAL		10	4	10	10	10

RAIN GAUGE						
Seq.	Station	Site Controller	Sensor	GSM Modem	VHF Radio	Civil Works
31	AIRPORT(PAGASA)	1		1	1	1
32	GUADANOVILLE	1		1	1	1
33	MARIKINA (YOUTH CAMP)	1		1	1	1
34	NAPINDAN II	1		1	1	1
35	SAN MATEO II	1		1	1	1
SUBTOTAL		5	0	5	5	5

Automatic Weather Station							
Seq.	Station	Site Controller	Wind Direction Sensor	Wind Speed Sensor	GSM Modem	VHF Radio	Civil Works
36	ANTIPOLO	1	1	1	1	1	1
37	LA MESA DAM	1	1	1	1	1	1
38	PASIG CITY HALL	1	1	1	1	1	1
39	PORT AREA	1	1	1	1	1	1
SUBTOTAL		4	4	4	4	4	4

Relay Station						
Seq.	Station	VHF Repeater	VHF Antenna	Power Supply	P2P	UPS
1	PAGASA	2	2	1		1
2	MT. MATABA	1	1	1		1
3	ANTIPOLO	1	1	1	1	1
SUBTOTAL		4	4	3	1	3

G. MISCELLANEOUS

1. System Documentations – The winning bidder must supply four (4) complete sets of as-built documents, schematic diagrams and current instruction books with fully keyed descriptive parts lists for each type of equipment supplied including network management software.

2. Schedule of Payments / Warranties / After Sales Support

The bidders warrant that it shall strictly conform to all the Terms and Condition of the Contract, including this Terms of reference (TOR).

3. All workmanship, materials and equipment shall be warranted by the supplier for a period of **two (2) years** commencing from the date of acceptance. The warranty shall include:
 - Provide immediate technical assistance when summoned to by the end-user regarding the delivery items.
 - In any case of malfunctions during the warranty period, replacement/repair of the defective parts will be provided within a week.
 - While the equipment is undergoing repair, a spare unit shall be made available to PAGASA to maintain the continuous operation of the system. Repair of the defective materials or equipment shall be permitted provided that the repaired item meets original specifications.
4. Parts and materials must be readily available at the market for at least **five (5) years** after the warranty period.
5. The winning bidder shall neither assign, transfer, pledge nor sub-contract any part or interest therein.
6. Cost for Licenses, Permits, Training, etc.

The prospective bidders shall include in this financial proposal the cost of all permits and licenses necessary to purchase, install and operate the equipment to be supplied for a two (2) year period.
7. Deviation from the Installation Procedures

If the winning bidder has to deviate from the installation procedures and/or the set-up and to some certain accessories of the system as against the bid offer, such deviation must first be justified accordingly in writing and subject to prior approval by the Head of Procuring Entity. Major deviation, as determined by the Head of the Procuring Entity may be allowed and charged against the 10% contingency and variation orders after fully satisfying criteria covered under Revised IRR of RA 9184.

It is understood that in this particular project, major deviations shall have to be determined solely by PAGASA upon the request of the winning bidder, and thus qualifies to utilize contingency funds. In cases of minor deviations, again determined solely by PAGASA, there is no way the winning bidder can request to utilize the contingency funds.
8. Performance Testing

Prior to acceptance, the winning bidder shall provide actual equipment testing (table) wherein specifications will be clearly shown. A hard copy of the test results shall be provided together with the end-user approval and shall form part of the acceptance and completion certificate.
9. Training

Five (5) days on-site training for ten (10) PAGASA personnel involved in the flood

forecasting and warning activities. All expenses to be incurred in the said training shall be shouldered by the winning bidder.

H. PRICE

Inclusive of VAT and all other local taxes