TERMS OF REFERENCE

DATA COMMUNICATION AND FLOW MONITORING FOR UMIRAY, ANGAT, IPO BIGTE AND BALARA

Contract No. MWSS-DCFM-001-2019

A. BACKGROUND

Pursuant to its Charter, Republic Act No. 6234, as amended, Metropolitan Waterworks and Sewerage System ("MWSS"), is empowered to construct, maintain and operate dams, reservoirs and transmission lines for the purpose of supplying water to Metro Manila.

The Angat Dam is the main source of raw water for the three MWSS Concessionaires, the Maynilad Water Services, Inc (MWSI), Manila Water Company, Inc. (MWCI) and Luzon Clean Water Development Corporation (LCWDC). It is a multi-purpose dam situated about 58 kilometers northeast of Metro Manila. The dam is located along the Angat River in San Lorenzo, Norzagaray, Bulacan approximately 7.5 kilometers upstream of the New Ipo Dam. The dam, dyke, spillway and reservoir are being managed by the National Power Corporation (NPC) while the power component - the hydroelectric plant is being managed by the Angat Hydroelectric Corporation. The water supply to MWSS Concessionaires, is released through the five (5) existing auxiliary turbines and the released water continues downstream to the New Ipo Dam through the Angat River.

Additional to the river tributaries of the Angat reservoir, the Umiray Angat Transbasin Facility (UATF) also contributes an average of 13 cubic meters per second (cms) of raw water to the Angat reservoir. The UATF is located in Sitio Mabituan, Barangay Umiray, General Nakar, Quezon Province. The water from the Umiray river is being diverted to the 13.14 kilometers long and 4.3 meters diameter tunnel going to Sitio Macua, Doña Remedios Trinidad, Bulacan and then flows to Angat reservoir.

Ipo Dam is a diversion dam that is owned and operated by MWSS thru the Common Purpose Facilities (CPF) of the Concessionaires. The outflow from the Dam flows through three tunnels going to the Bigte basins and then diverted to the six (6) aqueducts that flows down to the Novaliches Portal which is located in the La Mesa Reservoir.

B. IMPLEMENTATION

The mode of procurement shall be through an open competitive bidding in accordance with R.A. 9184.

C. THE PROJECT

The works called for under this Contract shall be the complete design, supply, installation and commissioning of the Flow Meter and Data Communication in areas or locations mentioned in this TOR.

It is the responsibility of the Contractor to confirm the accuracy of the information provided through actual observation and measurement on site prior to bid submittal. The Contractor shall comply with the requirements of the Contract as defined within the Scope of Work.

D. PROJECT SITE

The project will cover the facilities from Umiray, Ipo Dam to the La Mesa Portal.

MAIN LOCATIONS	COORDINATES	NO. OF FLOW METERS
UATF (Tunnel inlet) in Umiray	14°55'39.54"N, 121°21'55.00"E	1
UATF (Tunnel outlet) in Macua	14°56'59.31"N, 121°14'37.06"E	1
Ipo Dam Tunnel Inlets	14°52'27.89"N, 121° 8'48.69"E	3
Bigte Basins Tunnel Outlets	14°51'36.44"N, 121° 5'29.25"E	3
Aqueduct No. 3 - 6 inlets		4
Aqueduct No. 3 - 6 outlets	14°43'57.89"N, 121° 4'29.15"E	4
Novaliches Portal Structure - Big Weir - Small Weir - Manila Water By-Pass - La Mesa Treatment Plant 1 Open channel - La Mesa Treatment Plant 2 Open channel	14°43'49.61"N, 121° 4'28.98"E	5
TOTAL		**21**

See Annex A for the overall details of the MWSS Water Source.

E. SCOPE OF WORK

The general scope of Contractor for the entire project is as follows, but not limited to:

1.1. Preliminary Investigation, Site Assessment and Data Gathering

a. MWSS will be providing the following available documents. However, any document requested to MWSS, aside from the listed documents below, will be subject for approval and availability:

   i. As-built drawings of UATF Tunnel, Ipo Dam, Aqueducts and La Mesa Portal
   ii. In the absence of some of the old as-built drawings, the contractor shall conduct actual measurement, as needed, and subject for the approval of the MWSS without affecting the existing operations.

b. The Contractor shall be responsible in gathering all available information necessary to achieve the objectives of the study from other Stakeholders and government/private agencies, as needed.

c. Presentation of the result of the investigation, site assessment and data gathered.

d. All data gathered shall be collected and turned over to MWSS

1.2. Design, Supply, Installation and Commissioning Works of the ultrasonic transit-time flow meter

a. Civil Works:

The Contractor shall design and construct, according to the following performance specifications/parameters:

i. Clearing and preparation of the project site;
ii. Cutting and breaking of concrete including overlaid or underlying pavement, if necessary;
iii. Support and protection (or relocation) of existing utility lines and other structure whenever encounter in actual condition;
iv. Test pit excavation if required;
v. Sheeting, bracing and dewatering of trenches and structures whenever necessary;
vi. Design, supply and installation of flow meter supports and fence;
vii. Restoration works;
viii. Disposal and hauling of unusable and unsuitable materials to the MWSS designated area; and
ix. Any other works implied or not implied in this contract but is necessary to complete the work item.

b. Mechanical Works

The Contractor shall design the mechanical works in accordance with the following performance specifications/parameters:

i. Reading Accuracy: within +/- 2.0%
ii. Can measure flow range of 10 to 60 cubic meters per second (cms)
iii. Meter Technology: Capable of a real-time, 24/7 measurement, leave alone, automatic calibration and remotely operated but with provision for manual operation.
iv. Flow: Bi-directional
v. IP Sensor: 68 or better
vi. IP Converter: 67 or better
vii. Output signal: Digital
viii. Installation: Live
ix. Measurement: Raw water
x. Built-in data logger that is capable of recording minimum of 6 months data; 10 seconds resolution; 15 minutes averaging and capable of sending thru wire communication. Has a data storage capability at the site as a back-up during down time or real time monitoring aside from

capability of remote transmission with Ethernet port & SD memory, 2 months logging capacity & per second recording;
xi. Stand-alone solar power supply;
xii. Sensors/ flow meters shall come up with updated calibration certificate;
xiii. System Architecture of the Flowmeter's Automation and Telemetry/ Communication
xiv. Electrical Requirements and System Protection of the Flowmeters

c. Electrical Works

The Contractor shall design the electrical components in accordance with the following performance specifications/parameters:

i. Tapping to existing power supply complete with wiring, enclosed circuit breaker and protection devices, junction box, laying and installation of conduit and cable trench and its required appurtenances;
ii. Remote Telemetry Unit (RTU) to be connected to the broadband frequency of MWSS located at the MWSS Balara Office.
iii. Provide real-time monitoring and supervision of these flow meters through a PC/Window base software with 60" LED display at MWSS Balara Office.
iv. Supply and installation of control panel
v. Supply and installation of lightning protection;
vi. Grounding of equipment and enclosures;
vii. Provide surveillance (CCTV Pan/Tilt/Zoom) Camera (for the whole Novaliches portal structures only) complete with necessary fittings, support and accessories.
viii. Energizing of the completely assembled unit and commissioning; and
ix. Any other works implied or not implied in this contract but is necessary to complete the work item.

1.3. Other Works

The following Works shall be undertaken by the Contractor:

a. Mobilization and Demobilization;
b. Secure, in behalf of MWSS, all necessary permits and clearances. All fees and incidental costs required in securing the said permits and licenses shall be borne by the Contractor.

F. QUALIFICATION OF BIDDERS

The Bid Submission shall be in accordance to Section 23.4.2.1 of the 2016 Revised IRR of RA 9184, wherein the prospective bidder shall have a registered local firm who may be a sole proprietorship, partnership, corporation or joint venture. In addition, the Bidder shall possess the following additional minimum specifications to be eligible to participate in the public bidding, to wit:

PARTICULARS	REQUIRED QUALIFICATIONS
1. PCAB Category	Size Range: Medium A License Category: Class "B"
2. Experience	With **at least five (5) years-experience** in the field of Flow Metering and Data Communication (supported by list of completed projects)
3. Minimum Number of Projects Undertaken	Have successfully undertaken and completed within the last ten (10) years, **at least one (1) flow metering project**.
4. Single Largest Completed Contract (SLCC)	Have successfully completed **at least one (1) flow metering project** having a cost equivalent to at least fifty percent (50%) of the Approved Budget for the Contract (ABC).

In addition, the following documents shall be included in the bid proposal:

- Table of Organization
- CVs of nominated personnel
- Design scheme and Construction Methodology to be subject for Technical Bid Evaluation (Note: the bidders may be invited to present their technical proposal)
- Construction Schedule
- Technical brochures of all pertinent control equipment, instrumentation and hardware should be included to be evaluated during technical bid evaluation
- Manufacturer's Authorization Certificate, After Sales Service/Support Certificate and Warranty Certificate
- Authorization to supply products
- Warranty Certificate

G. PERSONNEL QUALIFICATIONS

Following are the key personnel required to work full time for providing services and mandatory requirements. Other personnel required in the project should be included in the proposal.

Designation	Qualification	Year of work Experience	
		Overall	Similar Project
Project Manager/Team Leader	Licensed Engineer	5	5
Electrical Engineer	Licensed Engineer	5	5
Electronics and Communications Engineer	Licensed Engineer	5	5

Structural Engineer	Licensed Engineer	5	5
Site Civil Engineer	Graduate on related field	5	5
Site Electrical Engineer	Graduate on related field	5	5
Cost Engineer/Scheduler	Graduate on related field	5	5
Safety Officer/Engineer	Graduate on related field; Additional education and training on construction health and safety	5	5

The key personnel listed are mandatory. Prospective bidders shall attach/submit the resumé of the above professional key personnel. The key personnel shall possess and submit together with their resumé, their valid license for the practice of engineering issued by the Professional Regulation Commission (PRC).

The Design and Build Contractor may, as needed and at its own expense, add additional professionals and/or support personnel for the optimal performance of all architectural and engineering design services, and construction services, as stipulated in the Terms of Reference for this Project.

H. TRAININGS

The Contractor shall conduct trainings to the representatives of the MWSS. The training plan shall include the operation, maintenance, troubleshooting, as necessary to enable to operate the whole system.

The method of training delivery shall be structured to include theory, group discussion and part practical elements like troubleshooting, etc. supported with visual aids, demonstrations and appropriate assessments. Training manual shall be produced by Contractor, covering all the related training matters to be discussed during the training.

I. LOGISTICS

MWSS will provide assistance to the Contractor for the access to the Angat Dam facility, Aqueduct Right-of-Way and La Mesa Portal.

It is expected that the Contractor shall provide their own security guards, field offices, service vehicles and other logistics necessary for the smooth implementation during the entire duration of the Project.

The Contractor shall be under the overall supervision and monitoring of the MWSS Project Manager.

J. OTHER TERMS AND CONDITIONS

1. The Contractor shall be responsible for the provision of uninterrupted power supply at the Umiray Inlet and Outlet.

2. Prior to installation, detailed design drawings including the following documents shall be reviewed and approved by MWSS, in accordance with the required specifications.
    - Flow meter layout plan and details supported with specifications and catalogue/ literature
    - Installation methodology of all equipment/ instruments
    - Implementation schedule

- Fencing details
- Data Communication scheme and details
- System diagram of the whole project
- Submission of Health and Safety program
- Construction shop drawing

3. As-Built and Documentation

Immediately following final successful works testing, the Contractor shall revise all appropriate drawings and incorporate any modifications found necessary as a result of the tests, showing the exact “as-built” locations, sizes and details of the work as executed, and submit it to the MWSS for signature.

Contractor shall, at its expense and not later than thirty (30) calendar days after Project Acceptance:

- one (1) set of A0 on mylar paper,
- four (4) sets of A0 scan hard copies,
- four (4) sets of A3 scan hard copies,
- one (1) set of PDF soft copy and three (3) set of AutoCAD copies in CD/DVD) with "AS-BUILT" clearly printed on each sheet.

K. WARRANTY AND AFTER SALES SUPPORT

From the time of commencement of project construction up to the final acceptance, the Contractor shall assume full responsibility pursuant to Section 62.2 of the 2016 Revised IRR of RA 9184. In addition, the Contract shall guarantee the following:

1. The Contractor shall guarantee that the system is free from all ground and from all defective workmanship for a minimum period of one (1) year from date of acceptance of the work.

2. The Contractor shall guarantee the design and construction for a minimum period of ten (10) years from the date of acceptance.

3. The Contractor shall guarantee that the equipment, machinery and device Supplier/s have the capability and facilities to do the repair and maintenance of the units to be supplied.

4. In addition, the equipment/instrument shall be guaranteed for an additional period of one (1) year on top of the warranty given by the equipment supplier. Any defects appearing shall undertake remedy and/or replacement without cost to the government during the warranty period.

5. In the event the equipment and devices or any of its accessories becomes defective, the supplier/ Contractor must provide a repairman/ technician to attend to the defect within 24 hours upon receiving the MWSS notice.

6. The contractor shall submit a certification that the spare parts of the model being proposed are locally available in the next five (5) years.

L. COMMISSIONING AND ACCEPTANCE

A proving period will be conducted for at least six (6) months to check the workmanship of the system. After installation of the Flow Meters, the contractor shall submit an affidavit and test certificate. The affidavit shall state that the workmanship in the manufacture of the items are of the highest standard, designed and manufactured in accordance with the best practice, that all tests specified herein have been performed and that all test requirements have been met. The test certificates shall show the inspection and test conducted on the items.

M. WORK SCHEDULE AND DELIVERABLES

The Contract is proposed to commence from the issuance of the Notice to Proceed (NTP). The duration includes the required time for undertaking the Scope of Work as specified above.

The total duration of all work items specified for this project will be **16 Months or 480 calendar days** as detailed:

REQUIRED ACTIVITIES/ SCHEDULE	DUR	MONTH															
	MON	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A. Data Preliminary Investigation, Site Assessment and Data Gathering	1																
B. Preparation of DED including methodology and specifications	3																
C. Project implementation	12																
D. Proving period including documentation (Test and Commission)	6																
TOTAL	**16**																

*Final acceptance shall be issued after the defects and liability period of one (1) year

** After sales/ warranty of the supplied equipment shall commence the day following the final acceptance has been issued

All reports shall be in English, in book-bounded printed form, plus electronic form (MS Excel, MS Word, pdf-format, and other electronic format as required and approved by MWSS).

Deliverables	Date of Submission
Concise Monthly Progress Reports	Submitted, monthly, after the issuance of Notice of Award (NOA) and Notice to Proceed (NOA).
Draft Detailed Engineering Design (DED)	Submitted, for MWSS approval, within sixty (60) calendar days after issuance of NTP. Shall be in A3 size format for Engineering Drawings.
Final Detailed Engineering Design Report (including specification and methodology)	Submitted within fifteen (15) calendar days after review and approval of draft DED.

	Shall submit four (4) sets. Engineering drawings shall be in A3 size format.
Draft Final Report (including As-Built Drawings and Operations and Maintenance Manual)	Submitted, for MWSS approval, within thirty (30) calendar days after Project Acceptance. Shall be in A0 size format for As-Built Drawings.
Final Report	Submitted within seven (7) calendar days after receiving comments on the Draft Final Report Shall submit four (4) sets. For As-Built Drawings, refer to Section I (As-built and Documentation) of this TOR.

N. TERMS OF PAYMENT

In consideration of the services required under this Terms of Reference, payment to the Contractor shall be made in the following breakdown. **No claims for payment shall be processed and paid unless duly-supported with complete documents.**

BILLING PARTICULARS	CONDITION/REQUIREMENTS
1. Advance Payment	**15%** of Total Contract Amount The Procuring Entity shall, upon a written request of the Contractor which shall be submitted as a contract document, make an advance payment to the Contractor in an amount not exceeding fifteen percent (15%) of the total contract price, to be made in lump sum or, at the most, two installments according to a schedule specified in the Instructions to Bidders and other relevant Tender Documents. The advance payment shall be made only upon the submission to and acceptance by the Procuring Entity of an irrevocable standby letter of credit of equivalent value from a commercial bank, a bank guarantee or a surety bond callable upon demand, issued by a surety or insurance company duly licensed by the Insurance Commission and confirmed by the Procuring Entity. The advance payment shall be repaid by the Contractor by deducting fifteen percent (15%) from his periodic progress payments a percentage equal to the percentage of the total contract price used for the advance payment. The contractor may reduce his standby letter of credit or guarantee instrument by the amounts refunded by the Monthly Certificates in the advance payment.

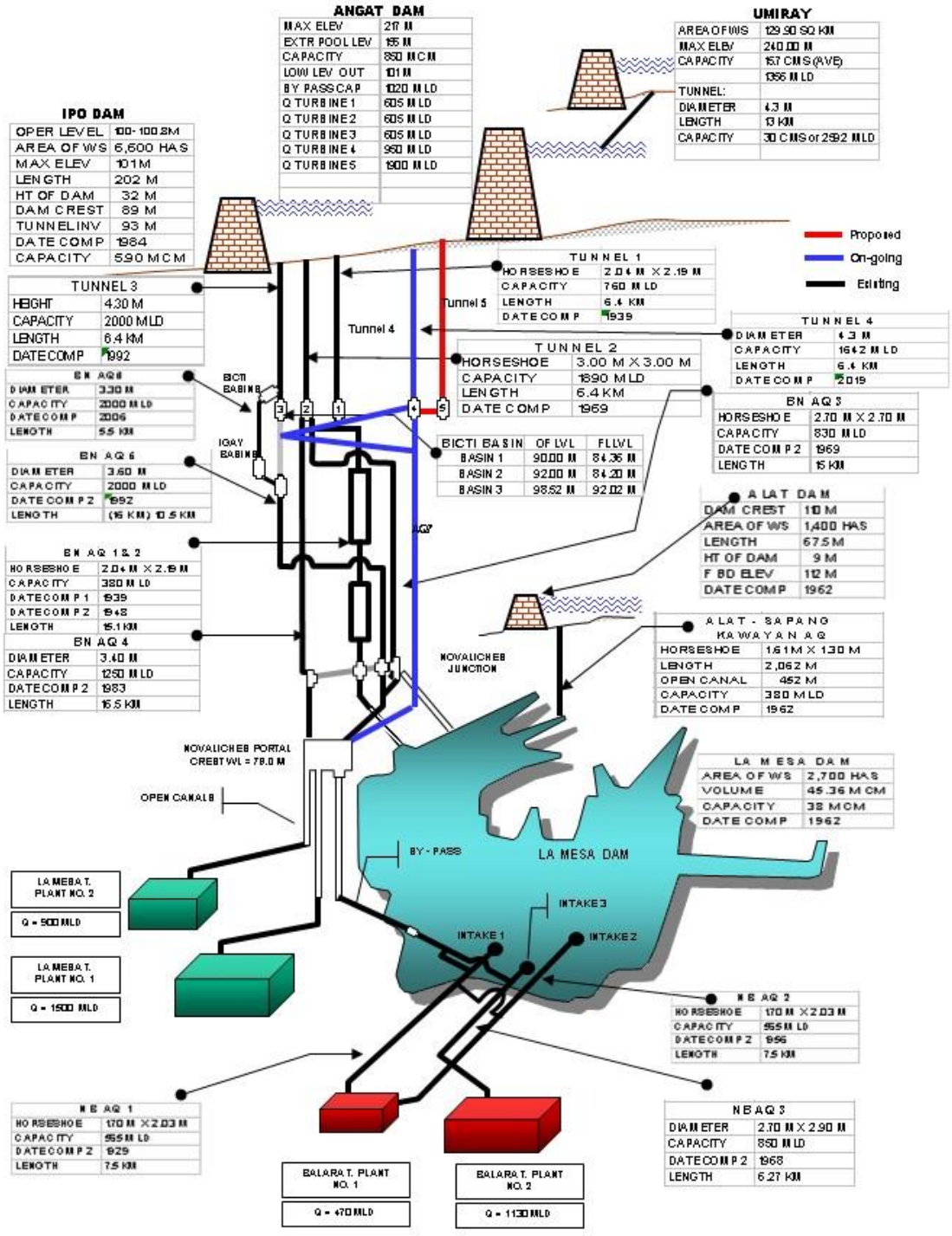
2. Milestone Billing	• **15%** - Upon submission and acceptance of detailed design documents (i.e. drawings, technical specifications, installation methodology, etc.). • **20%** - Upon submission of original copy of the Bill of Lading. • **40%** - Upon complete installation of all the unit.
3. Final Payment	**10%** of Total Contract Amount. Payment shall be of the following: i. Upon complete Testing and Commissioning ii. Upon submission of the approved Final report and As-Built Drawings pursuant to the required deliverables of this Terms of Reference. iii. Upon rectification of defects noted during punch listing and Issuance of Final Acceptance by MWSS.

To assure performance of the Obligations in the Warranty Clause, Retention money equivalent to five percent (5%) shall be deducted from each billing pursuant to Section 62.2 of the Revised IRR of RA 9184. This will be released after expiration of the warranty period.

O. RESERVATION CLAUSE

The MWSS-CO reserves the right to reject all bids, declare a failure of bidding, or not award the contract at any time prior to contract award in accordance with Section 41 of RA 9184 and its IRR, without thereby incurring any liability to the affected bidder or bidders. In addition, MWSS reserves the right to disapprove any of the team member/s nominated prior to award. Reason for disapproval shall be made clear to the bidder. The bidder shall nominate an equally capable team member to be approved by MWSS. Any changes in the project team members, after the contract has been awarded shall be formally communicated to Manila Water for approval.

ANNEX A: MWSS WATER SOURCE



CPF HEADWORKS SCHEMATIC DIAGRAM

As of July 2019

SSL