

ANNEX B
MCWD WATER QUALITY STANDARDS

Mandatory Parameters

	Maximum Allowable Level (MAL) (mg/Li)	Raw Water Source	Injection Point
1 Total Coliform	MTFT: <1.1 MPN/100 mL EST: Absent or <1 MPN/100 mL MFT: <1 total coliform colonies/100 mL		●
2 Thermotolerant Coliform(E.Coli)	MTFT: <1.1 MPN/100 mL EST: Absent or <1 MPN/100 mL MFT: <1 thermotolerant coliform colonies/100 mL	-	●
3 Heterotrophic Plate Count (HPC)	<500 CFU/mL		●
4 Arsenic	0.01 mg/L	●	○ ●
5 Cadmium	0.003 mg/L	●	○ ●
6 Lead	0.01 mg/L	●	○ ●
7 Nitrate	50.00 mg/L	●	○ ●
8 Color, apparent	10 CU	●	○ ●
9 Turbidity	5 NTU		○ ●
10 pH	6.5-8.5	●	○ ●
11 Total Dissolved Solids	600 mg/L	●	○ ●
12 Disinfection Residual (Res Cl ₂)	1.0-1.5 mg/L	-	●
13 Langelier Saturation Index (LSI) – for RO Water	plus/minus (±) 1.0	-	●

Primary Drinking Water Quality Parameters

	Maximum Allowable Level (MAL) (mg/Li)	Raw Water Source	Injection Point
1 1,2-Dibromo-3-chloropropane (DBCP)	0.001 mg/L	-	○ ●
2 1,2-Dichlorobenzene	1.0 mg/L	-	○ ●
3 1,2-Dichloroethane	0.03 mg/L	-	○ ●
4 1,2-Dichloroethene	0.05 mg/L	-	○ ●
5 1,4-Dichlorobenzene	0.3 mg/L	-	○ ●
6 2,4,6-Trichlorophenol	0.2 mg/L	-	○ ●
7 Acrylamide	0.0005 mg/L	-	○ ●
8 Aldrin and Dieldrin	0.00003 mg/L	-	○ ●
9 Alpha Particles	0.5 Bq/L	-	○ ●
10 Atrazine	0.1 mg/L	-	○ ●
11 Antimony	0.02 mg/L	-	○ ●
12 Barium	0.7 mg/L	-	○ ●
13 Benzene	0.01 mg/L	-	○ ●
14 Benzo(a)pyrene (PAHS)	0.0007 mg/L	-	○ ●
15 Beta Particles	1.0 Bq/L	-	○ ●
16 Boron	2.0 mg/L	-	○ ●
17 Bromate	0.01 mg/L	-	○ ●

Prepared: Maria Helen V. Aragonés

Noted: Roel A. Panebio

Indorsed: Edgar D. Ortega

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18	Bromodichloromethane (BDCM)	0.06 mg/L	-	○	●
19	Bromoform	0.1 mg/L	-	○	●
20	Carbon Tetrachloride	0.004 mg/L	-	○	●
21	Carbofuran	0.007 mg/L	-	○	●
22	Chlorate	0.7 mg/L	-	○	●
23	Chlordane	0.002 mg/L	-	○	●
24	Chlorite	0.7 mg/L	-	○	●
25	Chloroform	0.3 mg/L	-	○	●
26	Chromium (Total)	0.05 mg/L	-	○	●
27	Cyanide(Total)	0.5 mg/L	-	○	●
28	Di(2-ethylexyl)phthalate	0.008 mg/L	-	○	●
29	Dibromochloromethane	0.1 mg/L	-	○	●
30	Dibromoacetone	0.07 mg/L	-	○	●
31	Dichloroacetate	0.05 mg/L	-	○	●
32	Dichloroacetonitrile	0.02 mg/L	-	○	●
33	Dichlorodiphenyltrichloroethane (DDT)	0.001 mg/L	-	○	●
34	Dichloromethane	0.02 mg/L	-	○	●
35	Endrin	0.0006mg/L	-	○	●
36	Epichlorohydrin	0.0004 mg/L	-	○	●
37	Ethylbenzene	0.3 mg/L	-	○	●
38	Ethylene Dibromide	0.0004 mg/L	-	○	●
39	Fluoride	1.5 mg/L	-	○	●
40	Glyphosate	1.0 mg/L	-	○	●
41	Lindane	0.002 mg/L	-	○	●
42	Manganese	0.4 mg/L	-	○	●
43	Mercury (Total)	0.001 mg/L	-	○	●
44	Monochloroacetate	0.02 mg/L	-	○	●
45	Nickel	0.07 mg/L	-	○	●
46	Nitrite	50.0 mg/L	-	○	●
47	Pendimethalin	0.02 mg/L	-	○	●
48	Radon	11.0 Bq/L	-	○	●
49	Sulfate	250 mg/L	-	○	●
50	Selenium	0.04 mg/L	-	○	●
51	Styrene	0.02 mg/L	-	○	●
52	Tetrachloroethene	0.04 mg/L	-	○	●
53	Trichloroacetate	0.2 mg/L	-	○	●
54	Toluene	0.7 mg/L	-	○	●
55	Total Trihalomethane	1.0 mg/L	-	○	●
56	Vinyl Chloride	0.003 mg/L	-	○	●

Prepared: Maria Helen V. Aragonés

Noted: Roel A Panebio

Indorsed: Edgar D. Ortega

ANNEX B
MCWD WATER QUALITY STANDARDS

Secondary Drinking Water Quality Parameters

	Maximum Allowable Level (MAL) (mg/Li)	Raw Water Source	Injection Point
1 Aluminum	0.2 mg/L	●	●
2 Chloride	250 mg/L	●	●
3 Copper	1.0 mg/L	●	●
4 Hardness	300 mg/L	●	●
5 Hydrogen Sulfide	0.05 mg/L	●	●
6 Iron	1.0 mg/L	●	●
7 Manganese	0.4 mg/L	●	●
8 Odor	No objectionable Odor	●	●
9 Sodium	200 mg/L	●	●
10 Taste	No objectionable Taste	●	●
11 Xylenes (Total)	0.5 mg/L	●	●
12 Zinc	5.0 mg/L	●	●

LEGEND:

- - daily
- - before start of the operation
- - once a year
- - annual for first 3 years / once every 3 years if the water shows undetectable levels (<MDL-method detection limit)
- - start of operation / Once every 5 years if the water shows undetectable levels (<MDL-method detection limit)
- - as needed upon request of MCWD

**Please refer to PNSDW 2017 for Method of Analysis*

Prepared: Maria Helen V. Aragonés

Noted: Reel A Panbio

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ANNEX C

ELECTROMAGNETIC FLOWMETER WITH GPRS

I. Specifications General Specification

1. The flowmeter shall measure water flow, totalized volume in a close conduit pipe in metric system of measurement (liters/hour, m³/hour, liters, m³)
2. The flowmeter shall measure water flow bi-directionally.
3. The flowmeter shall be a battery-powered electromagnetic flowmeter that will measure and monitor the water flowing through the meter continuously.
4. The flowmeter shall have internal data loggers which shall log the flow and pressure data continually and shall transmit the data via General Packet Radio Services (GPRS) communication periodically directly to file servers including a file server of MCWD where the data are stored, viewed, analyzed, and printed. The supply, delivery, installation, and maintenance of such equipment shall be shouldered by the BWS.
5. The BWS shall also provide the needed software, software configuration and the maintenance fees for the transmission of the data to the MCWD server where MCWD shall have access to production data and pressure profile 24 hours a day, seven days a week.

II. Flowmeter

1. The flowmeter size shall be 150mm (6") nominal diameter.
2. Maximum rated capacity ≥ 750 m³ per hour with an allowable error $=\pm 2\%$
3. Transitional flow rate ≤ 4 m³ per hour with an allowable error $= \pm 2\%$
4. Nominal flow rate ≤ 600 m³ per hour with an allowable error $= \pm 2\%$
5. Minimum rated capacity ≤ 2.5 m³ per hour with an allowable error $=\pm 5\%$
6. The flowmeter shall be a fullbore type design.
7. The flowmeter shall be of an electromagnetic induction type with no mechanical moving parts.
8. The flowmeter shall fully operate on an internal battery without need of any external power source.
9. The flowmeter power shall be supplied by an internal battery which shall last to at least five (5) years. It shall have at least two (2) batteries and two (2) backup internal batteries which shall automatically switch over whenever one battery loses power. A time of at least three (3) months to six (6) months shall be given to replace the dead battery before the second battery also loses power. The internal battery shall be available in the market and shall be easily replaceable on-site.
10. The flowmeter shall be made secure and compact with no external cabling or junction box that can be easily tampered with and immune to magnetic tampering.
11. The flowmeter shall be flange type with flange sizes and holes according to I.S.O. standards with pressure ratings up to not less than 1,600 kPa.
12. The flowmeter should be provided with proper grounding system and should be implemented accordingly.

III. Sensor

1. The flowmeter sensor shall be fully welded design to minimize risk of water ingress. The flow sensor shall be rated to IP 68 ingress protection and shall not have any electronic components within the sensor body.
2. The flow sensor material shall be made of carbon steel with corrosion resistant two-component epoxy coating. Corrosivity category C4 according to ISO12944-2.
3. The lining of the sensor in contact with water shall be made from suitable materials for potable water and can withstand pressures up to 1,600 kPa/232 psi and liquid temperature tolerance of up to at least 60°C or higher.
4. The flowmeter sensor shall be of compact type and directly coupled to the flowmeter converter forming one unit.
5. Straight length pipe requirement of the meter shall be ≤ 5 times the length of the nominal size of the flowmeter.

IV. Converter

1. The flowmeter converter shall be of a compact type with no external wirings and shall be rated to at least IP 67 for ingress protection.
2. The flowmeter converter shall come with an internal data logger to log flow rate, both positive and negative, and pressure continually. Logged data shall show date and time references.
3. Sampling interval for flow and pressure shall be user settable from 1 to 15 seconds. Data logging interval shall also be user settable between one to thirty minutes.
4. The pressure transducer where a hose can be fitted to take samples of pressure in the pipeline. The pressure measurements shall also be logged into the internal data logger of the flowmeter converter. Pressure range shall be between 0 to 200 kPa.
5. The flowmeter converter shall also come with a Liquid Crystal Display (LCD) display which shall display flow rate, totalized volume, battery levels, flow direction, positive totalized volume, negative totalized volume, net volume etc. All flow measurements and totalized volume shall have the corresponding units to avoid confusion.
6. The flowmeter converter shall come with an integrated keypad where meter settings can be keyed in. Protection codes shall also be available so that only authorized personnel can change the settings of the meter.
7. The battery level status of the meter shall also be monitored and transmitted to the data servers including that of MCWD. If a low battery level occurs an alarm shall be sent to data servers including that of MCWD in order that the operator can replace the battery in the presence of MCWD personnel.
8. The converter shall also come with a protection enclosure which can be locked using 2 different pod locks together. This box shall be so designed that no manipulation of the meter converter can be done without opening the two pod locks. This enclosure shall be suitable for outdoor installation and shall not disrupt any communications with the file server and other devices.
9. The converter must be so designed that the meter's calibration, accuracy, readings, and date-time signatures cannot be altered without MCWD knowing such changes. An alarm system shall be sent to MCWD file server if such changes are made.

V. Communication

1. The flowmeter shall come with an internal GSM/GPRS modem for data transmission via GPRS communication directly to file servers including a file server of MCWD where the data are stored, viewed, analyzed and printed. This data shall have time signatures. The data transmission shall be settable from 1 to 24 hours.
2. The data sent to file servers (including MCWD file server) shall include data from the flowmeter data loggers and shall display flow, totalized volume, pressure, battery levels and other alarms, with time and date signatures.
3. The data system shall come with an automatic data acquisition module that shall be responsible for all communications functions of the flowmeter. The data acquisition module shall automatically retrieve data to and from the flowmeter.
4. A calculation module shall be provided to automatically calculate relevant data on an hourly, daily, weekly and monthly basis and shall show graphs of data.
5. An alarm shall automatically be sent to the MCWD file server in the event that changes in meter settings are being done.

VI. Other Requirements

A. Technical Manual and Brochures

1. Technical brochure shall be provided, and demo software shall be provided for evaluation.
2. Operating manuals and maintenance manuals shall also be provided upon delivery of equipment.

B. Testing of Water Meter

1. MCWD shall test the water meter together with the meter provider for accuracy and functionality.
2. In the event that the meter fails the test, the BWS shall replace such meter with one that will comply with all the specification and requirements in this document.

C. Installation & Commissioning of Water Meter

MCWD reserves the right to supervise check the meter installation and shall approve or reject in accordance to the requirements of this specification.

D. Training

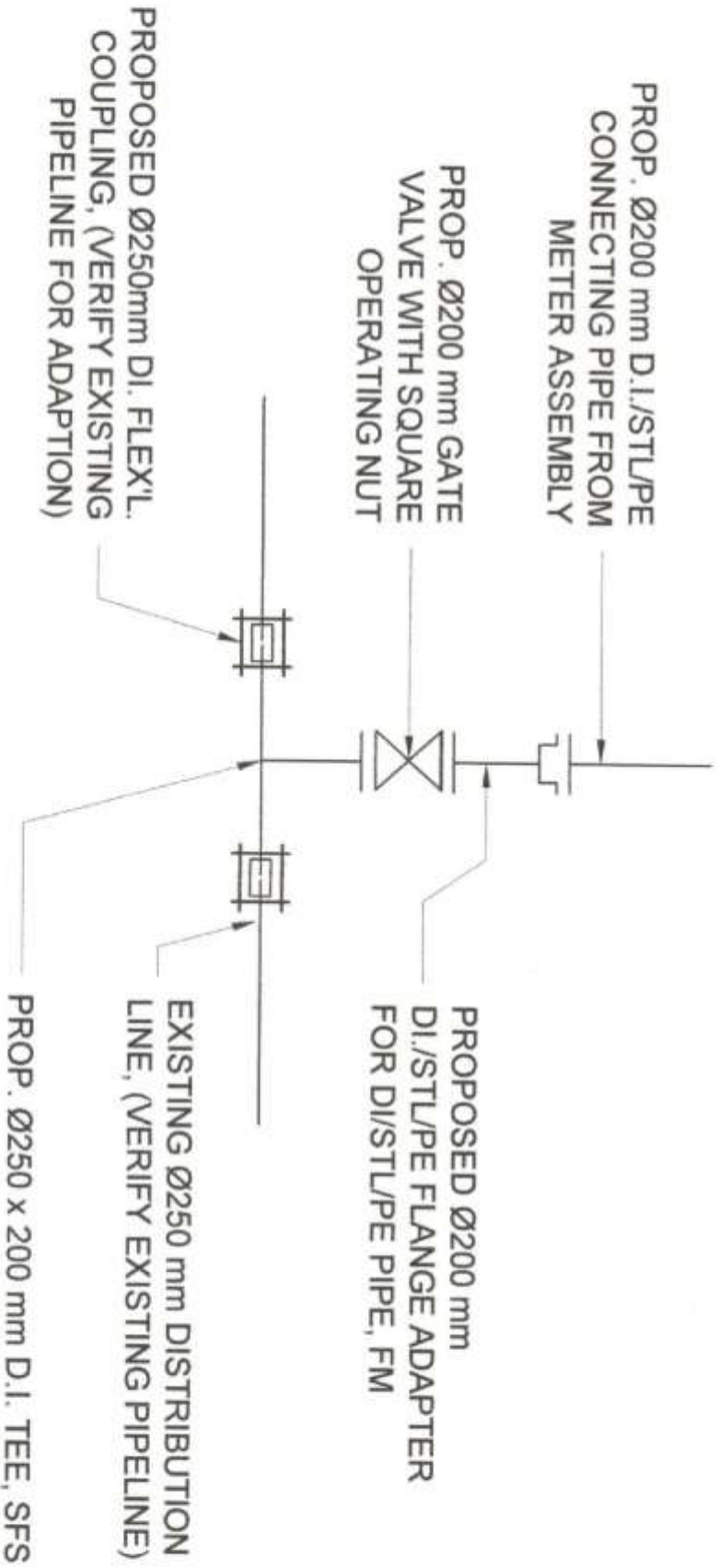
Training of at least 4 MCWD personnel must be conducted by the BWS for the proper operation and maintenance of the equipment and the use of the automatic data acquisition system software.

Prepared by:


JOSEPH Z. CABALLES
Manager, Water Meter Maintenance Division

Noted:


TOMMY L. GONZALEZ
Acting-Manager, PD



INTERCONNECTION DETAIL



Michael & Associates, Inc.
 MICHAEL ENGINEERING DEPARTMENT

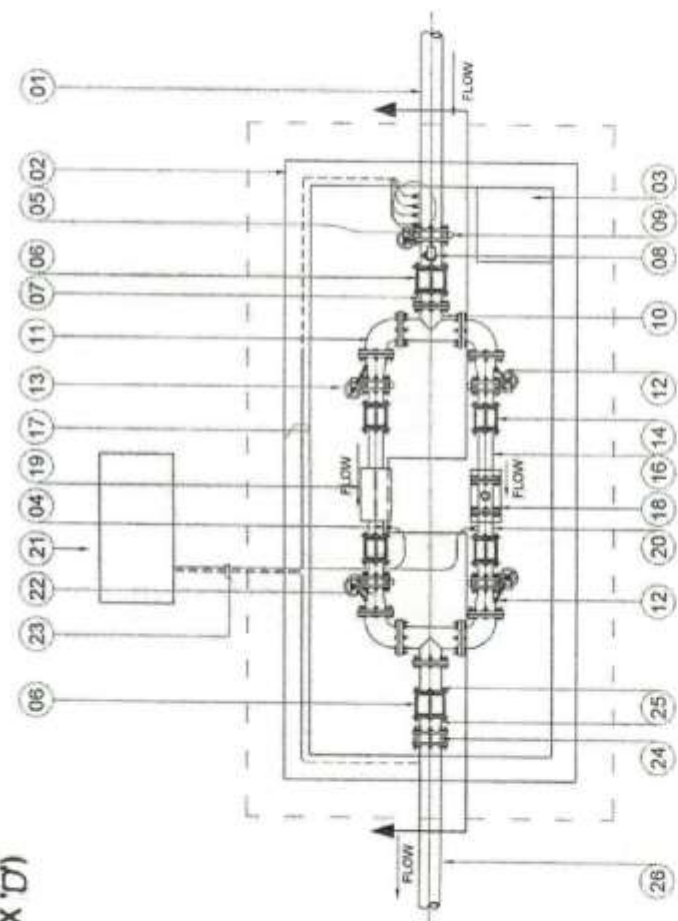
1500 West 10th Street, Suite 100
 Anchorage, Alaska 99501
 Phone: (907) 562-1234
 Fax: (907) 562-1235

Project No.: 1500 West 10th
 Date: 01/15/01
 Scale: AS SHOWN

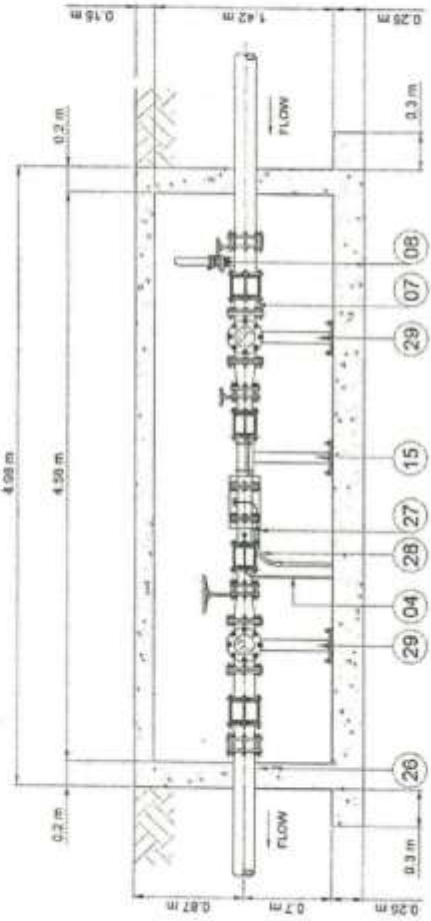
Author	Checked	Drawn

AMERICAN WATER SUPPLY
 INTERCONNECTION DETAIL

(ANNEX 'D')



PLAN
SCALE 1 : 25 METERS

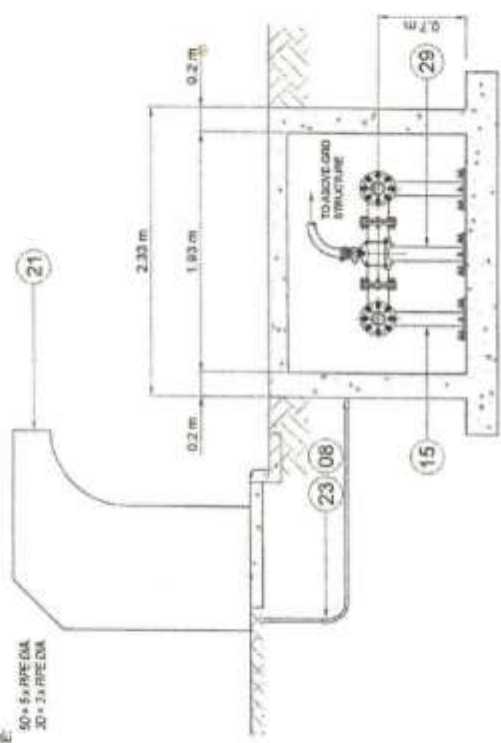


LONGITUDINAL SECTION
SCALE 1 : 25 METERS

LEGEND

01. PROPOSED Ø 200 mm SUPPLY LINE FROM SOURCE
02. PROPOSED REINFORCED CONCRETE VAULT WITH 12 IMPROVED C.I. ACCESS MANHOLE FRAME AND COVER, SEE DETAIL
03. 0.10 m SQR x 0.60 m DEEP SLUMP
04. PRESSURE MONITORING SENSOR PORT
05. WATER QUALITY MONITORING SENSOR PORTS
06. Ø 200 mm DUCTILE IRON FLEXIBLE COUPLING ASSEMBLY, STEEL TO STEEL CONNECTION
07. Ø 200 mm SCHED 40 G.I. FLANGE ADAPTOR, F5
08. 200 mm CORR STOP IN 650 mm Ø COUPLING & STUB PIPE
09. Ø 200 mm WAFER TYPE SEMI-LOG BUTTERFLY VALVE WITH HANDWHEEL (REFER TO SPECS)
10. Ø 200 mm DUCTILE IRON TEE, FF
11. Ø 200 mm x 60° DUCTILE IRON ELBOW, FF (TYPICAL OF 4)
12. VALVE SECURITY AND LOCKING DEVICE, TYPICAL ON ALL VALVES INSIDE THE VAULT (SEE DETAIL ON SHIT #3)
13. Ø 150 mm D.I. FLEXIBLE COUPLING ASSEMBLY FOR STEEL CONNECTION (TYPICAL OF 4)
14. METER SUPPORT (TYPICAL OF 2, SEE DETAIL)
15. Ø 150 mm x 0.75 m 50 UPSTREAM FLOW STRAIGHTENER SPOOL (0.1 SCHED. 40 H.G.I.) F5 (TYP OF 2)
16. Ø 150 mm FULL BORE ELECTROMAGNETIC FLOWMETER (SHOWN WITH NO ENCASEMENT), TYP. OF 2 (SEE SPECIFICATIONS)
17. CABLE LINES FROM DATA PORTS & FLOWMETERS IN Ø 63 mm PVC CONDUIT
18. FLOWMETER FABRICATED METAL CASING WITH LOCK, (TYPICAL OF 2, SEE DETAIL)
19. Ø 150 mm x 0.45 m 30 DOWNSTREAM FLOW STRAIGHTENER SPOOL (0.1 SCHED. 40 H.G.I.) F5 (TYP. OF 2)
20. PROPOSED ABOVE-GROUND FLOWMETER-TRANSMITTER STRUCTURE, SEE DETAIL (LOCATION FOR ACTUAL VERIFICATION)
21. Ø 200 mm x 150 mm DUCTILE IRON REDUCER, FF (TYPICAL OF 4)
22. TRANSMITTER & PRESSURE MONITORING CABLES IN Ø 63 mm PVC CONDUITS TO ABOVE-GROUND CONTROL STRUCTURE
23. Ø 200 mm WAFER TYPE 50MM CHECK VALVE
24. Ø 200 mm G.I. FLANGE ADAPTOR, F5, (TYPICAL)
25. Ø 200 mm PIPE TO INJECTION POINT
26. Ø 20 mm (1") PVC ELECTRICAL MALE THREADED ADAPTOR WITH LOCKWUT, TYPICAL
27. Ø 20 mm (1") PVC ELECTRICAL CONDUIT WITH 90° ELBOW, TYPICAL
28. TEE SUPPORT, (TYPICAL OF 2, SEE DETAIL)
29. 150 PSI CAPACITY OIL-FILLED PRESSURE GAUGE WITH SHIMMER AND BALL VALVE

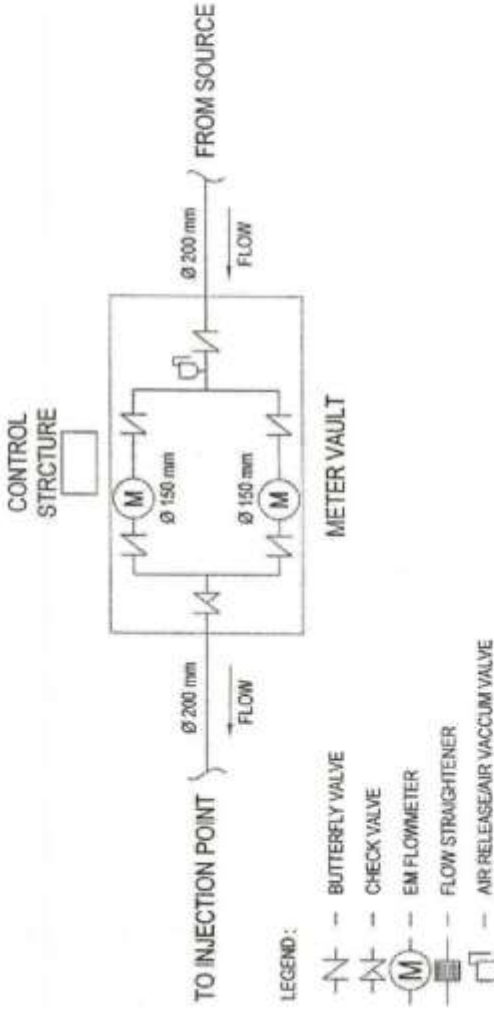
NOTE:
50+ 5x/REDA
20+ 2x/REDA



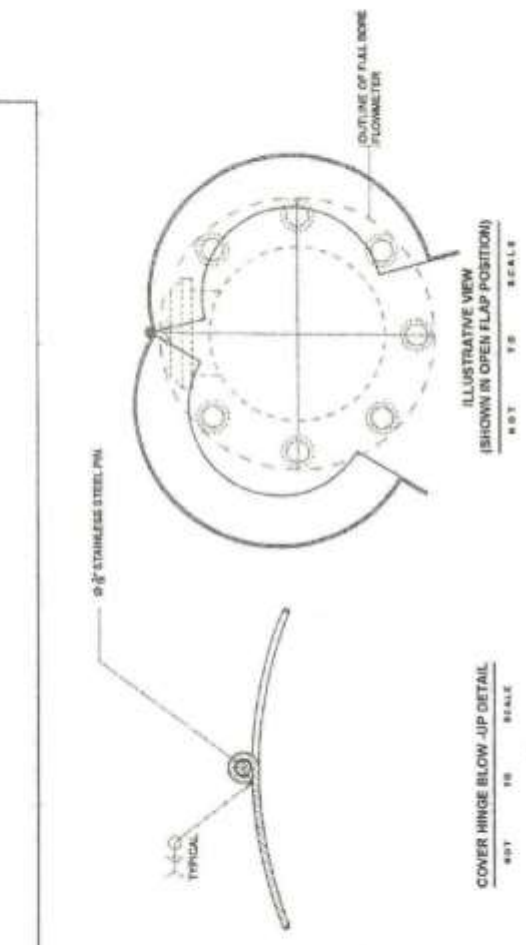
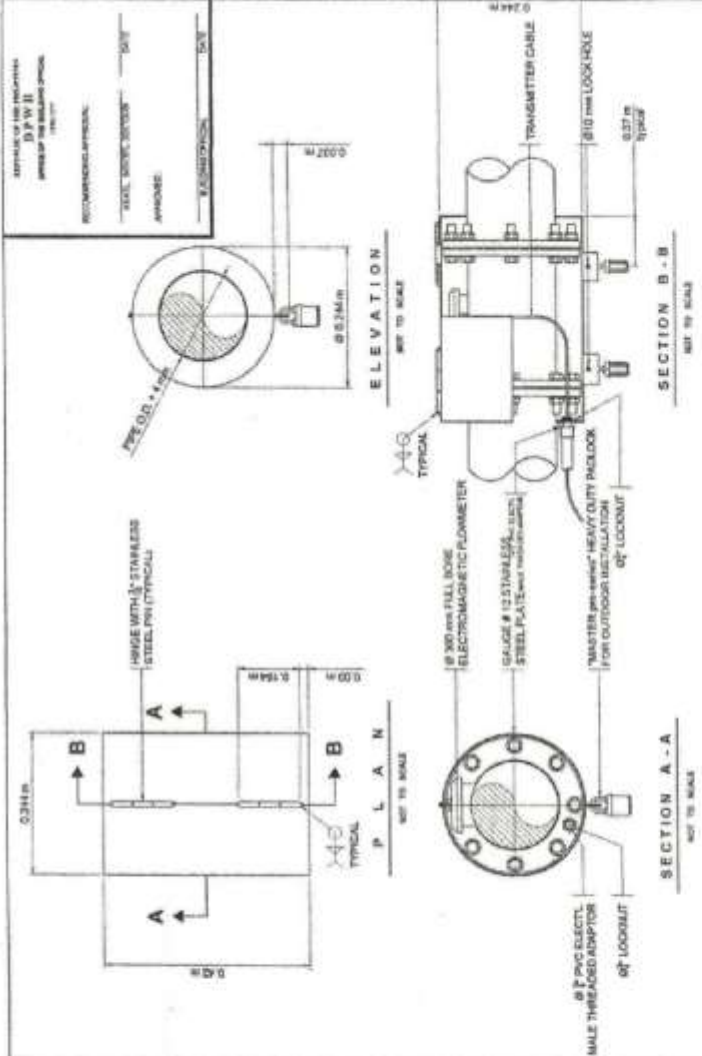
CROSS SECTION
SCALE 1 : 25 METERS

		PROJECT NO: _____ DATE: _____ DRAWN BY: _____ CHECKED BY: _____		SHEET NO: _____ OF _____	
PROJECT TITLE: _____ LOCATION: _____		CLIENT: _____ ADDRESS: _____		SHEET NO: _____ OF _____	
PROJECT NO: _____ DATE: _____ DRAWN BY: _____ CHECKED BY: _____		PROJECT TITLE: _____ LOCATION: _____		SHEET NO: _____ OF _____	
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(ANNEX 'D')

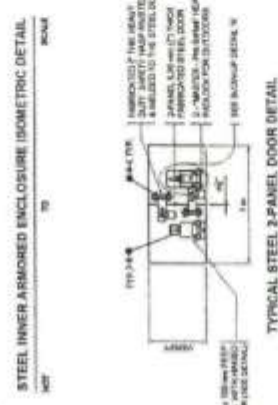
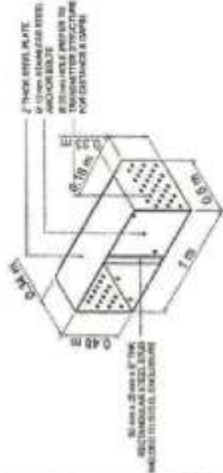
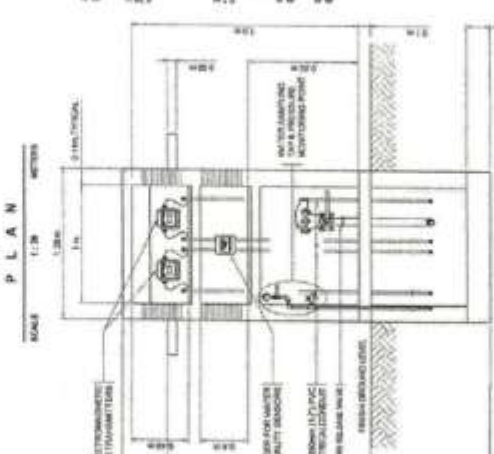
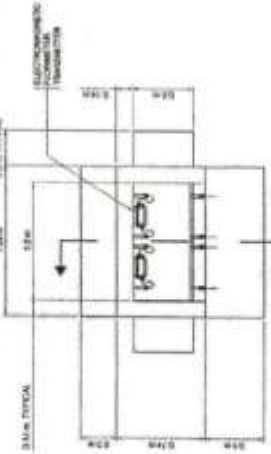
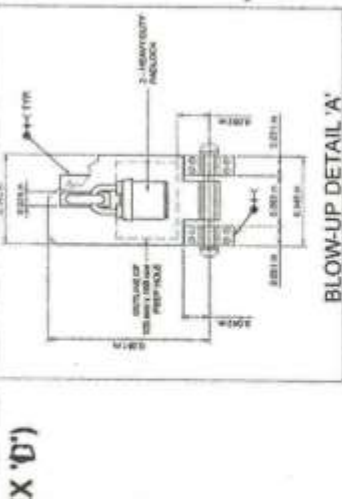


SCHEMATIC DIAGRAM



 MCD ENGINEERING DEPARTMENT PROJECT NO. _____ DRAWN BY: _____ DATE: _____ CHECKED BY: _____ DATE: _____	SHEET NO. 03 / 04 PROJECT TITLE: GUADALUPE BULK WATER SUPPLY PROJECT DRAWING TITLE: VALVE SECURITY LOCKING DEVICE SCALE: AS SHOWN	CLIENT: Albuquerque Water Works ADDRESS: _____ DATE: _____ PROJECT NO.: _____ DRAWING NO.: _____ SHEET NO.: _____	PROJECT NO. _____ DRAWING NO. _____ SHEET NO. _____ SCALE: _____
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(ANNEX 'D')



ABOVE GROUND TRANSMITTER STRUCTURE

MCDW ENGINEERING DEPARTMENT
 PROJECT: BELONG & MDC
 DATE: JAN 28, 2006
 DRAWN BY: [Signature]
 CHECKED BY: [Signature]

NO.	REV.	DATE	DESCRIPTION

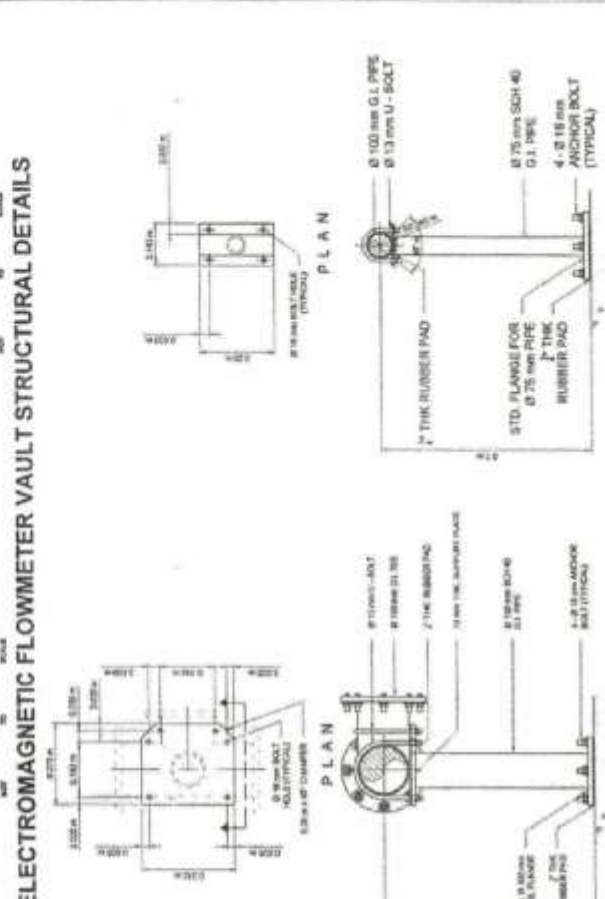
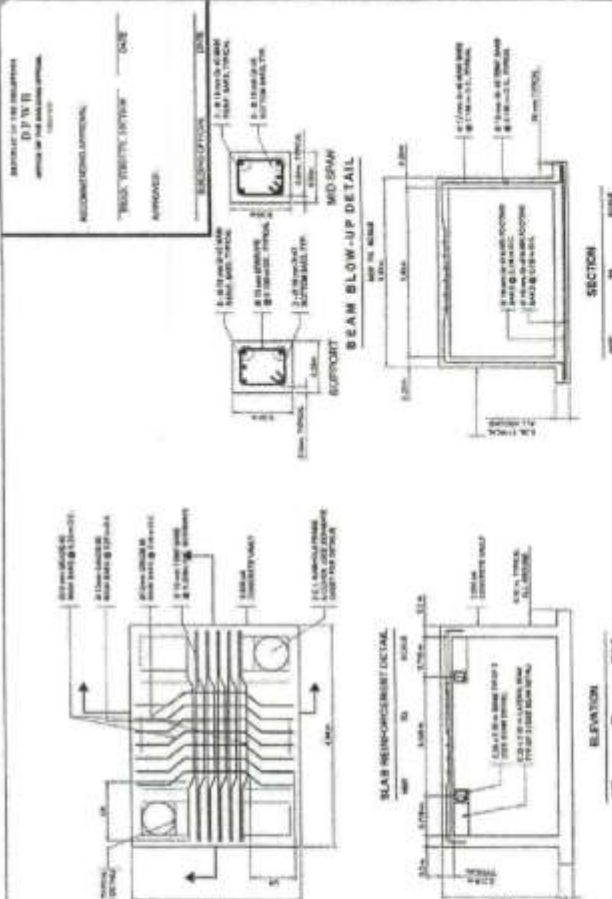
NO.	REV.	DATE	DESCRIPTION

Michaelson Water Works District
 CONTRACT NO. 113-03-0001
 PROJECT: GUADALUPE BULK WATER SUPPLY PROJECT
 LOCATION: BERRAZOBA ROAD ST. LINDAUR, CO. 1079

NO.	REV.	DATE	DESCRIPTION

SCALE: 1:10	SECTION: TYPICAL TEE SUPPORT DETAIL	SCALE: 1:10	SECTION: TYPICAL METER SUPPORT DETAIL

04	04
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MCDW ENGINEERING DEPARTMENT
 PROJECT: BELONG & MDC
 DATE: JAN 28, 2006
 DRAWN BY: [Signature]
 CHECKED BY: [Signature]

ANNEX E
PRESSURE TRANSDUCER

PRESSURE TRANSDUCER 0-50psi, 0-100psi, 0-150psi, 0-200psi. Item codes: 398PT50, 398PT100, 398PT150, 398PT200

This specification calls for the supply and delivery of Pressure Transducer for Metropolitan Cebu Water District. It shall be used on heavy duty applications.

The quotation shall enclose complete technical brochures which shall include:

1. The unit description, application, and benefits.
2. Maintenance manual.
3. Establishment of office for Engineering Support or Services with the Cebu.
4. Proof of experience (track record) in supplying similar products.
5. Certificate of authorized distribution from the manufacturer.
6. Manufacturer shall be ISO and OHSAS certified.

All these are necessary for the evaluation of the quoted items and therefore are part of the bid.

Technical Specifications:

The Pressure Transducer is a type of pressure sensor for use in instrumentation and control applications. It measures pressure thru a diaphragm sensing element, which changes its electrical resistance in accordance to the pressure. It is ideal for liquid pressure measurement particularly in discharge lines and pipes, where it can be interfaced with a PLC system or a digital display panel indicator thru the standard 4-20mA instrumentation current loop.

The transducer shall operate on a continuous, heavy-duty application. It should be similar to "Endress+Hauser Cerabar T" or equivalent.

Specifications:

Field of application	Absolute/Guage Pressure
Measuring Range	(0 - 50psi)
	(0 - 100psi)
	(0 - 150psi)
	(0 - 200psi)
Maximum Working Pressure	27.57 bar (400psi)
Supply Voltage.....	11 - 30V DC
Output Signal (Analog).....	Current 4 - 20mA
Electrical Connection.....	2 - wire (loop-powered)
	with 5 meters, shielded 2-core cable
	#20-24 AWG with separate ground wire

Process Connection (Thread) ½ NPT
Process Temperature Range..... (-20 to +100°C)
Ambient Temp. Range..... (-20 to +85°C)
Degree of Protection IP68 / NEMA6P
Long term Stability..... ≤ 0.15% of URL per year

Warranty and Repair

The supplier shall guarantee the Pressure Transducer against fault of materials or manufacture workmanship for a period of not less than 12 months. Extended warranty beyond one year is welcomed.

The supplier shall guarantee to provide servicing support, repair and replacement for the Pressure Transducer for a period of not less than 5 years.

Prepared by:


DARWIN A. DURAN
Manager, Electro-Mechanical Division

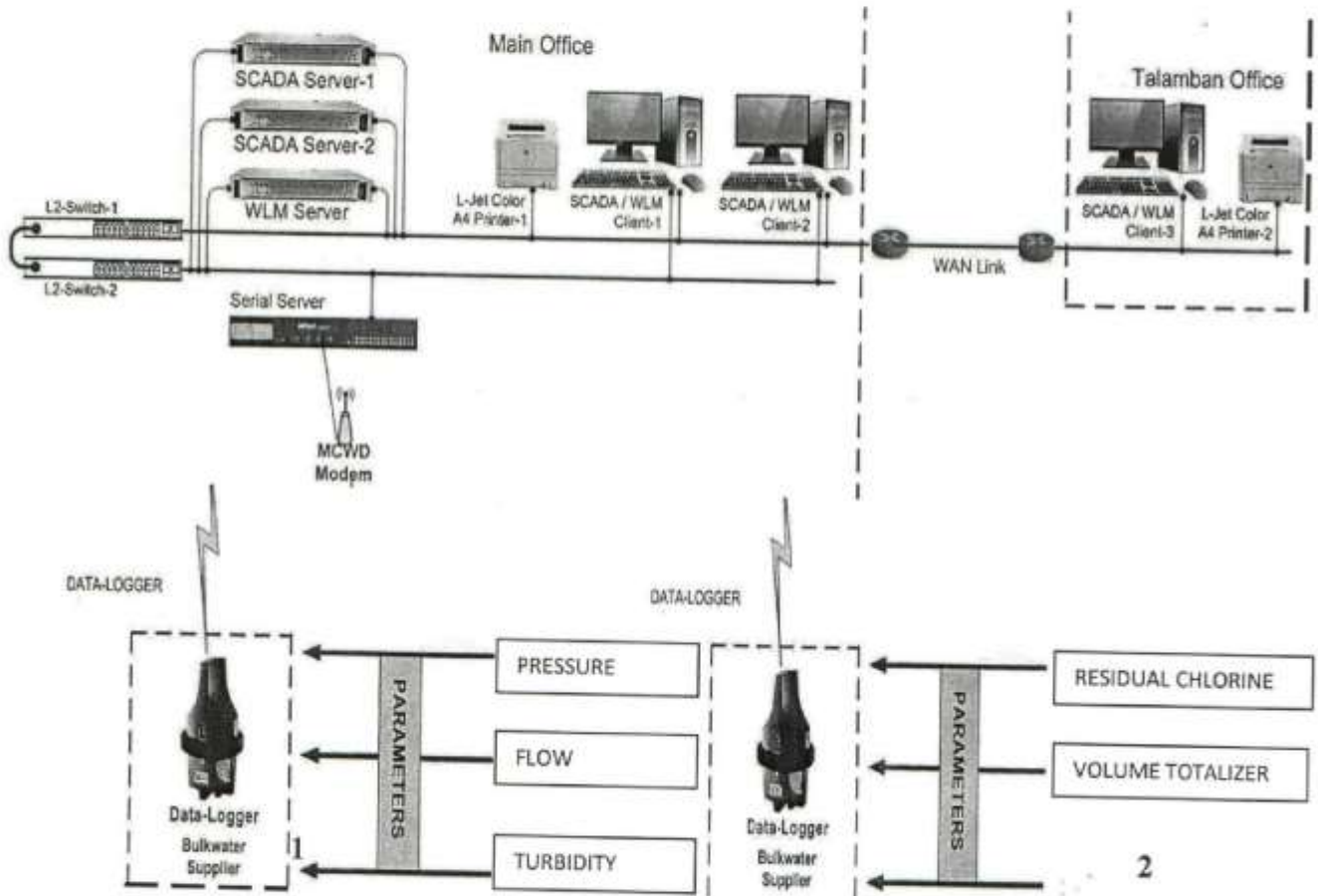
Noted:


TOMMY L. GONZALEZ
Acting Manager, PD

Indorsed:


EDGAR D. ORTEGA
Acting-AGM for Operations

ANNEX F SCADA MONITORING SYSTEM



Prepared by:

ARVIN JOHN M. JALUAGUE
Manager, Water Production Division

Noted:

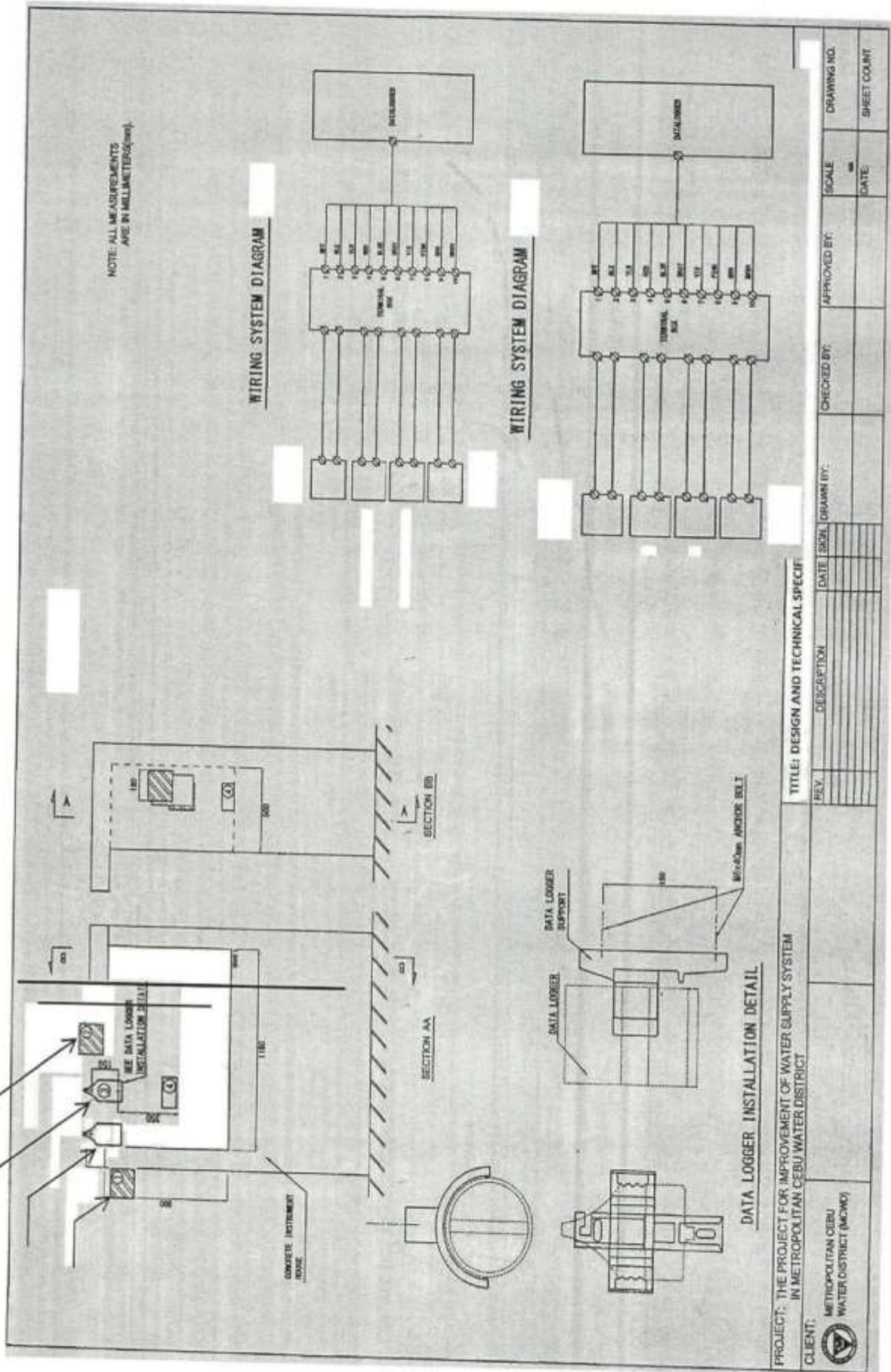
TOMMY L. GONZALEZ
Acting-Manager, PD

Indorsed:

EDGAR D. ORTEGA
Acting-AGM for Operations

ANNEX F

SCADA MONITORING SYSTEM CONFIGURATION



TITLE: DESIGN AND TECHNICAL SPECIF

REV.	DESCRIPTION	DATE	SKD.	DRWN.	BY:	CHECKED BY:	APPROVED BY:	SCALE	DRAWING NO.

PROJECT: THE PROJECT FOR IMPROVEMENT OF WATER SUPPLY SYSTEM
IN METROPOLITAN CEBU WATER DISTRICT

CLIENT: METROPOLITAN CEBU WATER DISTRICT (MCHWD)

DATE: _____ SHEET COUNT: _____

OPTION 2: PROVIDE COMPUTER SET TO BE INSTALLED IN MCWD SCADA ROOM

Computer Specifications for SCADA Monitoring System

Type: Black Branded Desktop
Processor: Intel i9 10th generation or more
Memory: 16 GByte
Storage : 1TB SSD + 1TB HDD
Graphics: At least 2GByte Video Card
OS: Windows 11 PRO
Monitor: 32 inch LED
Keyboard: Black same brand with CPU
Mouse : PS2 Black same brand with CPU
UPS: 650 VA

Software Specifications for SCADA Monitoring System

Productivity Software: License Microsoft Office 2019 Standard Edition
Communication Software: Software that will receive and process data from remote location and can be converted to CSV File (i.e. PCWin)

Prepared by:


ROMMEL CYRIL V. YU
Manager, ICTD

Noted:


TOMMY D. GONZALEZ
Acting-Manager, PD

Indorsed:


EDGAR D. ORTEGA
Acting-AGM for Operations


ANNEX G
PROTOCOL ON WATER QUALITY

PROTOCOL ON WATER QUALITY
FOR WATER SUPPLY FROM MCWD BULK WATER SUPPLIERS

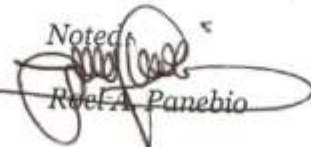
General Protocol:

1. MCWD Water Quality Laboratory shall be the official laboratory to undertake the required tests as per MCWD Standards for Drinking Water. Expenses will be charged to the Bulk Water Supplier (BWS).
2. The BWS however, may hire an independent laboratory to conduct a separate water quality testing but the findings thereof shall be for its own consumption and interest only.
3. Should the BWS contest any test result performed by MCWD, the issue shall be resolved through a Third-party Laboratory (TPL) applying the specific protocol herewith elaborated per specific parameters.
4. The Third-party Laboratory (TPL) shall be chosen by both MCWD and the BWS. For this contract, the TPL shall be the USC Water Laboratory (USCWL).
5. This protocol shall be supplementary to the provisions of the water supply contract between MCWD and the BWS. Provisions in the original contract specifically on the water quality shall remain in full force and effect.
6. Standard procedures stipulated in the MCWD Standards for Drinking Water for sample collection, handling, transport, storage and testing shall be observed and shall prevail should any provision in this protocol contradicts the same.
7. Specific protocols on certain parameters herewith elaborated may be applied to other parameters whenever practicable.
8. From a shutdown, acceptance of the water supply shall only be done after the same has been found compliant to the specific parameter/s it has failed. In addition, the residual chlorine and turbidity requirements on the day of the acceptance must also be complied with.
9. Random checking of water quality (turbidity) shall be conducted at least once a week by WQCD.
10. MCWD shall not be made to pay for any loss of opportunity to supply water during the stoppage where results from MCWD and the TPL differ. In the same manner, for that period of stoppage, the BWS is

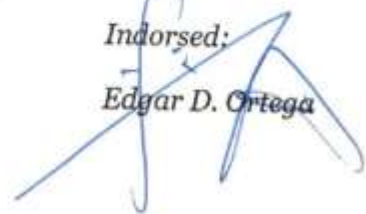
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ANNEX G
PROTOCOL ON WATER QUALITY

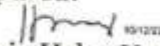
considered having delivered the equivalent volume of supply for the contractual volume delivery per day computation.

Specific Protocol on Certain Parameters:


A. On Turbidity:

1. Turbidity tests are determined thru a real time monitoring instrument which should be compatible with the existing MCWD SCADA system.
2. In instances wherein the turbidity reading deviates from the standard, as determined by the SCADA system, MCWD shall immediately inform the BWS so by then, both parties shall immediately go to the injection point for onsite testing.
3. Testing shall be conducted by representatives of both MCWD and BWS and duly recorded and signed.
4. Water from a particular source subject to testing shall be collected first using a one-liter container. Water sample which shall undergo actual testing shall be taken from this container and not directly from the source.
5. If the test conducted by MCWD yields a result of more than 5 NTU, and the BWS contests such result, another sample shall be taken from the same container. Said sample shall be sealed, signed by both parties and endorsed to the BWS representative for testing at the USCWQL. The latter shall not accept sample with tampered or broken seal.
6. The result of the test conducted by the USCWQL shall be final.
7. However, pending the USCWQL test result, the BWS shall perform remedial measures to address the turbidity problem and shall request MCWD representative for another testing when the water quality improves.
8. No water supplied by WATER SUPPLIER shall be accepted until it possesses the standard set for turbidity
9. The MCWD representative will do the next testing on a best effort rule taking into consideration all workloads. The resampling shall observe the same protocol and procedures provided hereof.
10. Penalty shall be imposed for the period between the failed and passed turbidity tests. If the USCWL yielded a similar failed result

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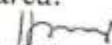

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C. On Total Coliform (Non-fecal):


1. Not more than 5% of the total samples per month per injection point shall fail in this parameter. Since Total Coliform testing is undertaken daily, 30 samples shall be collected per month per injection point. Since 5% of 30 samples is 1.5 samples, MCWD hereby specifies that not more than one sample shall fail per month per injection point. No penalties shall be imposed by reason of the first failed sample provided however, that for the two (2) days prior to the day the sample failed, the subject source pass both the residual chlorine and turbidity tests.
2. Penalties shall be imposed on succeeding failures/s within the same month.
3. Since test results on this parameter come out 18 hours to 5 days after, resampling therefore is not acceptable as the water samples by then will not be representative of the subject water supply volume. Simultaneous testing by the TPL, the USCWL, with that of the daily testing by MCWD is thus, recommended.
4. For clarification, resampling hereof means testing at a later time or date which is aimed at confirming/validating the findings of the original test. This is different from simultaneous testing which are acceptable as the tests will use the water samples obtain at the same time.
5. Testing therefore can either be by MCWD alone or simultaneously with the TPL, the USCWL.
6. Official tests shall be in the laboratory using water samples collected at the same time both by MCWD and BWS representatives and duly recorded, signed and sealed. Only one sample is to be collected if it is only MCWD to do the test. Otherwise, two samples are to be taken for both MCWD and the TPL.
7. Should the BWS opt not to avail the services of a TPL, then MCWD test result shall be final.
8. If the BWS opts to avail the services of the TPL, the sealed and signed 2nd sample will be endorsed to the BWS representative for testing at the USCWL. The latter shall not accept sample with tampered or broken seal.
9. The result of the test conducted by the USC Water Quality Laboratory shall prevail and settles the issue with finality.

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10. Successive sample failures for two (2) days allows MCWD to call for a shutdown following standard procedure.

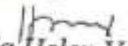
D. On Coliform (Fecal):

1. There is no percentage of sample allowed to fail in any injection point. Penalties and shutdown are imposed immediately upon non-compliance.
2. When the MCWD test shows that the sample is positive of Fecal Coliform, MCWD shall refuse the water supply and shall order immediate stoppage thereof following standard procedure. If a corresponding TPL test reveals a result within the allowable limit, water supply will be allowed to resume immediately.
3. For critical parameters like this one, the 18-hour chromogenic substrate or the 24-hour membrane filter test is advisable.

E. On Nitrate:

1. Since test results on this parameter come out few hours or even days after, resampling therefore is not acceptable as the water samples by then will not be representative of the subject water supply volume. Simultaneous testing by the TPL, the USCWL, with that of the daily testing by MCWD is then recommended.
2. For clarification, resampling hereof means testing at a later time or date which is aimed at confirming / validating the findings of the original test. This is different from simultaneous testings which are acceptable as the tests will use the water samples obtained at the same time.
3. Testing therefore can either be by MCWD alone or simultaneously with the TPL, the USCWL in case of dispute.
4. Official tests shall be in the laboratory using water samples collected at the same time both by MCWD and BWS representatives and duly recorded, signed and sealed. Only one sample is to be collected if it is only MCWD to do the test. Otherwise, two samples are to be taken for both MCWD and the TPL.
5. Since test results, if so desired, can actually be obtained within a few hours, another testing, if the first testing for the day fails, can be requested by the BWS within the same day after the same has conducted remedial measures to address the problem. Protocol on such re-testing as stipulated under turbidity shall be followed.

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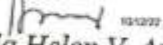

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6. Should the BWS opt not to avail the services of a TPL, MCWD test result shall be final.
7. If the BWS opts to avail the services of the TPL, the sealed and signed 2nd sample will be endorsed to the BWS representative for testing at the USC Quality Control Laboratory. The latter shall not accept sample with tampered or broken seal.
8. The result of the test conducted by the USC Water Laboratory shall prevail and settles the issue with finality.
9. When the MCWD test shows a nitrate reading higher than the allowable level of 50 mg/Li, MCWD may refuse the water supply and may order immediate stoppage thereof following standard procedure. If a corresponding TPL test reveals a result within the allowable limit, water supply will be allowed to resume immediately.
10. MCWD shall not be made to pay for any loss of opportunity to supply water during the stoppage where results from MCWD and TPL differ. Likewise, the BWS will not be penalized for under delivery for that particularly period.
11. Since test results, if so derived, can be actually be obtained within a few hours, another testing, if the first testing for the day fails, can be requested by the BWS within the same day after the same has conducted remedial measures to address the nitrate problem. Protocol on such re-testing as stipulated under turbidity shall be followed.

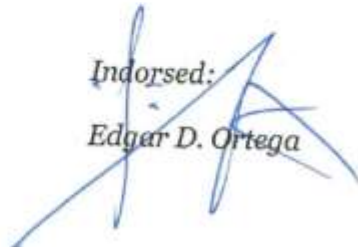
E. On Langelier Saturation Index (LSI)

1. Langelier Saturation Index acceptable range is **Negative One to Positive One**. This revises the Zero to Positive One range stipulated in Annex A: MCWD Standard for Water Quality.
2. For continuous non-compliance for 2 consecutive days, MCWD may opt for a shutdown.

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ANNEX H
PROTOCOL ON METERING and MEASUREMENT OF BULK WATER SUPPLY

1. BWS shall install full-bore electromagnetic bulk water meters with accessories at injection point and drop-off point specification indicated at Annex A. The basis to measure the actual volume of potable bulk water delivered to MCWD will be the aggregate volume of the injection point and drop-off point(s) ("Billing Meters").
2. The readings on the Billing Meters shall be jointly conducted by the both parties within the first week of the succeeding month.
3. MCWD shall be able to monitor flow rate, totalizer reading, pressure, turbidity and residual chlorine to be transmitted every hour at the MCWD SCADA Control Center. All cost incurred in the transmission, interface, maintenance and replacement shall be borne by BWS. This monitoring system that will be provided by the BWS shall be compatible with the existing MCWD SCADA monitoring system, capable of transmitting through SMS/GPRS and other reliable means. However, regardless of the time, in instances when any of the parameters fail to comply with the allowable range set by both parties, the monitoring system shall trigger an alarm to MCWD's SCADA monitoring system. All cost incurred in the transmission of data to MCWD i.e., software, hardware, data loggers, GPRS transmission, etc. shall be borne by the BWS.
4. Anytime during commissioning period but prior to Day 1 of the commercial operations, the billing meters to be installed shall be represented by both parties for inspection. All the billing meters and spare meters shall be subjected to a testing laboratory agreed by both parties. Onsite Installation of meters shall be represented by both parties. After meter installation, a baseline variance between the installed parallel meters (and other possible combination meters) shall be established using the formula:

$$BV_{meter} = \frac{HR - LR}{HR} \times 100\%$$

Where:

BV_{meter} = *Baseline Variance*

HR = *Highest registered reading of the two meters*

LR = *Lowest registered reading of the two meters*

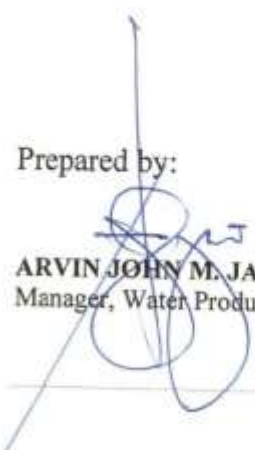
5. During Operations period, successive daily variance meter readings between the parallel meters shall be acceptable if it falls within the $\pm 5\%$ of the baseline variance. The baseline variance shall remain to be the reference unless any of the installed meters has been replaced by a different meter. If a meter has been replaced, a new baseline variance shall be established using the formula above.
6. If $[[Var]]_{actual} > [[\pm 5\% * BV]]_{meter}$, then any of the two parties shall notify the other party for a scheduled joint inspection. BWS shall investigate which of the two meters may have been inaccurate through historical readings and will be subjected to test bench by an agreed testing laboratory. The meter when pulled out for testing shall be replaced by a spare meter to be witnessed by both parties. If both of the 2 meters were found to be defective, then volume to be billed shall be the average consumption of the immediately preceding three (3) months.



Terms of Reference
Guadalupe Bulk Water Supply Contract

7. The BWS agrees to annually test the billing meters and provide the MCWD with a copy of the test results. BWS shall ensure meter is calibrated where the annual meter test shall require the presence of both parties to witness the dismantling, sealing of the meter and testing. In the event that the billing water meter failed the test bench, BWS shall bear the replacement of the billing water meter.
8. Either party may request to conduct a field counter-checking on the accuracy of the billing meters at any given time. A party may request the other party, within thirty days (30) from receipt of billing and at the cost of the requesting Party, for the conduct of additional or special accuracy test on the billing meter by a DOST accredited water meter testing laboratory to verify the accuracy of the billing meter and to ensure that the same meets the accuracy limit. If one (1) flowmeter is confirmed by the laboratory to be defective, the water delivered shall be measured on the basis of the non-defective water meter reading for the period. If both flowmeters are confirmed to be defective, the water delivered shall be based on the average of the immediately preceding three (3) months.
9. If joint investigation results show that there is no defect in the flow meter, billing shall be made based on the actual reading (less the volume delivered in excess of the specified hourly flow rates).
10. Any replacement of a defective flow meter shall be done within five (5) calendar days from the time a suspected defect was confirmed and shall be the responsibility and for the account of BWS.
11. Any protest for over- or under-registration or other defect in the flow meter shall be filed by either party within thirty (30) calendar days from receipt or submission of the subject bill. Failure to protest on time waives the right to seek adjustment of the billed amount.


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