

Sponsored by: Lindsey

**CITY OF MARATHON, FLORIDA
RESOLUTION 2020-07**

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MARATHON, FLORIDA, APPROVING A CONTRACT WITH MKI SERVICES, INC. FOR A KUBOTA BIOREACTOR MEMBRANE UPGRADE FOR THE SERVICE AREA 5 WWTP IN AN AMOUNT NOT TO EXCEED \$519,000.00; AUTHORIZING THE CITY MANAGER TO ISSUE THE CONTRACT AND TO APPROPRIATE AND EXPEND BUDGETED FUNDS ON BEHALF OF THE CITY; AND PROVIDING FOR AN EFFECTIVE DATE

WHEREAS, the City of Marathon (the “City”) Purchased the Service Area 5 (Little Venice) wastewater treatment facility, and

WHEREAS, the City continues to upgrade the facility in order to comply with all FDEP permit requirements, and

WHEREAS, the City staff wishes to award a contract to MKI Services, Inc. for upgrading the bioreactor membranes to the original Kubota design in an amount not to exceed \$519,000.00.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF MARATHON, FLORIDA, THAT:

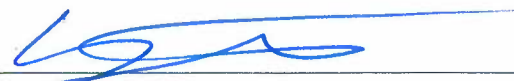
Section 1. The foregoing recitals are true and correct and are incorporated herein by this reference.

Section 2. The proposal from Kubota Membrane USA Corporation is attached.

Section 3. This resolution shall take effect immediately upon its adoption.

PASSED AND APPROVED BY THE CITY COUNCIL OF THE CITY OF MARATHON, FLORIDA, THIS 14th DAY OF January 2020.

THE CITY OF MARATHON, FLORIDA



Steve Cook, Mayor

AYES: Bartus, Gonzalez, Senmartin, Zieg, Cook

NOES: None

ABSENT: None

ABSTAIN: None

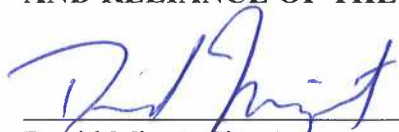
ATTEST:



Diane Clavier, City Clerk

(City Seal)

**APPROVED AS TO FORM AND LEGALITY FOR THE USE
AND RELIANCE OF THE CITY OF MARATHON, FLORIDA ONLY:**



David Migut, City Attorney

For Earth, For Life



Proposal for

Area 5 Wastewater Treatment Plant

Marathon, Florida



Membrane Bioreactor System

October 30, 2019



Prepared By:

Kubota Membrane USA

11807 North Creek Parkway S. Ste B-109

Bothell, WA 98011

425-898-2858

Local Representation By:

MOSS KELLEY, INC.

W. Ben McDorman

954-415-7411

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January 6, 2020



Mr. Saus,

I am pleased to present this proposal for consideration regarding the proposed Kubota membrane bioreactor (MBR) system for the Area 5 WWTP MBR project in the city of Marathon, Florida. Kubota Membrane USA is a company with a strong history in the U.S., backed by Kubota Corporation's extensive wastewater experience worldwide. Our Kubota MBR System brings unique features to save your client time and hassle. Most importantly, our product saves money over the life-cycle of the treatment system because of our high-quality membrane.

A compelling feature of the Kubota MBR System is the simplicity of daily operations and periodic maintenance. Both the membrane unit itself and the MBR system are designed for the operator's convenience. Cleaning is performed in place, with no routine membrane unit removal required. Cleaning events are performed two to four times per year, and each event can be completed in a matter of hours. Also, because the Kubota MBR System uses a flat sheet membrane, it offers straightforward troubleshooting and easy replacement in the unlikely event that problems arise.

Kubota Membrane USA offers first class service. Our technicians have operational experience and are well trained in wastewater analysis and membrane inspection. This sets us apart from other membrane manufacturers who do not design, build, or operate treatment plants, and system integrators who do not manufacture parts or operate plants. We are responsive to operator concerns and knowledgeable about the Kubota MBR System from top to bottom.

With the Kubota name comes a long history of excellence in MBR wastewater treatment. We are happy to put you in touch with operators and engineers who can share their experience with our product. If you have any questions regarding our proposal, please feel free to contact us or our local representative, **W. Ben McDorman** of **MOSS KELLEY, INC.**, at **954-415-7411** or wbm@mosskelley.com.

Best regards,

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1 Introduction

Kubota Membrane USA would like to thank you for the opportunity to present the enclosed proposal to supply a membrane bioreactor (MBR) system and associated components for the city of Marathon Area 5 MBR Plant project. Included below is a brief background of the Kubota Corporation and Kubota's Submerged Membrane Unit. This is followed by a description of the proposed system, along with a scope of supply and budgetary price.

2 Company Background

2.1 History

Kubota Corporation has been designing and building wastewater treatment plants since the early 1960s. Long before building wastewater treatment plants, the company became involved with water engineering projects in 1893 as a manufacturer of iron piping, which was used for clean water distribution. As the largest engineering contractor for wastewater treatment plants in Japan, Kubota has the capability to design, build and operate municipal and industrial wastewater treatment plants.

In the 1980s, Kubota developed its own MBR technology using an external tubular type of ultrafiltration membrane. After the initial installation of these membranes in a soil treatment plant in Japan, Kubota realized these membranes lacked energy efficiency, had short life spans, and required frequent maintenance. This prompted Kubota to find an alternative to the external tubular membranes. In 1989, Kubota pioneered the energy-efficient, long-lasting, and easy-to-use flat sheet membrane with its Submerged Membrane Unit. Kubota's Submerged Membrane Unit was designed specifically for wastewater treatment applications, and is currently installed in wastewater treatment plants around the world, making Kubota a leader in the flat sheet MBR technology market.

The first installation of the Kubota flat sheet Submerged Membrane Unit was for a mechanical tool equipment manufacturer in Hiroshima in 1990. Kubota has refined and improved the membrane product for over 25 years (*Figure 1*). Kubota membranes were first introduced to the U.S. in 2002. Today, MBR systems using the Kubota membrane have been installed all over the world for numerous applications in addition to sewage treatment, such as brewery, dairy, food processing, pharmaceutical and chemical, laundry, leachate, and electrical industry wastes, as well as for sludge liquor treatment and water reuse.

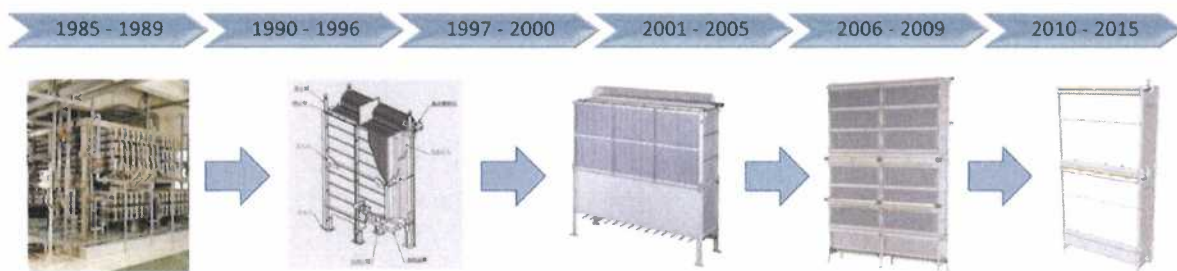


Figure 1: Progression of the Kubota membrane

2.2 Design Support and After-Sales Service

Kubota Membrane USA has technical staff in Bothell, Washington and Canton, Ohio who can help the customer with any design or operational needs of this project. Kubota staff members are available to provide technical support to consultants, WWTP operators, and WWTP owners. Additionally, Kubota has a Research and Development Center in Canton, OH, which focuses on optimizing the design and performance of Kubota membrane systems for the North American market.

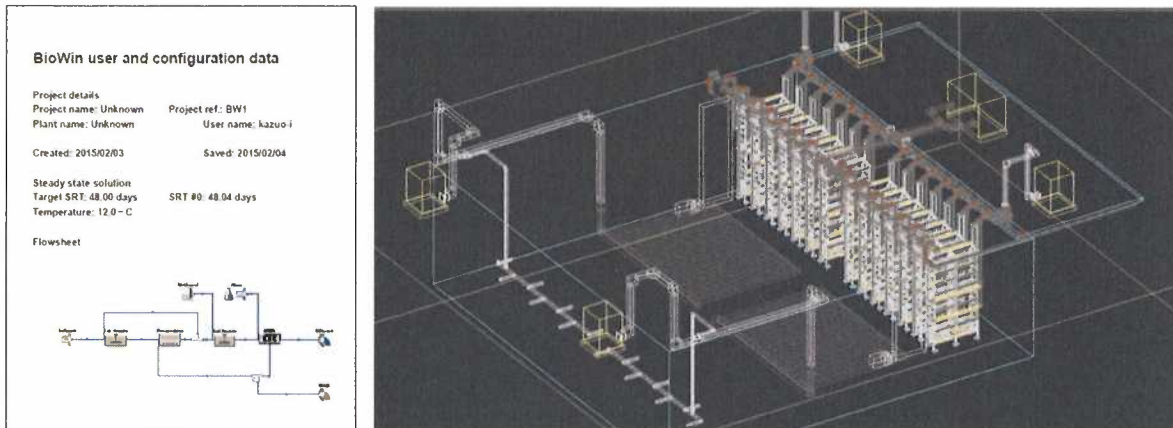


Figure 2: Examples of Kubota's Design Support

Kubota provides staff on a regular basis for service and support of construction activities and throughout the warranty period. The service provided includes delivery inspection, installation certification, training, commissioning and ongoing technical support. Kubota will also provide operation and maintenance (O&M) manuals and 24/7 customer support.



Figure 3: Kubota's Service and Support Team

2.3 Kubota’s Experience

Kubota has extensive experience in all facets of an MBR system project including designing, building, and operating MBR systems. Kubota has over 300 Design-Build projects, operates over 30 plants, and has over 150 maintenance contracts.

As of 2017, Kubota MBR systems have been installed at over 5,900 facilities worldwide, making Kubota the top supplier in the world. Even prior to the first U.S. MBR installations, Kubota had already been designing, building, and operating MBR systems around the world for many years.

Table 1: Kubota Submerged Membrane Unit Installations Worldwide as of December 2017

Region	Number of Installations
North America	412
Europe & Africa	624
Middle East	97
Asia (Except Japan) & Oceania	628
Japan	4,213
Total MBR Plants	5,973

3 Technology Description

3.1 Membrane Product Information

For this project, we have prepared a preliminary design based around the SP400 Submerged Membrane Unit (SMU). Kubota’s SP series of SMUs offer state-of-the-art technology. The SP series was developed in 2011 to create a Submerged Membrane Unit which is more energy efficient and faster to assemble on-site than the preceding RM/RW series, while still maintaining the reliable and simple operation that is characteristic of Kubota’s MBR systems. Kubota’s philosophy of learning from our extensive experience is one of our greatest advantages, setting us apart from more newly developed membrane manufacturers. An overview of the structure of the SP series is provided below.

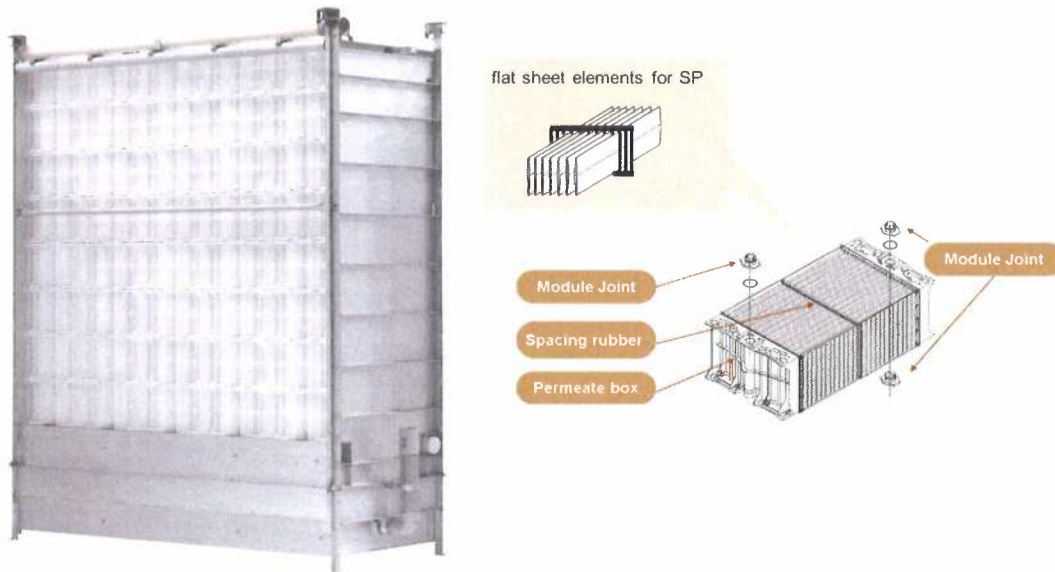


Figure 4: SP Series Unit Structure (left) and Module Structure (right)

The cartridge structure of the SP series units differs from previous Kubota products. Forty individual membrane sheets are permanently fixed to each membrane module. Each module has a permeate box and module joint on both ends. These modules are connected in a tubeless configuration by the integrated module joints to form a single cassette. Built-in retainers connect the assembled cassette to a permeate manifold which is connected to the permeate header.

Kubota’s membrane sheet is made from chlorinated polyethylene, has an average pore size of 0.2 micron (maximum 0.4 micron). This membrane is much thicker than other membranes to provide long-lasting durability and features high porosity to enable high flows. This pore size has been designed as the optimum balance between water quality and quantity and has Title 22 approval for water reuse in California. The SP series utilizes the same membrane material used by Kubota worldwide for over 25 years.

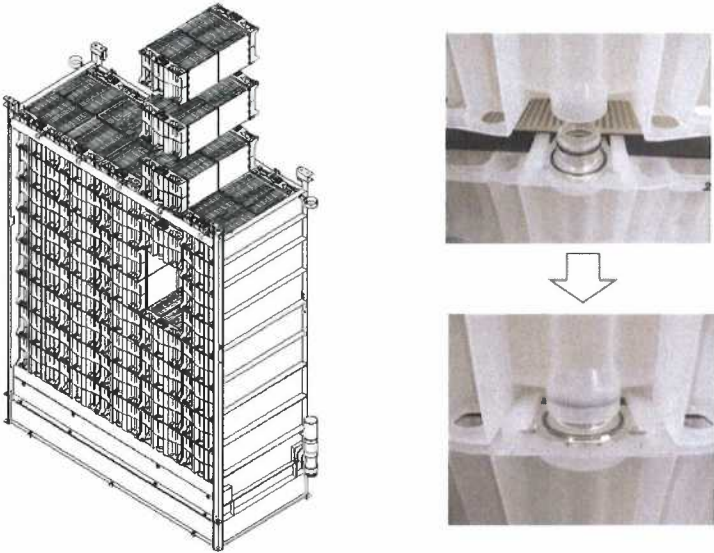


Figure 5: SP Series Module Assembly (left) and Module Connection Detail (right)

3.2 Operation and Maintenance

Simplicity is a core tenet of the Kubota MBR system. The Kubota MBR system offers a simple design, simple operation, and simple maintenance. The primary method of membrane cleaning for the Kubota MBR system is the air scour provided by the diffusers at the base of the membrane units. The chemical cleaning system is extremely simple and eliminates the need for separate tanks or tank linings for immersive cleaning. The system consists of a venturi injector which feeds the cleaning solution through the permeate piping using municipal utility water. The venturi system can be skid-mounted on a wall, as shown in the figure below.

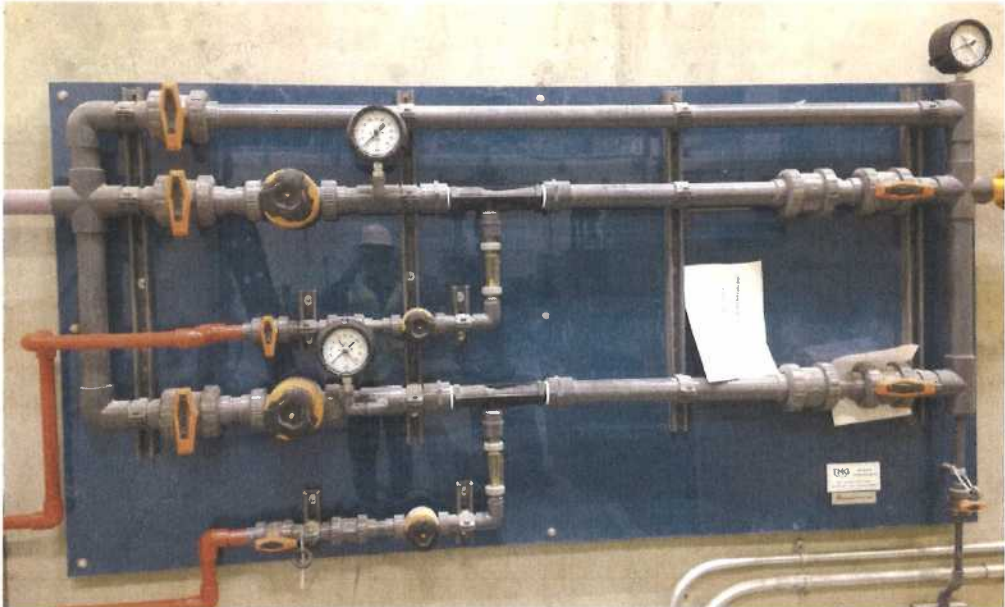


Figure 6: Skid-Mounted Clean-In-Place System

There is no need to drain the tanks or remove the membrane units to perform chemical cleaning. All that is required is stopping the operation, opening a vent, injecting a chemical solution, and allowing that solution to soak in the membrane units for 2 to 4 hours.

Organic fouling can be cleaned with a 0.5% sodium hypochlorite (NaClO) solution. This is typically done two to four times per year. Each cleaning event for organic fouling would consume 17 gallons of 12.5% NaClO stock solution per SP400 SMU.

Inorganic fouling such as iron or aluminum can be cleaned by a 1% oxalic or citric acid solution and is typically needed once a year or less. If the residual chemical cannot be discharged from the system, it can be sent back to the raw water inlet or to the bioreactor in order to neutralize the chemical. Each cleaning event for organic fouling would consume 35 pounds of 100% oxalic acid powder per SP400 SMU.

This simple and infrequent maintenance cleaning is the only chemical cleaning required; no recovery cleaning is necessary for operation of the Kubota MBR system. Moreover, the Kubota MBR system does not use the backpulse cleaning that is frequently used in hollow fiber MBR systems. This helps reduce the energy requirements and simplifies the piping and operation of the Kubota MBR system when compared with hollow fiber systems.

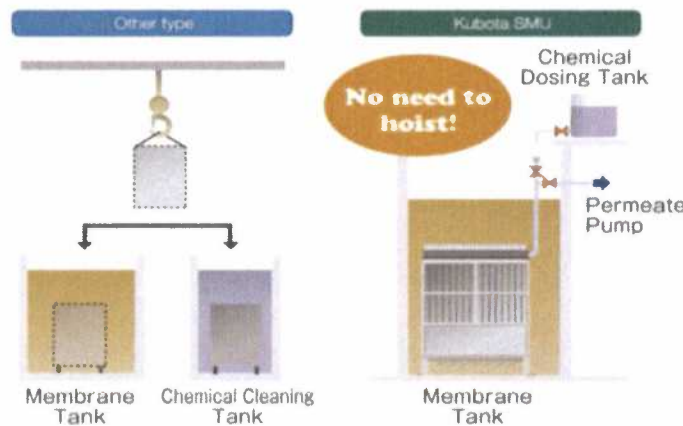


Figure 7: Chemical Cleaning for Other Manufacturers (left) vs. Kubota Membrane Units (right)

4 MBR Specifications

Specifications for the proposed membrane equipment are provided in the tables below.

Table 2: Membrane Equipment Specifications

Component	Specifications
Membrane Model	SP400
Membrane Surface Area per Unit	4,305 ft ²
Design MLSS at MBR	5,000 – 13,000 mg/L
Number of MBR Tanks	3 tanks
Total Number of Submerged Membrane Units	9 units (3 units per tank)
Scour Air Requirement per MBR tank	300 SCFM/7.8 psig
Minimum Design Temperature	20°C

Preliminary layout of the SMUs installed in the existing MBR tanks is presented in Attachment 1.

Table 3: Membrane Filtration Flux at Different Flow Conditions

Condition	Value	Flux rate at 20C
Annual Average Flow	0.45 MGD	11.6 gfd
Max Month Avg Day Flow	0.65 MGD	16.8 gfd
Peak Day Flow	0.9 MGD	23.3 gfd
Peak Hour Flow	1.2 MGD	31.0 gfd
Minimum Design Temperature	Minimum Design Temperature	20°C

5 Scope of Supply

The following proposed items will be supplied by Kubota Membrane USA and are included in the price that is listed in Section 7.

5.1 Major Equipment and Instrumentation

Table 4: Major Equipment and Instrumentation in Kubota's Scope of Supply

Name	Type	Estimated Size	Total Quantity
Membrane Zone (MBR) Equipment			
Submerged Membrane Unit (SMU)	Flat Plate	SP400	9
Submerged Membrane Unit (SMU) Freight	Flat Plate	-	9
SMU and Module lifting tools	TGSP508-R TGSPM008	-	1
SMU Guide and Stabilizer	Guide and Stabilizer Pipes	-	9 sets
SMU fasteners	-	-	90 set
In-Basin permeate pipe and supports	Schedule 80 PVC	3"	9
In-Basin Air Scour Drop Pipe and support	304 Stainless Steel	3"	9
MBR Permeate Isolation Valves	Ball Valve	3"	9
MBR Air Isolation Valves	Butterfly Valve	3"	9

5.2 Direct Services

The following services are included in Kubota's scope of supply:

Design Support

- Support during preliminary and final design.
- One day on-site design meeting.
- Construction submittals including shop drawings.
- Preparation and submittal of a system O&M manual for Kubota supplied systems and equipment.
- Equipment delivery coordination with the contractor.
- One day on-site delivery inspection of Submerged Membrane Units.

Commissioning

- Installation inspection (1 day), start-up (up to 3 days), and commissioning (up to 3 days) including dry and wet equipment checks, clean water testing, and support during seeding and start-up.
- Performance testing (1 day).

Workshop/Additional Training Available (No Charge)

- In addition to our standard training at commissioning, Kubota Membrane USA will host an annual operator workshop in which operators meet to exchange ideas and learn about the latest developments in MBR technology.
- Customized individual training, such as membrane disassembling training, is also available upon request.

6 Warranty

Equipment Warranty

Kubota's standard 5-year membrane warranty is included in the price proposed and goes into effect at the commencement date of commissioning. The warranty included is a guarantee that the products supplied by Kubota are free from defect in material or workmanship.

7 24/7 Technical Support

24/7 phone support is available in addition to support during regular business hours. 24-hour technical support calls are shared within the Kubota staff so that you can rest assured knowing that knowledgeable engineers and technicians are just a phone call away.

8 Additional Services (Optional)

The following service plans are optional and may be added to Kubota's scope of supply if desired for an additional cost.

Training (Optional with Additional Cost)

- 3 days of on-site, hands on operator training using a mix of classroom and field time. See Table 6 below for list of training topics.

Table 6: Training and Workshops Included in Kubota's Scope of Supply

Training/Workshop	Brief Summary
SCADA and HMI	<ol style="list-style-type: none"> 1. Navigation of all HMI screens and menus. 2. Review of automatic operations and controls. 3. Changing process set points. 4. Overriding controls from the HMI. 5. Manual operation of the system in the event of a power failure.
CIP training	<ol style="list-style-type: none"> 1. Navigation of CIP (Clean-In-Place), in-situ maintenance chemical cleaning. 2. Control from HMI and operation of manual valve. 3. Adjust set points of chemical flow.
Troubleshooting	<ol style="list-style-type: none"> 1. Case study of troubleshooting 2. Recovery from trouble 3. "Fish bone" approach
Daily testing	<ol style="list-style-type: none"> 1. Filterability test 2. Viscosity measurement

Kubota Membrane Protection Plan

Under this plan, Kubota Membrane USA warrants against any membrane failure for 10 years when the system is operated in accordance with the O&M manual. This plan includes annual onsite membrane inspection with membrane examination and inspection report, periodic replacement of parts and damaged membranes (if any), and phone support during the 10-year period. With this plan, Kubota will replace each cartridge at least once during the 10-year span, regardless of necessity.

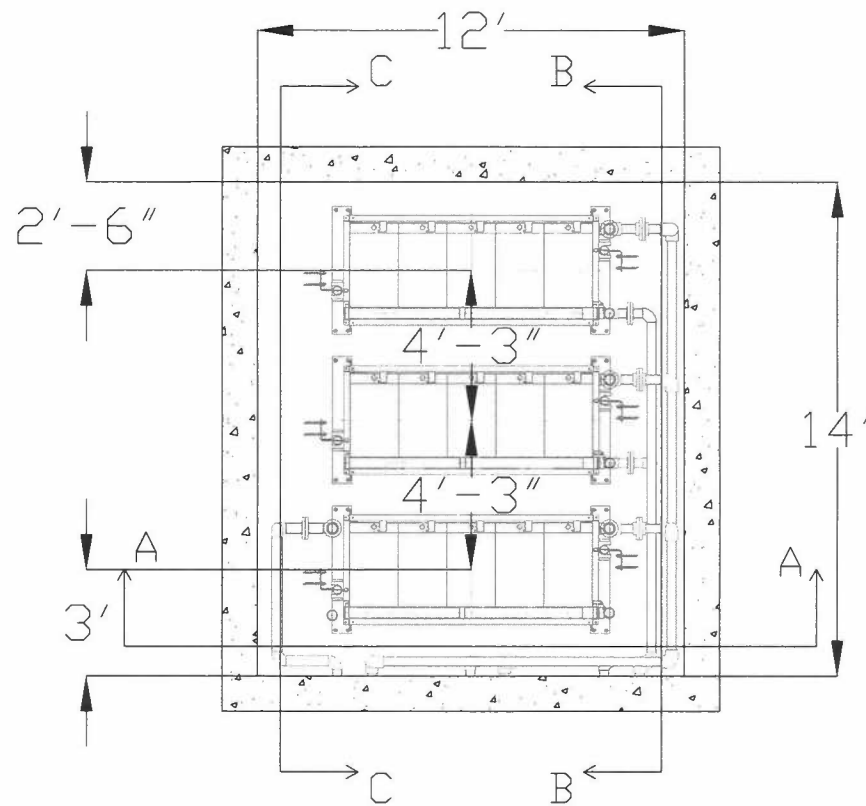
Kubota Custom Membrane Support Plan

Kubota can customize your support/service package to meet your needs. The following table shows a variety of our available services:

Table 7: Kubota's Available Services

Service	Note
Periodical technical support	Monthly, Quarterly, Annually
24/7 phone support	
SCADA monitoring	Weekly, Monthly, Quarterly
Periodical site visit	Quarterly, Semi-annually, Annually
Membrane inspection	Annual, Semi-annual, 3x per year
Membrane protection (10-year contract)	Select annual or semi-annual inspections
Program (SCADA, etc.) update	Based on hydraulic changes, such as increases in flow or changes in operation.

Attachment 1 – Preliminary Tank Layout



General Notes

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Kubota

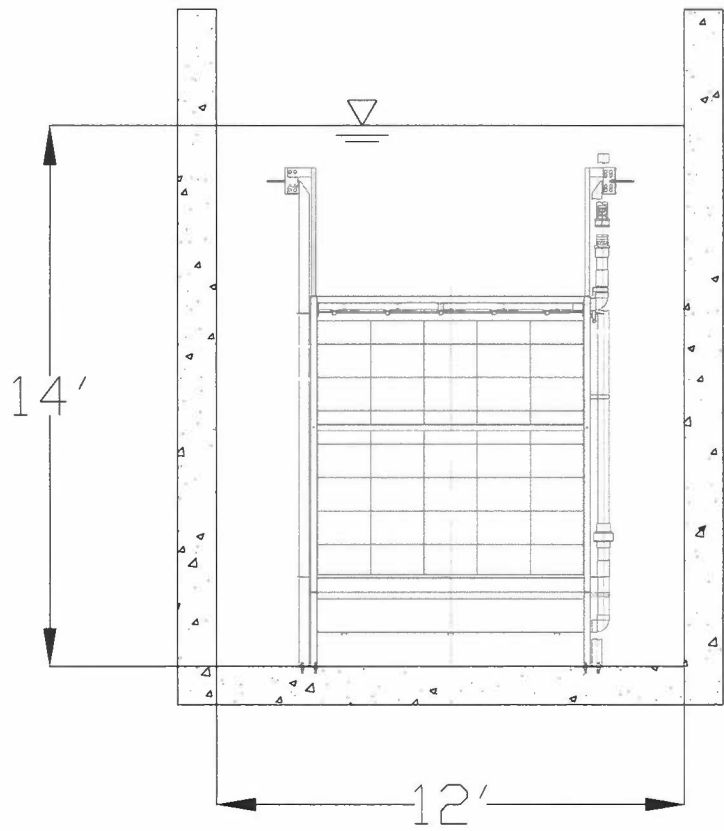
Kubota Membrane USA Corporation
 11801 North Coast Parkway S. Suite 8103
 Buckle, WA 98071 USA
 Tel: +1 425 398 3551

No.	Revision/Issue	Date
2		
1	PRELIMINARY LAYOUT	10/30 2013

Drawing Name
 MBR TANK
 1 OF 3
 PLAN VIEW

Project Name and Address
 AREA 5 WWTP
 CITY OF MARATHON
 FLORIDA

Area	Stamp
Drawing Number 1/4	
DATE S. MOHARRESI	



General Notes

For Earth, For Life
كويكوا

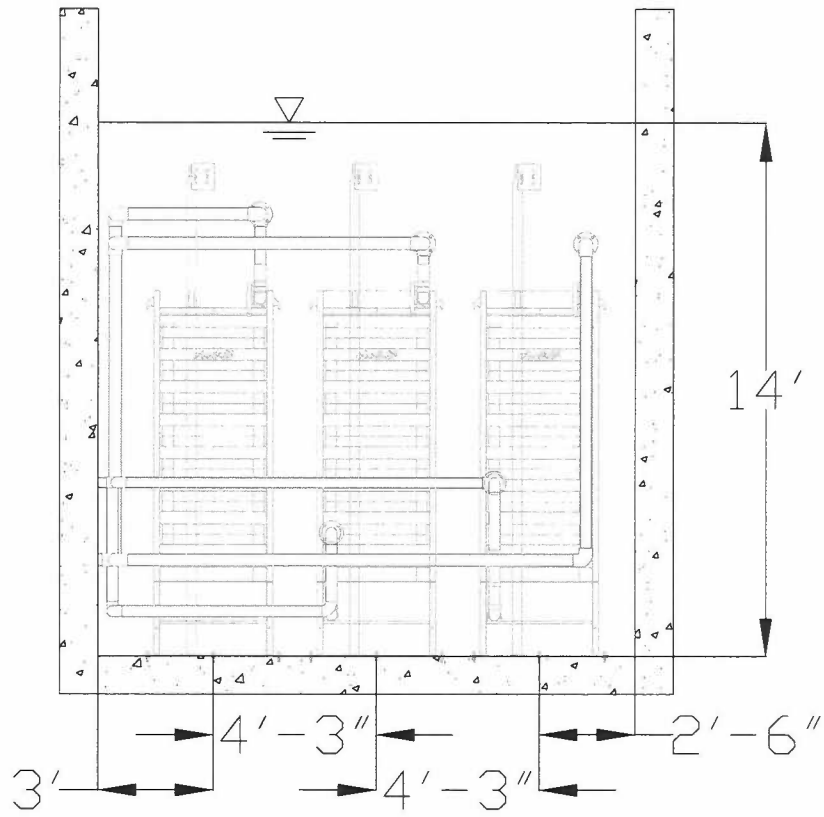
Kubota Membrane USA Cooperation
 17801 North Creek Parkway, S. Suite 8100
 Denver, CO 80231 USA
 Tel: +1 425 895 7822

2		
1	PRELIMINARY LAYOUT	10/30 2019
No.	Revision/Issue	Date

Drawing Name
 MBR TANK
 1 OF 3
 SECTION A-A

Project Name and Address
 AREA 5 WWTP
 CITY OF MARATHON
 FLORIDA

Area	Sheet
Drawing Number 2/4	
Scale	
S: MODARRESI	



General Notes

For Earth, For Life
 Կյանքի

Kudata Membrane USA Cooperation
 11801 North Central Parkway S. Suite 8709
 Dallas, TX 75243 USA
 Tel: +1 475 898 7863

2		
1	PRELIMINARY LAYOUT	10/30 2013
No.	Revision/Issue	Date

Drawing Name
 MBR TANK
 1 OF 3
 SECTION B-B

Project Name and Address
 AREA 5 WWTP
 CITY OF MARATHON
 FLORIDA

Date _____
 Drawing Number
 3/4
 Designer
 S. MODARRESI

General Notes

For Earth, For Life
Kyohoh

Kubota Membrane USA Corporation
1380 West Gate Drive
Buckeye, AZ 85326
Tel: 1-800-898-7252

No.	Revised/Issue	Date
1	PRELIMINARY LAYOUT	10/30/2019
2		

MBR TANK
: CF 3
SECTION C-C

Project Name & Address
AREA 5 WWTP
CITY OF MARATHON
FLORIDA

Drawn	Checked	Scale

S. MODARESI

