

Exhibit A

City of Riviera Beach Utility Special District

Scope of Services - Work Authorization No. 23

Water Distribution System Flushing Plan Development

Scope of Services

I. BACKGROUND

Consent Order File No. WP-020-16 requires that the Riviera Beach Utility Special District (RBUD) develop a written flushing plan based on the disinfectant residual monitor data collected in the water distribution system. The CONSULTANT shall develop the following: 1) unidirectional flushing (UDF) plan and 2) spot flushing plan.

Unidirectional Flushing (UDF) Plan

Unidirectional flushing (UDF) is not used in response to a specific water quality issue, rather it is a routine maintenance to prevent water quality degradation resulting from nitrification. UDF is a common practice in South Florida for water systems that use chloramines.

UDF is a systematic method of closing valves and opening hydrants to direct water through targeted segments of pipe. Flushing begins near sources such as water plants, trunk mains, and tanks. Closing certain valves in a prescribed sequence creates one-way flow into each segment from other pipes that have been flushed previously. Flowing hydrants induce velocities high enough to scour sediment and biofilm from the walls of the pipes. Pipes 16-inch and larger cannot be included because flowing from hydrants cannot achieve sufficient scouring velocities.

Nitrification is a microbial growth process that occur in water systems that contain chloramines. Nitrification consumes the chloramine disinfectant residual in the water piping. The key to stopping nitrification is to starve the nitrifying bacteria of nitrogen. The most effective way to do this is to temporarily convert the disinfectant from chloramine to free chlorine concurrent with the UDF to convey the free chlorine throughout the pipe network. The plan prepared under this scope of work assumes that the UDF would be performed concurrent temporarily converting the disinfectant from chloramine to free chlorine.

Spot Flushing Plan

Spot flushing is used when a degraded water quality – such as low chloramine disinfectant – has been identified through monitoring. Spot flushing consist of utility staff opening fire hydrants to flush water out of the system and bring fresh water into the pipes. The spot flushing plan prepared under this scope of work will include flushing criteria triggers (based on disinfectant residual) along with an response action plan as required by the consent order.

Under the existing Continuing Professional Utility Consulting Engineering Services Agreement (dated December 4, 2013), C Solutions, Inc. (CONSULTANT) was selected to provide these services as defined below.

II. SCOPE OF SERVICES

The CONSULTANT will perform engineering services for C Solutions (CONSULTANT) as described herein.

Task 1 Unidirectional Flushing (UDF) Plan

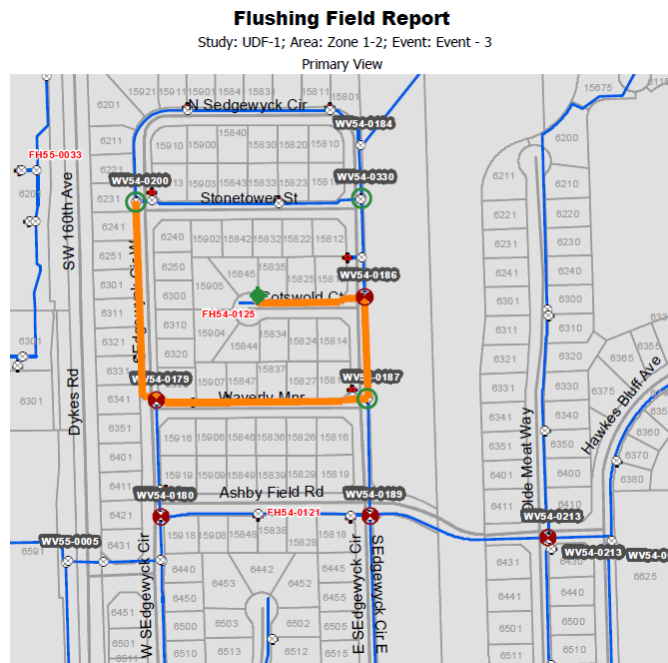
CONSULTANT shall use WaterGEMS software to prepare a UDF plan. The UDF plan shall be based on using valve and hydrant locations in the RBUD's graphical information system (GIS) and the water system hydraulic model prepared for the 2013 Water and Wastewater Master Plan. The flushing program will cover the entire distribution system, which comprises of approximately 180 miles of pipes 12-inch and smaller.

The task will include the following activities:

1. Attending meetings to obtain information and report progress
2. Importing valves and pump curves into the existing hydraulic model
3. Reviewing and cleaning up the software's automatic assignment of valves to pipes in the model
4. Setting up a UDF scenario in the model
5. Developing a UDF plan for approximately 180 miles of pipe
6. Preparing a UDF field journal in PDF format

TASK 1 DELIVERABLES

1. Two paper copies and an electronic version of the field journal consisting of two pages for each flushing sequence. An example of a field journal sequence is shown below.
2. An overall map of the distribution system will summarize the flushing plan.



Flushing Field Report

Study: UDF-1; Area: Zone 1-2; Event: Event - 3

Fire Hydrant	Notes	Pressure (psi) Static, Dynamic	Measured Flow (gpm)	Predicted Pressure (psi)	Predicted Flow (gpm)
FH54-0125				38.70	870.88
Valve					
	Operation		Notes	Flushing	Minimum
WV54-0330	Reopen <input type="checkbox"/>			Time (min)	5.3
WV54-0200	Reopen <input type="checkbox"/>			Volume (gal)	13,783.9
WV54-0187	Reopen <input type="checkbox"/>			Start Time	
WV54-0264	Reopen <input type="checkbox"/>			End Time	
WV54-0186	Close <input type="checkbox"/>			Operator	
WV54-0179	Close <input type="checkbox"/>			Date	
WV54-0189	Closed (prior) <input type="checkbox"/>				
WV54-0180	Closed (prior) <input type="checkbox"/>				
WV54-0213	Closed (prior) <input type="checkbox"/>				
	<input type="checkbox"/>				
	<input type="checkbox"/>				
	<input type="checkbox"/>				
	<input type="checkbox"/>				
Pipe Run to be Cleaned				Water Quality	Initial
WM54-0235, WM54-0233-1, WM54-0233-2, WM54-0196, WM54-0195,				Clear	<input type="checkbox"/>
WM54-0226, WM54-0228-2, WM54-0227, WM54-0228-1, WM54-0215-2, WM54-0215-1, WM54-0216, WM5				Colored	<input type="checkbox"/>
				Chlorine Residual	
				Turbidity	
Notes _____					

Example UDF Field Journal Sequence

3. The field journal shall include key data such as the following:
 - Pipes to be flushed
 - Length of pipes flushed
 - Valves to be opened or closed
 - Hydrants to be flushed
 - Amount of flow to flush
 - Amount of time to flush
 - Flushing volume
 - Pressures while flushing

4. The RBUD is required to submit its flushing plan to the Florida Department of Environmental Protection (FDEP) for review and comment. CONSULTANT shall prepare written responses to the FDEP's comments on the UDF and spot flushing plans.

Task 2 Spot Flushing Plan

CONSULTANT shall prepare a written plan that describes localized flushing in response to a chlorine disinfectant sample result below the target threshold. This task shall include the following activities:

1. Tabulating the existing 40 water quality sample site locations.

2. Hydraulic modeling to determine a localized flushing procedure at each of the 40 sample site locations. This includes identifying which hydrants to flush to ensure adequate water turnover in the area surrounding each sample site.

3. Preparing a spot flushing journal that will include one page for each sample site identifying the hydrants to be flushed on a small map and provides space to document before and after chlorine residual, flushing flow rates, flushing duration, etc.
4. Mapping all sample sites and associated flushing locations

TASK 2 DELIVERABLES

1. Two paper copies and an electronic version of the spot flushing journal consisting of one page for each water quality sample site.
2. An overall map of the distribution system showing all sample sites and associated flushing locations

Task 3 Unidirectional Flushing (UDF) Plan Bidding Services

The RBUD staff require assistance and training to perform UDF using its available resources. Hence, the first several UDFs should be performed by a contractor with expertise in implementing UDF so that the RBUD staff can gain experience in UDF implementation.

CONSULTANT shall prepare bidding documents for the RBUD to advertise and receive bids by contractors with expertise in implementing UDF. CONSULTANT shall assist the RBUD staff during the bidding process by responding to bidder questions.

Task 4 As-Needed Assistance

CONSULTANT shall provide as-needed assistance (upon request of the RBUD) on a time and material basis during the performance of the UDF up to the limit of the dollar amount for this task.

ASSUMPTIONS

1. RBUD will provide CONSULTANT the latest GIS shape files for all water assets prior to issuing a notice to proceed.
2. GIS shape files for all water quality sampling points will be provided to CONSULTANT.
3. Pipes, valves, and hydrants locations in GIS are spatially accurate.
4. Hydrants shown in GIS are operational. Valves shown in GIS can be field located and are operational.

III. Time of Completion

The CONSULTANT will commence services upon receipt of written authorization of notice to proceed (NTP). All days are defined as calendar days.

Task Description	Completion (Days from NTP)
TASK 1 - Unidirectional Flushing (UDF) Plan	180
TASK 2 - Spot Flushing Plan	180
TASK 3 - UDF Plan Bidding Services	240
TASK 4 – As-needed Assistance	Not Applicable

A number of factors affecting the project are beyond the control of CONSULTANT including work by others such as reviews by others and delivery of information to be supplied by others. Consequently, the schedule presented herein is dynamic and is presented as a best-case scenario. The schedule will be updated when appropriate.

IV. Proposed Compensation

The CONSULTANT shall perform the services defined in this scope of work for the lump sum fee of \$101,243 (Tasks 1 – 3) and a not to exceed fee of \$18,690 for Task 4 as indicated in the table below. Invoices will be submitted to RBUD monthly and define the current percent complete for the project or the accounting of time and materials for work performed under Task 4.

Task Description	Compensation Type	Not to Exceed Amount
TASK 1 - Unidirectional Flushing (UDF) Plan	Lump Sum	\$72,908
TASK 2 - Spot Flushing Plan	Lump Sum	\$14,385
TASK 3 - UDF Plan Bidding Services	Lump Sum	\$13,950
TASK 4 – As-needed Assistance	Time and Materials	\$18,690
TOTAL		\$119,933