Memorandum
Public Works Department

ROCK ISLAND
ILLINOIS

To: City Manager
Subject: WWTS Control System Integration
              Project 2624
Date: April 23, 2012
Number: 2012-092

Attached is a proposed contract amendment to the agreement with Symbiont for additional engineering services related to the proposed wet weather treatment system at the Mill Street wastewater treatment facility.

The Wastewater Treatment Facility Project currently under construction includes a new process control system consisting of field instrumentation, control panels, and computer hardware and software which will be installed by the general contractor. This amendment is to allow Symbiont to coordinate the control system programming and applications engineering for the new process control system.

Symbiont proposes to provide these additional engineering services at their standard hourly rates at an estimated cost of $387,000.

Recommendation

The Public Works Department recommends that the City Council approve the amendment to Symbiont's contract at an additional cost of $387,000 and that the City Manager be authorized to sign the amendment on behalf of the City of Rock Island.

Submitted by: Robert T. Hawes, P.E., Assistant City Manager/Public Works Director
                    Michael J. Kane, P.E., City Engineer

Approved by: Thomas Thomas, City Manager

Mr. Robert Hawes, P.E.   April 23, 2012
Assistant City Manager/Public Works Director
City of Rock Island
1309 Mill Street
Rock Island, IL 61201

RE: Control System Integration
Wet Weather Treatment System
City of Rock Island, Illinois
Symbiont Proposal No. 32465

Dear Mr. Hawes:

Symbiont is pleased to submit this proposal to the City of Rock Island (City) Public Works Department for control system integration services for the Wet Weather Treatment System (WWTS) project.

PROJECT UNDERSTANDING AND APPROACH

Symbiont completed detailed design of the Wet Weather Treatment System project which included a new wet weather treatment system, existing wastewater treatment plant improvements, a new outfall sewer, a new utilities maintenance garage, a new process control system, and miscellaneous improvements. The City opened bids for the project on May 10, 2011 and has entered into an agreement with the low, responsive bidder, Civil Constructors, for the completion of the work. Site construction activities began in August 2011, and the project has a substantial completion schedule of 870 days from award of contract with an additional 60 days for final completion, approximately March 2014.

A design workshop was held with City staff on February 11, 2009, to review and finalize the new instrumentation and control system architecture. The completed design includes a new process control system consisting of field instrumentation, control panels, and computer hardware and software. The control and computer equipment will be furnished and installed by the general contractor as part of the construction contract. During detailed design it was determined that the design team would complete the control system programming and applications engineering.

Symbiont proposes to complete the controls system integration as an amendment to the on-going engineering services during construction contract Symbiont has with the City. The following paragraphs outline the specific tasks to be performed to complete the control system integration. As previously discussed, Symbiont will also submit separate proposals to the City for WWTS startup and training services and O&M manual preparation.

M:\L1-A1-32465-229

S Y M B I O N T

SCOPE OF WORK

The following scope of work outlines the tasks deemed necessary to accomplish the control system integration. The scope of work is based on the control system included in the WWTS construction contract documents including P&ID drawings 20-I-1 through 20-I-17, network diagram 200-I-1, and specification sections 13401, 13420, 13440, 13450, 13460, and 13470.

Task 1 – Controls Programming Development

1.1   Server-Based Human-Machine Interface (HMI) System

Symbiont will provide software application design services for an HMI system providing central control and monitoring of the WWTS and WWTP processes. The application design services for the server-based HMI system are based on utilizing the hardware and software components furnished as part of the construction contract and include the following:

Hardware:
1. 120-SRVR-A: PCS/Historian Server
2. 50-SRVR-A: PCS Server
3. Workstations/Human Machine Interfaces
4. Operator Interface Unit, 90-OIU-1

Software:
1. PCS Server and PCS/Historian Server:
   a. Wonderware InTouch Runtime with I/O v.10, 2 licenses
   b. Wonderware Historian 10, 1 license
2. Operator Workstation / Human Machine Interfaces (HMIs):
   a. Wonderware InTouch Runtime without I/O v.10, 6 licenses (One for offsite system access).
   b. Upgrade from v.8 to v.10; Wonderware InTouch Runtime without I/O, 3 licenses (for offsite access).
3. Operator Interface Units (OIUs):
   a. Wonderware InTouch Runtime with I/O v.10, 1 license
4. Remote Telephone Alarm Notification System
   a. WIN-911/Professional

The HMI application will include the following monitoring and control components for the new treatment system:

* Graphical overview of the wastewater treatment components
* Hand/Off/Auto selection for operation of individual equipment

SYMBIONT

- Operational status of equipment (On/Off/Fail/Speed/Open/Close/Position)
- Analog values for instruments
- PID display and tuning
- Set point display and modification
- System alarms and warnings
- Trending of critical data
- Data logging of critical data

Symbiont will develop the HMI screens/information as listed in Table 1, attached.

1.2 Automation Control System PLC

Symbiont will provide software application design for an automation control system providing central control of the WWTS and WWTP processes.   The automation control system components will be furnished and installed by the general contractor as part of the construction contract and include the following:

PLC Systems:
1. Allen Bradley ControlLogix series with ControlNet.
   a. 50-PLC-1
   b. 120-PLC-1
2. Allen Bradley MicroLogix 1100 series, with Ethernet and RS-485 communication.
   a. 90-PLC-1 (with implemented RS-485 network)
   b. 135-PLC-1(with implemented RS-485 network)
3. SLC-500 Processor replacement 122-PLC-1 (Blower Control).
   a. Allen-Bradley; Model SLC-500, 5/05 with Ethernet.
4. SLC-500 Processor replacement 120-PLC-10-15 (Gravity Belt Thickener Control).
   a. Allen-Bradley; Model SLC-500, 5/05 with Ethernet.

Automation Software:
- RS Linx, RSLogix 500, RSLogix 5000, and RS Emulate

Symbiont will develop the WWTS and WWTP RSLogix applications for installation in the appropriate PLC system. As part of the control system software development, Symbiont will verify IP addresses for network controlled process equipment and configure the associated control system network equipment.

Task 2 – Controls System Testing

Symbiont will provide the necessary labor to supplement the construction contractor required operational, functional, and performance testing requirements by testing the new HMI and PLC systems in conjunction with the contractor testing. Symbiont will work with the general contractor

and instrumentation and controls system supplier to coordinate the control system testing as specified in the construction contract documents.

2.1 Component Calibration

The general contractor and instrumentation and controls system supplier will complete component calibration as required by the construction contract documents. Symbiont will coordinate instrumentation set points, operational ranges, and output scaling requirements between resident staff and the contractors. Symbiont will review calibration documentation following field testing and integrate into the control system programming to match field settings.

2.2 I/O Checkout

The general contractor and instrumentation and controls system supplier will complete I/O checkout to verify proper wiring as required by the construction contract documents. Symbiont will witness selected portions of the contractors' I/O testing to verify that the installed devices in the wastewater treatment system are correctly wired, identified, and communicating with expected assignments and scale ranges so that functional/performance testing and commissioning activities are ready to commence. Based on the design sequence of construction, Symbiont has assumed three site visits will be required to witness I/O checkout of the equipment systems.

2.3 Operational Acceptance Testing

The general contractor and instrumentation and controls system supplier will complete operational acceptance testing as required by the construction contract documents. Symbiont will witness and monitor plant control systems during these tests to ensure that the components of the new instrumentation and control system are ready for operation. Based on the design sequence of construction, Symbiont has assumed four site visits will be required to witness the operational acceptance testing as various unit processes are completed and ready for operation.

2.4 Functional Acceptance Testing

The objective of these tests is to demonstrate that the Process Instrumentation and Control System is operating as intended. Symbiont will coordinate and conduct this testing with the assistance of the contractor. The testing will include the following:

- All PLCs and operator interface computer station hardware and software, including modifications to the existing aeration blower and gravity belt thickener control systems, will be tested to verify proper operation as an integrated system. System testing will include, as a minimum, the following:

- All digital inputs will be activated at the field element to verify proper response to the status change on graphic displays, reports, and in automatic control algorithms.

- All analog inputs will be tested at the field transmitter over a full range to verify proper response on graphic displays, reports and in automatic control algorithms.

- All digital and analog outputs will be forced to verify proper control operation.

- Communications, including data highway, remote I/O, and serial communications will be tested between all components, including existing equipment.

- Alarm displays and printing will be tested for all analog and digital alarm points.

- All automatic control algorithms will be tested over various ranges and input conditions to verify proper operation. Graphic displays will be observed to verify proper response to automatic control operations.

Based on the design sequence of construction, Symbiont has assumed four site visits will be required to complete the functional acceptance testing as various unit processes are completed and ready for operation.

SYSTEM START-UP AND OPERATOR TRAINING

This proposal does not include overall treatment system start-up and operator training. These services will be provided under a separate contract amendment following additional construction progress so the scope of services can be better tailored to the final construction sequence and duration.

SCHEDULE AND BUDGET

Symbiont proposes to perform the control system integration services described herein on a time and materials basis in the amount of $387,000.

Symbiont's current engineering services contract totals $5,044,826. With the addition of this amendment, the revised contract amount will be $5,431,826. All services will be billed on a time and materials basis according to the rate schedule in effect when the work is completed.

The construction phase for this project is currently underway and is scheduled to be completed in March of 2014. Control system integration work would begin immediately upon notification to proceed so as to be complete when the contractor's work is complete.

SYMBIONT

PROJECT TEAM

Symbiont plans to maintain the same team of highly qualified personnel that designed the Wet Weather Treatment System project for the control system integration services described herein.

TERMS AND CONDITIONS

Symbiont Standard Terms and Conditions of Agreement as previously executed apply to this contract amendment. Please indicate your acceptance of this contract amendment by having an authorized representative sign the attached and return one copy to Symbiont.

Symbiont appreciates the opportunity to provide the City with the above engineering services. The work scope, cost, and schedule can be further modified as necessary to better meet the needs of the City. Please call at your earliest convenience if you have any questions regarding this proposal.

Sincerely,

SYMBIONT
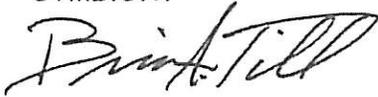
Brian A. Till, P.E.
Project Manager

SYMBIONT

Patrick W. Carnahan, P.E.
Municipal Group Manager

Attachments

M:\L1-A1-32465-229

TABLE 1
Rock Island WWTS
HMI SCREEN LIST

Screen No.	Process Overview Screen	Process Subset Screen(s)	Screen Content
1	Main WWTP Overview		System overview, WWTP flow, WWTS flow
2		Totalization	Summation of treatment volumes
3	WWTP Screening		WWTP screens, washpresses, and associated equipment
4		Screen Control	Screen selection and control settings
5		WWTP Screening Trending	Influent diversion level & ambient gas concentration trending screens
6	WWTP Pumping		Influet WWTP pumps and associated equipment
7		Pump Control	Pump selection and control
8		Pump Trending	RWW wet well level and flow trending screens
9	WWTP Grit Handling		WWTP grit collectors, classifier, and associated equipment
10		Grit Elimination Control	Grit equipment cycle times and control
11	WWTP Primary Clarifiers		WWTP primary clarifier rake mechanisms and associated equipment
12		Clarifier Control	Clarifier equipment cycle times and contro
13	WWTS Screening		WWTS screens, washpresses, and associated equipment
14		Screen Control	Screen selection and control settings
15		WWTS Screening Trending	Influent diversion level trending screens
16	WWTS Pumping		WWTS pumps, wet well level, drain pump, and associated equipment
17		WWTS Pump Control	Pump selection and control
18		Drain Pump Control	Pump selection and control
19		Splitter Structure	WWTS splitter structure mixing blower control
20		WWTS Pump Trending	Level and flow trending screens
21	WWTS Clarifiers		WWTS Clarifiers, control valves and gates, and associated equipment
22		WWTS Clarifier No. 1	WWTS clarifier selection and control
23		WWTS Clarifier No. 2	WWTS clarifier selection and control
24		WWTS Clarifier Trending	WWTS clarifier level and flow trending
25	WWTS Sludge Handling		WWTS sludge pumping, de-gritting, thickening, and associated equipment
26		WWTS Sludge Pumping	WWTS sludge pumping selection and control
27		WWTS Sludge De-Gritting	WWTS sludge de-gritting selection and control
28		WWTS Sludge Thickening	WWTS sludge thickening selection and control
29		WWTS Sludge Trending	WWTS sludge concentration, level, and flow trending
30	WWTS Sodium Hypochlorite (SHC)		WWTS SHC storage and metering
31		WWTS SHC Control	WWTS SHC selection and control
32		WWTS SHC Trending	WWTS SHC level, flow, and ambient gas concentration trending
33	WWTS Sodium Bisulfite (SBS)		WWTS SBS storage and metering
34		WWTS SBS Control	WWTS SBS selection and control
35		Mixing Blower Control	Mixing blower selection and control
36		Effluent Sampling	Effluent sample pump and sampler control
37		WWTS SBS Trending	WWTS SBS level, flow, and concentration trending
38	WWTS Ferric Chloride (FC)		WWTS FC storage and metering
39		WWTS FC Control	WWTS FC selection and control
40		WWTS FC Trending	WWTS FC level and flow trending
41	WWTS Polymer		WWTS polymer feed and associated equipment
42		WWTS Polymer Control	WWTS polymer feed selecction and control
43	Storm Screening & Pumping		Storm screening, pumping, and associated equipment
44		Storm Screen Control	Storm screen and belt conveyor control
45		Effluent Pump Control	Effluent pump selection and control
46		Storm Trending	Storm screening and pumping level and pump speed trending
47	Effluent Pumping		Effluent pumping and associated equipment
48		Effluent Pumping Trending	Effluent level and pump speed trending
49	Anaerobic Digesters		Anaerobic digesters and associated equipment
50		Digester Control	Digester control
51		Digester Trending	Digester level, flow, and solids concentration trending
52	Digester Gas Generator		Digester gas generator system
53		Generator Control	Generator control
54		Generator Trending	Generator and ambient gas trending
55	Hot Water Boilers		Hot water boilers, pumps, and associated equipment
56		Boiler Control	Boiler selection and control
57		Building Heating	Building heating control
58		Boiler Trending	Hot water temperature trending
59	Digester Gas Handling		Gas compressor, waste gas flare, drying skid, & associated equipment
60		Drying Skid Control	Drying skid control
61		Gas Handling Trending	Digester gas flow, temperature, pressure, and ambient gas trending
62	WWTP Sludg Handling & Storage		GBT, sludge pumping, and storage
63		GBT Control	GBT control
64		Sludge Handling Trending	Sludge flow and level trending
65	Facility Support Systems		Non-potable water, HVAC, and electrical support systems
66		Building 120 HVAC Control	Building 120 HVAC selection and control
67		Building 135 HVAC Control	Building 135 HVAC selection and control
68		Electrical Systems	Standby generator, incoming power, and transfer switch
69		Facility Support Trending	Temperature and electrical power trending
70	Aeration Blowers		Aeration blowers and dissolved oxygen contro
71		Blower Control	Aeration blower selection and control
72		Blower Trending	Blower and dissolved oxygen concentration trending
73	SCADA Network		SCADA Network/PLC health and status
74	Alarm Summation		WWTP alarms and acknowledgement control

CONTRACT CHANGE ORDER

PROJECT NAME:	Wet Weather Treatment System	**CHANGE ORDER NO.:** 9
OWNER:	City of Rock Island 1309 Mill Street Rock Island, IL 61201	**DESIGNER:** Symbiont 6737 West Washington Street Suite 3440 West Allis, WI 53214

SUBCONTRACTOR: **SYMBIONT PROJECT NO.:** W091615

CONTRACT FOR: Design Services **CONTRACTOR PROJECT NO.:**

CONTRACT DATE: January 19, 2009

You are directed to make the following changes in the Contract Documents.

Description: Controls System Integration

Purpose of Change Order: Contract amendment to include controls system integration services.

Attachments: 1 **Symbiont Proposal No. 32465**

CHANGE IN CONTRACT PRICE:	CHANGE IN CONTRACT TIME:
Original Contract Price $ 1,900,000.00	Original Contract Time (days or date) n/a
Previous Change Order $ 3,144,826.00	Net Change from Previous Change Orders (days) n/a
Contract Price Prior to this Change Order $ 5,044,826.00	Contract Time Prior to this Change Order (days or date) n/a
Net Increase (Decrease) of this Change Order $ 387,000.00	Net Increase (Decrease) of this Change Order (days) n/a
Contract Price with all Approved Change Orders $ 5,431,826.00	Contract Time with all Approved Change Orders (days or date) n/a

CITY OF ROCK ISLAND

By:_____

Title:_____

Date:_____

SYMBIONT

By _____

Title: _Vice President_

Date: _4/23/12_

CONTRACT CHANGE ORDER

PROJECT NAME: Wet Weather Treatment System

CHANGE ORDER NO.: 9

OWNER: City of Rock Island
1309 Mill Street
Rock Island, IL 61201

DESIGNER: Symbiont
6737 West Washington Street
Suite 3440
West Allis, WI 53214

SUBCONTRACTOR:

SYMBIONT PROJECT NO.: W091615

CONTRACT FOR: Design Services

CONTRACTOR PROJECT NO.:

CONTRACT DATE: January 19, 2009

You are directed to make the following changes in the Contract Documents.

Description: Controls System Integration

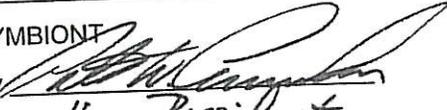**Purpose of Change Order:** Contract amendment to include controls system integration services.

Attachments: 1   **Symbiont Proposal No. 32465**

CHANGE IN CONTRACT PRICE:	CHANGE IN CONTRACT TIME:
Original Contract Price $ 1,900,000.00	Original Contract Time (days or date) n/a
Previous Change Order $ 3,144,826.00	Net Change from Previous Change Orders (days) n/a
Contract Price Prior to this Change Order $ 5,044,826.00	Contract Time Prior to this Change Order (days or date) n/a
Net Increase (Decrease) of this Change Order $ 387,000.00	Net Increase (Decrease) of this Change Order (days) n/a
Contract Price with all Approved Change Orders $ 5,431,826.00	Contract Time with all Approved Change Orders (days or date) n/a

CITY OF ROCK ISLAND

By:_____

Title:_____

Date: _____

SYMBIONT

By_____

Title: _Vice President_

Date: _4/23/12_