STANDARDS - PLC & HMI LOGIC

FUNCTIONAL REQUIREMENTS

REVISION 1.1
PUBLISH DATE: 04/22/2010

Laguna Treatment Plant
4300 Liano Road
Santa Rosa, CA 95407
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The information in this document is confidential and may not be disclosed without written consent.
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1 Introduction

This document describes the standards used in the programming and configuration of the Programmable Logic Controllers, HMI Touch Panels, and Wonderware HMI-SCADA systems used at the City of Santa Rosa Laguna Wastewater Treatment Plant.

The purpose of this document is:

- To document the programming standards for PLCs, Touch Panels, and Wonderware
- To provide a description of the standard screens and tools in the Touch Panel Library

Additional descriptions of the functionality, usage, and user interface for the individual program blocks in the S7-200, or S7-300 Standard Function Libraries exist, and will be provided as needed the start of any given project.

1.1 Revision Control

Table 1 - Revision Control

<table>
<thead>
<tr>
<th>Revision</th>
<th>Description</th>
<th>Changes Made By</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Initial Release</td>
<td>Bob Arthur</td>
<td>12/16/2009</td>
</tr>
<tr>
<td>1.1</td>
<td>Revised with HMI Additions</td>
<td>Rick Rogan</td>
<td>4/22/2010</td>
</tr>
</tbody>
</table>

1.2 Glossary

This document will use the following abbreviations.

Table 2 - Glossary

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP</td>
<td>Communications Processor, the PLC module that handles communications</td>
</tr>
<tr>
<td>CPU</td>
<td>Central Processing Unit, the PLC module that contains the working program</td>
</tr>
<tr>
<td>H1</td>
<td>Siemens S5 Industrial Ethernet network (replaced by S7 com)</td>
</tr>
<tr>
<td>HMI</td>
<td>Human Machine Interface</td>
</tr>
<tr>
<td>HOA</td>
<td>Hand / Off / Automatic mode switch (usually a physical switch)</td>
</tr>
<tr>
<td>I/O</td>
<td>Input / Output (refers to field devices connected to the PLC)</td>
</tr>
<tr>
<td>L1</td>
<td>Siemens S5 local area network (obsolete)</td>
</tr>
<tr>
<td>L2</td>
<td>Siemens S5 Fieldbus network (replaced by PROFIBUS in S7)</td>
</tr>
<tr>
<td>LAN</td>
<td>Local Area Network</td>
</tr>
<tr>
<td>OP</td>
<td>Operator Panel</td>
</tr>
<tr>
<td>PLC</td>
<td>Programmable Logic Controller</td>
</tr>
<tr>
<td>RTU</td>
<td>Remote Terminal Unit</td>
</tr>
<tr>
<td>ISQL</td>
<td>Wonderware Industrial SQL Server Program</td>
</tr>
<tr>
<td>SCADA</td>
<td>Supervisory Control and Data Acquisition</td>
</tr>
<tr>
<td>INTOUCH</td>
<td>Wonderware HMI-SCADA Program</td>
</tr>
<tr>
<td>OP</td>
<td>Operator Panel</td>
</tr>
<tr>
<td>TP</td>
<td>Touch Panel (Touch-operated Operator Panel)</td>
</tr>
<tr>
<td>WWTP</td>
<td>Wastewater Treatment Plant</td>
</tr>
</tbody>
</table>

The information in this document is confidential and may not be disclosed without written consent.
1.3 Assumptions

This document includes the following assumptions about the reader:

- The reader is familiar with control systems and control system components such as PLCs, HMI and SCADA.
- The reader is familiar with PLC and TP programming.
- The reader is familiar with the controls systems at the Laguna WWTP, reclamation RTUs, flow RTUs, and the remote site RTUs to which this document refers, as is appropriate to any specific project.

2 PLC Programming Standards

The PLC programming standards described in this section will ensure consistency and uniformity of the PLC programs developed for City of Santa Rosa.

2.1 Program Style

All logic shall be written in ladder except where complex manipulation is required, such as shifting, masking, math functions or string manipulation.

Mixing ladder logic and statement list programming in functions, function blocks, and subroutines is not allowed. Each function, function block, and subroutine must be either all ladder or all statement list.

All logic will be structured. Linear programs will be avoided. Logic will be structured into blocks of specific function, and those blocks will be arranged in OB1 or the master subroutine in a fashion that denotes system operational flow.

Logical operations for given systems should be grouped in single functions or subroutines. For example all logic dealing with Alarms should be grouped in a single function or subroutine.

Digital outputs must be written to only once, using a coil instruction. Multiple writes to digital outputs, including sets and resets, is forbidden.

Whenever possible, coil instructions should be used for digital logic rather than sets and resets.

All PID loops must be called from a regular timed interrupt block, for example OB35 in the S7-300. The PID loop timing must match the interrupt time of the routine where it is called.

Step7 Functions (as opposed to Function Blocks) will be used whenever possible to minimize the use of instance data blocks.

Libraries of standard Step7 Functions and Function Blocks and Step7-MicroWin Subroutines exist and are used for the facility. The libraries contain fully tested and documented blocks that perform common operations, such as analog scaling, digital point monitoring, etc. Whenever possible, the standard blocks will be used in order to reduce development and testing time, and to promote uniformity of code.

The following standards apply to alarms generated in the Laguna plant PLCs:

- All alarms, whether generated by digital inputs, analog inputs, or logic, should be latched, with a reset required at the panel. This requires the operator to go to the panel when any alarm occurs, and captures the condition if Wonderware is down.
- Every alarm should be debounced with a 30 second timer.
- The General Area Alarm output from each PLC is a normally ON output. It should be turned OFF if any of the alarms in that PLC is active. Since all alarms are latched, this provides a way for the operator to know that an alarm has occurred, even if Wonderware is down.
All alarms should be described this way. If there is an exception to these standards, it will be identified in documentation or program code prior to acceptance.

2.2 In-Program Documentation

All blocks will have a plain text description of the complete block function in the block header at the top of the block. The header will also contain a record of revision tracking, with version, author, date and nature of revision noted for each time the block has been modified.

Each and every operand, block and variable table shall have a plain text symbol in the program assignment list and a plain text description in the program assignment list.

All data in data blocks will have a plain text symbol and plain text description. Auto assignment of data member names is not acceptable.

All passed parameters for Functions, Function Blocks, Organizational Blocks, and others will be given a plain text symbol and plain text description in the block header. Auto assignment of parameter names is not acceptable.

Each rung of ladder will have a title and a plain text description of the logic operation contained in that rung.

Each line of statement list will have a comment that describes the use of the line operand and its function in relation to the previous and next operand.

2.3 SCADA Integration with the PLC

Each plant PLC will contain an HMI/SCADA interface data block that corresponds to the PLC number. For instance, DB6 in PLC6 will be the SCADA interface data block. All processed PLC data that is exchanged with SCADA and the local TP will be stored in this data block.

Each RTU that communicates with PLC23 via radio telemetry will use DB100 as its SCADA interface data block.

Whenever possible, the SCADA application will access digital values directly from the inputs or outputs being monitored. If logic is required for a digital result, the logic will take place in the PLC, not in the SCADA application, and the result will be stored in the SCADA interface data block.

All analog scaling will be done in the PLC, with the result stored in the SCADA interface data block. Scaling values (maximum and minimum engineering units) will be modifiable from a data block accessible from an OP.

All analog values passed to the SCADA system from the plant PLCs will be real (floating point) numbers that are scaled directly to engineering units in the PLC.

Analog values passed over the radio telemetry system will be scaled to engineering units in the RTU, then stored as integers that are multiplied by a factor of 10, such that the desired number of decimal places can be maintained. The integer values will be read by Intouch and InSQL, and the decimal offset will be applied within the respective applications to place the decimal point in the correct location in reported data. For example, a value with an engineering unit range of 0-10.0 would be stored as an integer with a raw value of 0-100. Real numbers can only be passed over the radio telemetry system when the number is too large to convert to an integer X10 format, such as pump run hours.

An analog value which is the sum or difference of two or more analog signals will be combined with signal conditioners or arithmetically in a PLC, and the result will then be stored in the SCADA interface data block.

The information in this document is confidential and may not be disclosed without written consent.
2.4 Security
Password protection of programs is not allowed, at the processor level or at the block level. The only
acceptable block locking will be Siemens firmware. No proprietary code is acceptable, and all operational
code will become the sole property of the City of Santa Rosa.

3 S7-200 & S7-300 PLC Standard Function Library Design
The City has a library of standard subroutines called Functions, which have been developed for
programming and data-handling of the S7-200 and S7-300 PLC families. These Standard Functions
will be provided by the City, and are to be used whenever possible in the programming of PLC’s for
specific City projects.

4 Touch Panel Screen Standards and Design
4.1 Touch Panel Selection
The default size for touch panels is 10". Exceptions can be made when there is not enough room for a 10"
unit. When this is the case, a 6" unit should be used.
Laguna Plant TP/OP will be SIEMENS panels.

4.2 Programming Software
The programming software shall be the latest version of SIMATIC WinCC Flexible programming software.
The WinCC Flexible software will be required to view, alter, or download the program to the touch panel.
All TP/OP code will be delivered in .hmi file (modifiable file) instead of compiled code.

4.3 Communication
4.3.1 Ethernet Address
Ethernet IP address shall be 192.168.56.198 and used for programming purposes only.

4.3.2 PLC Interface
PLC Interface shall be Profibus, MPI or PPI as required (determined by PLC type and available
interfaces.)

4.4 TP Screens
This section contains information on screen design standards and mock-ups of both example
screens and standard screens.

4.4.1 Screen Hierarchy
When possible, the panel should be no more than 2 screen levels deep.
Each TP should have a main or default overview screen which includes a process overview, and
access to lower level screens for specific processes or maintenance areas.
Lower level screens should display all data appropriate to a given process or type of measurement,
and may themselves have an overview screen if the process is sufficiently complicated.
Each lower level screen should have pushbutton access to the previous screen and the main
screen, and as space allows, to other related screens.
4.4.2 Color schemes

The following color schemes should be used for designing Touch Panel screens:

<table>
<thead>
<tr>
<th>Table 3 Touch Panel Color Schemes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
</tr>
<tr>
<td>Screen Background</td>
</tr>
<tr>
<td>Text Displays</td>
</tr>
<tr>
<td>Process Value</td>
</tr>
<tr>
<td>Displays</td>
</tr>
<tr>
<td>Setpoint Entry</td>
</tr>
<tr>
<td>PushButton Text</td>
</tr>
<tr>
<td>Alarm Reset</td>
</tr>
</tbody>
</table>

All additional colors used for bar graphs, etc. should be legible outdoors during daylight.

4.4.3 General Screen Design Standards

The following design standards apply to all touch panel screens:

- No date or time of day should be displayed unless it is used in process logic, and then only with other relevant time data.
- No form of password protection is allowed.
- No screen savers are allowed in the plant. Screen savers for Reclamation touch panels should be a simple blank screen.
- Process variable data will be displayed as bold text without any surrounding text-boxes.

Figure 1 – Example of Main Screen

- Setpoint access should be on the same screen and in proximity to the associated process variable. Each setpoint should be displayed inside a 3D text-box that will bring up a keypad for data entry when the box is pressed. Input limits can be configured as required to prevent input of a setpoint that is out of range.
- Bar graph representation of process variables is desired when screen space allows.
• No animation of moving equipment (ex. pumps, motors, etc.) is desired for touch panel screens. Equipment status should be displayed in a text representation (ex. PUMP 1 – AUTO, RUN or FAIL).

These design standards are illustrated on the two screen mock-ups in Figure 1 and Figure 2.

4.4.4 Utility Screen

Each TP should include a Utility Screen. The Utility Screen is an interface for service related functions, pump hour meters, and access to the analog scaling parameters and real time clock.

The analog scaling screen can be reached from the Utility Screen via the Scaling navigation button. The real time clock screen can be reached via the Clock navigation button. This screen may also contain the alarm reset button.

A typical Utility Screen is shown to the right in Figure 3.
4.4.5 Analog Scaling

The analog scaling screen allows access to high and low analog scaling inputs so that all of the scaled inputs and outputs in the PLC can be modified via the touch panel. Analog scaling screens should be accessed from the Utility Screen.

A Scaling screen mockup is shown in Figure 4.

4.4.6 Real Time Clock Screen

At facilities where clock time is relevant to the process, the Utility Screen may have a navigation button to display a screen where the real time clock can be set. The clock screen has a display of the present settings for the clock, along with setpoints for the clock parameters and a button to send the new settings to the PLC. A button allows easy navigation back to the Utility Screen.

A typical Clock Screen is shown in Figure 5.
4.4.7 Template Screen for Alarm Display

The template screen for the project contains screen elements which are present on each screen in the project. Elements included will be the Alarm Indicator and Alarm Window.

The Alarm Window will be displayed when alarms are latched in the PLC. When alarms are cleared in the PLC, they will be removed from the display. The window can be closed by selecting the close window 'X' in the upper right corner of the Alarm Window.

The Alarm Indicator in the upper right corner of the display will be shown as long as any alarm is latched in the PLC. Selecting the Alarm Indicator will display the Alarm Window.

The Alarm Reset Push-Button, if used, should be placed in a convenient location on the Template Screen so that it will appear on all screens when active. It should not be necessary to navigate through the screens in order to reset an alarm. See section 6.4.2 for standard color.

4.4.8 General Touch Panel Alarm Design

All alarm generation, latching, and acknowledgement logic will reside in the PLC. If a Reset or Acknowledge button is used on a touch panel screen, it must be independent of the Alarm Window “ACK” button, and it must provide direct access to the PLC's alarm logic.

Alarm descriptions should be Plain English, clearly describing the function of the alarm. Alarms will be defined in the Text of the alarm and linked to trigger tags.

The Alarm Window on the project template screen will be used to display alarms on the touch panel. The Alarm Window “Infotext Button”, “ACK” button, and the “Edit” buttons shall be disabled.

An incoming alarm will trigger the Alarm Window screen to pop up with an alarm text message. Multiple alarms will display in the order of “newest alarm first”. The Alarm Window can be closed by pressing the upper right corner "X".

After all alarms have been acknowledged and the Alarm Window screen has closed, the Alarm Indicator icon will still be present as long as alarms still exist. This icon is positioned in the upper right hand corner of the active screen. By pressing the Alarm Indicator icon, the Alarm Window screen will be recalled so that current alarms can be viewed.

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5 Wonderware SCADA System Standards and Design

5.1 General Design Standards

5.1.1 Digital Values
Whenever possible, digital values should be gathered directly from the inputs or outputs which are being monitored.

If logic is required for a digital result, the logic should take place in the PLC, not in the InTouch application.

5.1.2 Analog Values
Analog values passed over the radio telemetry system should be integers that are multiplied by a factor of 10 such that the correct number of decimal places can be displayed. For example: a value with an engineering unit range of 0-10.0 would be an integer with a raw value of 0-100.

Analog values within the plant should be real numbers that are scaled directly to engineering units in the PLC.

Within the plant, scaled analog values should be stored in the data block that corresponds to the PLC number; for instance values in PLC6 would be stored in DB6. In the reclamation system RTUs that communicate with PLC23 via Sub Master Protocol, scaled analog values should be stored in DB100, the interface data block for Sub Master Protocol.

If an analog value is the sum or difference of 2 or more analog signals, they should be combined with signal conditioners or arithmetically in a PLC, not in the InTouch application.

5.1.3 Display Decimal Places
Flows, levels and power will be reported with one decimal place.
Concentrations will be reported with two decimal places.
Pressure will be reported in whole units.

Additional standards for decimal places may be defined and documented here in the future.

Exceptions must be made for measurements with very large or very small full scale values. For example:

- If the first decimal place is less than 0.1% of the full scale value, only whole units should be displayed; an example is the suspended solids concentration in the mixed liquor channel, which has a span of 10,000 mg/l.
- Pressure measurements for digester gas are made in inches of water and have a span of 15 inches, so it is appropriate in this case to include a decimal place.

5.1.4 Color Schemes
Reported process values should be displayed in dark gray fields with white text.
Process setpoints should be displayed on white fields with black text, and the input field should have the keyboard enabled and appropriate limits imposed.
Equipment operating modes should be displayed in dark gray fields, and the text should be red for Auto, On, Closed and Remote; black if Not In Auto, Off or Local; and green for Open and Ready.
5.1.5 Documentation Deliverables

The documentation will include:

- Bill of Materials
- Description of operations and sequence of operations.
- Updated I/O map with both old and new addresses
- SCADA Data Map (including both old and new addresses)
- Touch Panel Data Map
- Wiring Diagram Drawings
- I/O Drawings
- Panel Layout Drawings

5.2 Software Deliverables

Upon completion of the project, the contractor will deliver finalized versions of the items listed to the city of Santa Rosa along with the items listed below:

- PLC Program (soft copy on CD)
- Touch Panel Program (modifiable .hmi files on CD)
- All necessary SCADA software to maintain and modify the system
CITY OF SANTA ROSA

STATE OF CALIFORNIA

CONTRACT PROPOSAL

LAGUNA TREATMENT PLANT COMBINED HEAT AND POWER PROJECT

The work to be done and referred to herein is in the City of Santa Rosa, California and consists of improvements to be constructed in accordance with the provisions of the Invitation for Bids, containing the Special Notice to Bidders, the Notice to Contractors, the Special Provisions, the Project Plan(s), the Contract Proposal Forms, and the Contract Form, all of which are by reference incorporated herein, and each Addendum, if any is issued, to any of the above which is also incorporated by reference herein.

Said work to be done is further shown upon a plan consisting of 125 sheets, entitled Laguna Treatment Plant Combined Heat and Power Project, File Number 2010-0026, and approved by the Deputy Director of Public Works - Engineering, hereinafter referred to as the Project Plan(s).

TO THE AWARD AUTHORITY OF THE CITY OF SANTA ROSA

The undersigned, as bidder, declares that the only person or parties interested in this proposal as principals are those named herein; that this proposal is made without collusion with any other person, firm, or corporation; that he has carefully examined the plans, special provisions and conditions therefor, and is familiar with all proposal requirements, that he has examined this Contract Proposal and the provisions incorporated by reference herein, and he hereby proposes, and agrees if this Contract Proposal is accepted by the City, to provide all necessary machinery, tools, apparatus, and other means of construction, and to do all the work and furnish all the materials and services required to complete the said construction in accordance with the Contract, the Special Provisions, the Project Plan(s), and Addendum to any of the above as incorporated by reference in the time stated herein, for the unit prices and/or lump sum prices as follows:

Version Date 3-30-10
<table>
<thead>
<tr>
<th>Item No</th>
<th>Quantity</th>
<th>Description</th>
<th>Unit Price</th>
<th>Total</th>
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</thead>
<tbody>
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<td>LUMP SUM</td>
<td>COMBINED HEAT &amp; POWER PROJECT</td>
<td>$_________</td>
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<tr>
<td></td>
<td></td>
<td>Total Base Bid (Sum of &quot;Total&quot; Column)</td>
<td>$_________</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Alternate A</td>
<td>$_________</td>
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<td>2</td>
<td>LUMP SUM</td>
<td>FOURTH ENGINE</td>
<td>$_________</td>
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<td></td>
<td></td>
<td>Total Alternate A</td>
<td>$_________</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total Base Bid plus Alternate A</td>
<td>$_________</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternate B</td>
<td>$_________</td>
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<tr>
<td>3</td>
<td>LUMP SUM</td>
<td>BUILDING SKYLIGHTS</td>
<td>$_________</td>
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<td></td>
<td></td>
<td>Total Alternate B</td>
<td>$_________</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Total Base Bid plus Alternate B</td>
<td>$_________</td>
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<tr>
<td></td>
<td></td>
<td>Alternate C</td>
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<td>4</td>
<td>LUMP SUM</td>
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<tr>
<td></td>
<td></td>
<td>Total Alternate C</td>
<td>$_________</td>
<td></td>
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<td></td>
<td></td>
<td>Total Base Bid plus Alternate C</td>
<td>$_________</td>
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<td></td>
<td></td>
<td>Total Base Bid plus Alternate ABC</td>
<td>$_________</td>
<td></td>
</tr>
</tbody>
</table>
In case of discrepancy between the unit price and the total set forth for the item, the unit price shall prevail, provided, however, if the amount set forth as a unit price is ambiguous, unintelligible or uncertain for any cause, or is omitted, or in the case of lump sum items, is not the same amount as the entry in the "Total" column, then the amount set forth in the "Total" column for the item shall prevail in accordance with the following:

1. As to lump sum items, the amount set forth in the "Total" column shall be the unit price.

2. As to unit basis items, the amount set forth in the "Total" column shall be divided by the estimated quantity for the item and the price thus obtained shall be the unit price.

The Total Base Bid shall be the sum of the "Total" column. In case of discrepancy between the sum of the "Total" column and the amount entered as Total Base Bid, the sum of the "Total" column shall prevail. The bid comparison will be based on the sum of the "Total" column for each bidder.

If this proposal shall be accepted and the undersigned shall fail to execute the contract as aforesaid and to give all the required bonds in the sums to be determined as aforesaid, with surety satisfactory to the Award Authority of the City of Santa Rosa, within ten (10) calendar days after the bidder has received notice from the City Engineer that the contract is ready for signature, the Award Authority of the City of Santa Rosa may, at its option, determine that the bidder has abandoned the contract, and thereupon this proposal and the acceptance thereof shall be null and void, and the forfeiture of such security accompanying this proposal shall be in accordance with California Public Contracts, Code Section 2017.

The undersigned understands and agrees that the City will not be responsible for any error or omissions on the part of the undersigned in making this proposal.

The bidder to whom the contract is awarded agrees to execute the contract in favor of the City, in the form attached, and to deliver any and all required bond(s) and insurance information within ten (10) calendar days from the date of the Notice of Award to the successful bidder by the City. Following the approval of the contract, insurance information, and any bonds, Contractor shall commence work within ten (10) calendar days from the day authorized in the Notice to Proceed and diligently prosecute the same to completion in accordance with Section 8-1.03.
LIST OF SUBCONTRACTORS

The following information is furnished relative to each subcontractor who will perform work or labor or render services to the undersigned in and about the construction of the project in an amount in excess of ½ of 1% of the total amount of this bid.

The undersigned agrees that any portion of the work in excess of ½ of 1% of the total amount of this bid and for which no subcontractor is designated herein will be performed by the undersigned.

<table>
<thead>
<tr>
<th>NAME OF SUBCONTRACTOR</th>
<th>COMPLETE ADDRESS</th>
<th>DESCRIPTION OF WORK (ITEM NO.)</th>
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</tbody>
</table>
NAME OF BIDDER: ____________________________________________

LIST OF PREVIOUS SIMILAR JOBS

_________________________________________________________________

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NONCOLLUSION AFFIDAVIT

In accordance with Title 23 United States Code Section 112 and Public Contract Code 7106, the bidder declares that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

NOTE: The above Noncollusion Affidavit is part of the Proposal. Signing this Proposal on the signature portion thereof shall also constitute signature of this Noncollusion Affidavit.

Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.
Accompanying this proposal is a guaranty in the form of (Notice: Insert the words "cash $.", "Cashier's Check," "Certified Check," or "Bidder's Bond" as the case may be) in an amount equal to at least ten percent of the total of the bid.

The undersigned further agrees that in case of default in executing the required contract together with the necessary bonds within the period of time provided in these Contract Proposal documents, the proceeds of the security accompanying this proposal shall become the property of the City of Santa Rosa, California, and this proposal and the acceptance thereof may, at the option of the City, be considered null and void.

The undersigned is licensed in accordance with an act providing for the registration of contractors, License No. _______, Class _______, expiration date __________.

IMPORTANT NOTICE: If bidder or other interested person is a corporation, state legal name of corporation, also names of the president, secretary, treasurer, and manager thereof; if a co-partnership, state true name of firm, also names of all individual co-partners composing firm; if bidder or other interested person is an individual, state firm name and individual's name in full.

________________________________________

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________________________________________

Business Address

________________________________________

Telephone No.

I declare under penalty of perjury that the foregoing is true and correct.

BIDDER'S SIGNATURE: ______________________________________

TITLE: ______________________________________

DATE: ______________________________________
CITY OF SANTA ROSA

CALIFORNIA

CONTRACT NO. 2010-022

This Agreement is made and entered into as of _____________ at Santa Rosa, California, between the City of Santa Rosa, herein referred to as "City" and ________________, herein referred to as "Contractor."

ARTICLE I - Witnesseth, that for and in consideration of the payment and agreement hereinafter mentioned, to be made and performed by the City, and under the conditions expressed in the required bonds dated ______________ and hereunto annexed, said Contractor agrees for the benefit of the said City, at its own cost and expense, to do all the work and furnish all the materials, except such as are mentioned in the Special Provisions to be furnished by said City, necessary to construct and complete the work herein described in a good, workmanlike, and substantial manner. The work embraced herein shall be done in accordance with the Standard Specifications of the State of California Department of Transportation, dated May, 2006, insofar as the same may apply (Standard Specifications); in accordance with the City of Santa Rosa Construction Specifications for Public Improvements (City Specifications); in accordance with the City of Santa Rosa Design and Construction Standards, (City Standards); State of California Department of Transportation Standard Plans, dated May, 2006 (Standard Plans), and in accordance with the Special Provisions hereinabove set forth, all of which are hereby incorporated into and made part of this Agreement.

Said work to be done is further shown upon a plan consisting of 125 sheets entitled, Laguna Treatment Plant Combined Heat and Power Project, File Number 2010-0026, approved by the Deputy Director of Public Works - Engineering, hereinafter referred to as Project Plan(s).

ARTICLE II - The said Contractor agrees to receive and accept the following prices as full compensation for furnishing all materials and doing all the work contemplated and embraced in this Agreement; also for all loss or damage arising out of the nature of the work aforesaid, or from the acts of the elements, or from any unforeseen difficulties or obstructions which may arise or be encountered in the prosecution of the work until its acceptance by the said City and for all expenses incurred by or in consequence of the suspension or discontinuance of work, and for well and faithfully completing the work, and the whole thereof in the manner and according to the plans and specifications therefor, and the requirements of the Engineer under them to wit:
<table>
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<tr>
<th>ITEM NUMBER</th>
<th>QUANTITY</th>
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TOTAL BASE BID (SUM OF "TOTAL" COLUMN) $ _ _ _ _ _ _

BID ITEMS IN THIS SECTION WILL BE INSERTED UPON AWARD OF THE CONTRACT. ITEMS WILL BE THE SAME AS THOSE BID IN PROPOSAL.
ARTICLE III - The City and Contractor hereby promise and agree that said Contractor shall provide the materials and do the work according to the terms and conditions herein contained and referred to, for the prices aforesaid, and the City hereby agrees to pay for the same at the time, in the manner, and upon the conditions set forth; and the said parties for themselves, their heirs, executors, administrators, successors, and assigns, do hereby agree to full performance of the covenant herein stated.

ARTICLE IV - By execution of this Agreement, Contractor hereby represents and certifies that Contractor is aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for Worker's Compensation or to undertake self insurance in accordance with the provisions of that Code, and the Contractor hereby agrees to comply with such provisions before commencing the performance of the work of this Agreement.

ARTICLE V - It is further expressly agreed by and between the parties hereto that the Invitation for Bids, containing the Notice to Contractors, including Special Notices, any required Bonds, the Special Provisions, the Project Plan(s), the Contract Proposal Documents, and any Addenda are all essential parts of this Agreement and are specially referred to and by such reference made a part hereof. In the event of any conflict in the provisions thereof, the terms of said document shall control each over the other, in the following order:

1. This Agreement
2. Addenda (if issued)
3. Contract Proposal Documents
5. Project Plans
6. Notice to Contractors
7. Bonds (if required)

ARTICLE VI - Contractor agrees to commence work pursuant to this Agreement within ten (10) calendar days from the date authorized in the Notice to Proceed and to diligently prosecute the same to completion in accordance with Section 8-1.03 of the Special Provisions.

This Agreement shall not be transferred or assigned without the prior written consent of the City, which may be withheld by the City in its sole and absolute discretion.

If Contractor is a corporation, two corporate officers of Contractor, one from each of the following two groups: a) the chairman of the board, president or any vice-president; b) the secretary, any assistant secretary, chief financial officer, or any assistant treasurer, shall execute this Agreement. The title and name of the corporate officer shall be printed under the signature.

In witness whereof, the parties hereto have executed this Agreement as of the date first written above.

City:

City of Santa Rosa,
a California charter city

By: __________________________
Title: __________________________

ATTEST:
By: __________________________
Title: __________________________

Approved as to form:
By: __________________________

Contractor:

Name of Contractor,
Type of entity

By: __________________________
Name: __________________________

Title: __________________________
By: __________________________
Name: __________________________

Title: __________________________
Contract Number: 2010-022  
Contract Name: LAGUNA TREATMENT PLANT COMBINED HEAT AND POWER PROJECT

Advertised/Announced: 09/07/2010  
Prebid: 09/22/2010 @ 09:00 AM / RM 3  
Bid opening: 10/06/2010 @ 03:00 PM / RM 3

Account:  
Cost: $125.00  
Materials will be available on or after 09/07/2010

Engineer: A. MCAULIFFE, CONTRACT ADMIN 707-543-4284  
Range: $12,642,500.00  
Administrative Support: AMM

Note: For bid results 30 MINUTES AFTER bid opening please call (707) 543-3835. Bid results and planholders lists are also available online at ci.santa-rosa.ca.us/pworks/engineering.

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<tr>
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<th>CONTRACTOR</th>
<th>STREET ADDRESS</th>
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<th>STATE</th>
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<td>SANTA ROSA</td>
<td>CA</td>
<td>95402</td>
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<td>(707) 528-3714</td>
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Last Updated: Wednesday, September 08, 2010  
Page 1 of 1  
Contract Number: 2010-022