ATTACHMENT B

Scope of Work
Amendment No. 1
City of Tualatin
SCADA System Upgrade – Phase 2 Design

July 2022

Background

The City of Tualatin (City) selected Control Systems NW LLC, (CSNW) to help upgrade its existing supervisory control and data acquisition (SCADA) system. The City plans to upgrade its SCADA system in phases. Phase 1, initiated in June of 2021, intended to identify the existing SCADA system assets and work with the City on a plan to modernize the SCADA instrumentation, communications, controllers, computer systems, and operational processes. Phase 1 is scheduled to be finalized in August 2022. Phase 2, discussed in this Scope of Work, is to perform the engineering design services required for the modernization of the SCADA sites as determined in Phase 1. This includes the design of the electrical installation of control system equipment and instrumentation, fabrication-level design drawings of the control panels, and a SCADA radio study for the 450 Megahertz (MHz) radio system. Future phases will include equipment procurement, control panel fabrication, control panel shop testing, and control software development (Phase 3), and electrical and control system installation, startup, testing, commissioning, and training (Phase 4). Contract Phases 3 and 4 will be executed at the City Managers discression after completion of Phase 2 of the project.

The design and radio study shall include the following sites:

1. ASR Well
2. Avery A1 Reservoir
3. Avery A2 Reservoir
4. Avery Pressure Reducing Pressure Sustaining (PRPS)
5. Boones Ferry Pump Station/Flow Control Valve (FCV)-Pressure Reducing Valve (PRV)
6. Chesapeake PRPS
7. City Services Building
8. Dakota hills PRPS
9. Frobase Reservoirs (C Tanks)
10. Lake Oswego Intertie
11. Leveton FCV-PRV
12. Martinazzi Pump Station
13. Metzger Meter
14. Mohawk PRPS
15. Norwood Reservoir/Pump Station (B Tanks)
16. Osage PRPS
17. Park Lift Station
18. Park PCV-PRV
19. Sherwood PRV

20. 57th PRPS
21. 65th PRPS
22. 72nd FCV-PRV
23. 108th FCV-PRV

CSNW will perform the services described in this Scope of Work up to the level of effort identified in the attached Exhibit B – Fee Estimate. If additional effort is required, that extra work will be mutually determined by the City and CSNW.

Task 1 – Project Administration Services

Objective: Administer project records and coordinate with the City and CSNW project team.

Approach:

1.1 Manage the CSNW project team to track work elements accomplished, work items planned for the next phase, man hours, scope changes, time, and budget. Prepare monthly progress reports to summarize work accomplished for the week, anticipate work for the following weeks, and identify potential problems or changes. Submit a monthly invoice summarizing costs and remaining budget. Coordinate with City staff on various project tasks.

CSNW Deliverables:

- Monthly progress reports in electronic format (PDF).
- Monthly invoices in electronic format (PDF).

Task 2 – SCADA Upgrades Design

Objective: Prepare electrical design plans and control panel design fabrication plans for the electrical and control system work at the facilities identified in the Background section.

Approach:

2.1 Visit each site to review the existing control system installation and plan for the proposed electrical and control system improvements. Review as-built information for each site and compare as-builts to actual installation in the field for accuracy.

2.2 Prepare electrical plans for upgrading the SCADA components at each of the City facilities. *Electrical plans will include electrical installation plans for each facility that will be utilized by CSNW for installation as part of a future Phase 4.*

2.3 Prepare control panel fabrication plans for the proposed control panels at each of the City facilities. *Control panel fabrication plans will include the control system drawings necessary for CSNW's control panel shop to fabricate the control panels as part of a future Phase 3. CSNW also will utilize the fabrication drawings to prepare a Bill of Materials (BOM) and finalize estimated equipment and fabrication costs.*

2.4 Submit 90-percent design plans for City review. The 90-percent documents will be submitted to the City, and after the City has reviewed, One (1) project manager from CSNW will attend one (1) review meeting with the City to address staff comments. Upon completion of

addressing the 90-percent comments, CSNW will submit a revised set of documents to the City for final comments.

2.5 Provide internal quality assurance and quality control (QA/QC) review services as part of this Scope of Work. Services will include a formal internal QA/QC process, which provides review of CSNW's design and final deliverables.

2.6 Prepare 90-percent and final construction cost estimates.

2.7 Finalize design plans and submit plans to the City for the City's internal use and records.

Provided by City:

- Attendance at site visits and access to the sites during the site visits.
- Attendance at 90-percent review meeting.
- 90-percent plan review comments.

CSNW Deliverables:

- Attendance at 90-percent review meeting.
- 90-percent design plans and updated 90-percent design plans in electronic format (PDF).
- 90-percent and final construction cost estimates in electronic format (PDF).
- Final plans in electronic format (PDF) for the City's use.

Task 3 – SCADA Radio Study

Objective: CSNW's subcontractor, Accu-Comm, to perform a SCADA Radio Frequency (RF) study with the intent of upgrading the City's analog and serial based 450 MHz radio system to a digital and Ethernet based 450 MHz radio system. As part of the study, Accu-Comm to identify methods to increase the speed of the system and methods to make it scalable for additional facilities.

Approach:

3.1 Visit each of the sites to ascertain existing radio system infrastructure, cabling, etc., and to determine what can't be used in the proposed system and what is suitable for re-use. This subtask will be performed by Accu-Comm as a subcontractor to CSNW and will include ascertaining potential antenna height above ground elevation for each site, as well as transmission line distances.

3.2 Perform computer Terrain Analysis. Using the sites and locations specified in the Background section and the results from the site visits, perform a computer-based Terrain Analysis from a Master Telemetry Unit, to each remote site using as fine a gradient vertical database available that is compatible with Softwright's TAP program. This subtask will be performed by Accu-Comm.

3.3 Develop system topology. Based on the results of the Terrain Analysis, develop a system topology that has clear Line of Site (LOS) between Ethernet capable RF routing equipment locations with regard to terrain infringement. This subtask will be performed by Accu-comm.

3.4 Perform detailed RF measurements and tests. Revisit the sites to perform detailed RF measurements and path availability tests based upon actual data transfers and log the test results. *This will involve temporarily placing RF equipment, antennas, masts, and possibly other infrastructure, as necessary, to perform these tests at each site. Path will be rejected if they do not meet manufacturer-specified minimums.* This subtask will be performed by Accu-comm.

3.5 Finalize system topology. Based on the outcome of tests performed in subtask 3.4, finalize a system topology to be employed for approval by the City with the assistance of Accu-Comm. This topology will include cost estimates for a 450 MHz upgrade at each site.

3.6 Provide report to the City and meet with City staff to discuss the report. Provide Accu-Comm's report to the City once an approval of the recommended system topology is obtained. Meet with the City to review and discuss critical aspects of the report.

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Provided by City:

- Access to City facilities and wireless communications systems during site visits.
- City staff to be available during site visits.
- Attendance at meeting to discuss radio survey results.

CSNW Deliverables:

- Attendance by Accu-Comm at site visits for testing.
- Radio survey results from wireless vendor in electronic format (PDF).
- Attendance at meeting with City to discuss radio survey results.

Project Schedule

Task	Anticipated Completion
Task 1 – Project Administration Services	
Task 2 – SCADA Upgrades Design	
2.1 – Attend Site Visits to Plan Improvements	1 Month After NTP
2.2 – Prepare Electrical Plans	3 Months After NTP
2.3 – Prepare Control Panel Fabrication Plans	3 Months After NTP
2.4 – Submit 90-Percent Documents for City Review and Revise Plans	3 Months After NTP
2.5 – Perform Internal QA/QC Review	4 Months After NTP
2.6 – Prepare Construction Cost Estimates	3 to 4 Months After NTP
2.7 – Finalize Plans and Submit to City	4 Months After NTP
Task 3 – SCADA Radio Study	
3.1 – Visit Sites to Ascertain Existing Infrastructure	1 Month After NTP
3.2 – Perform Computer Terrain Analysis	2 Months After NTP
3.3 – Develop System Topology	2 Months After NTP
3.4 – Perform Detailed RF Measurements and Tests	3 Months After NTP
3.5 – Finalize System Topology	3 Months After NTP
3.6 – Provide Report to City and Meet with City Staff	3 Months After NTP

CONTRACT COMPLETION DATE: 4 Months

EXHIBIT B

Fee Estimate
Amendment No. 1
City of Tualatin
SCADA System Upgrade - Phase 2 Design
Jul-22

	Description	Total Hours	Total Labor	Total Sub/Material	Total Expense	Total Cost
Task 1	**Project Administration Services**	**38**	**$ 8,014**	**$ -**	**$ 236**	**$ 8,250**
1.1	Manage CSNW Team and Prepare Progress Reports and Monthly Invoices	38	$ 8,014	$ -	$ 236	$ 8,250
Task 2	**SCADA Upgrades Design**	**650**	**$ 124,614**	**$ -**	**$ 15,388**	**$ 140,002**
2.1	Attend Site Visits to Plan Improvements	100	$ 19,068	$ -	$ 2,759	$ 21,827
2.2	Prepare Electrical Plans	104	$ 19,496	$ -	$ 2,687	$ 22,183
2.3	Prepare Control Panel Fabrication Plans	236	$ 44,356	$ -	$ 5,314	$ 49,670
2.4	Submit 90-Percent Documents for City Review and Revise Plans	88	$ 17,412	$ -	$ 2,269	$ 19,681
2.5	Perform Internal QA/QC Review	22	$ 5,282	$ -	$ 352	$ 5,634
2.6	Prepare Construction Cost Estimates	60	$ 11,412	$ -	$ 993	$ 12,405
2.7	Finalize Plans and Submit to City	40	$ 7,588	$ -	$ 1,015	$ 8,603
Task 3	**SCADA Radio Study**	**44**	**$ 10,124**	**$ 20,802**	**$ 822**	**$ 31,748**
3.1	Visit Sites to Ascertain Existing Infrastructure	6	$ 1,414	$ 4,600	$ 35	$ 6,049
3.2	Perform Computer Terrain Analysis	-	$ -	$ 2,300	$ -	$ 2,300
3.3	Develop System Topology	-	$ -	$ 2,300	$ -	$ 2,300
3.4	Perform Detailed RF Measurements and Tests	6	$ 1,414	$ 4,600	$ 35	$ 6,049
3.5	Finalize System Topology	-	$ -	$ 2,300	$ -	$ 2,300
3.6	Provide Report to City and Meet with City Staff	32	$ 7,296	$ 4,702	$ 751	$ 12,750
	PROJECT TOTAL	**732**	**$ 142,752**	**$ 20,802**	**$ 16,446**	**$ 180,000**

EXHIBIT C CONTROL SYSTEMS NW LLC 2022 SCHEDULE OF RATES AND CHARGES		
RATE LIST	**RATE**	**UNIT**
Professional I	$158	$/hr
Professional II	$173	$/hr
Professional III	$190	$/hr
Professional IV	$205	$/hr
Professional V	$220	$/hr
Professional VI	$234	$/hr
Professional VII	$251	$/hr
Professional VIII	$261	$/hr
Professional IX	$261	$/hr
Control Specialist I	$143	$/hr
Control Specialist II	$156	$/hr
Control Specialist III	$171	$/hr
Control Specialist IV	$186	$/hr
Control Specialist V	$198	$/hr
Control Specialist VI	$212	$/hr
Control Specialist VII	$228	$/hr
Control Specialist VIII	$237	$/hr
Technician I	$120	$/hr
Technician II	$131	$/hr
Technician III	$148	$/hr
Technician IV	$160	$/hr
Technician V	$175	$/hr
Technician VI	$191	$/hr
Technician VII	$207	$/hr
Technician VIII	$218	$/hr
Administrative I	$78	$/hr
Administrative II	$92	$/hr
Administrative III	$111	$/hr
Administrative IV	$131	$/hr
Administrative V	$149	$/hr
CAD/GIS System	$27.50	$/hr
CAD Plots - Half Size	$2.50	price per plot
CAD Plots - Full Size	$10.00	price per plot
CAD Plots - Large	$25.00	price per plot
Copies (bw) 8.5" X 11"	$0.09	price per copy
Copies (bw) 8.5" X 14"	$0.14	price per copy
Copies (bw) 11" X 17"	$0.20	price per copy
Copies (color) 8.5" X 11"	$0.90	price per copy
Copies (color) 8.5" X 14"	$1.20	price per copy
Copies (color) 11" X 17"	$2.00	price per copy
Technology Charge	2.50%	% of Direct Labor
Mileage	$0.625	price per mile (or Current IRS Rate)
Subconsultants/Subcontractors	15%	Cost +
Materials/Equipment	15%	Cost +

Rates listed are adjusted annually.