Statement of Work

Autonomous Underwater Vehicle (AUV)

Phase I – Development & Demonstration



**HISTORY CHANGE LOG**

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| --- | --- | --- | --- | --- |
| REV | DATE | ORIGINATOR | USED ON | SUMMARY DESCRIPTION OF CHANGES |
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# Introduction

The BUYER is in need of Periods of performance for this effort are as defined in the associated subcontract document.

Work covered by this Statement of Work (SOW) include the following activities; all definitized future work will be handled by an update to this SOW and Subcontract modification:

* Completion of preliminary design and production of prototype units that have all functionality in the source procurement specification but may not necessarily conform to the specified mechanical dimensions. This effort will culminate in a preliminary design review (PDR). Approximate timeframe to be 01 February 2020 – 30 June 2020.
* Completion of design updates identified from the prototype or the initial design efforts, culminating in a critical design review (CDR), serving as the gate for production. Approximate timeframe to be 01 July 2020 – 31 March 2021.
* Completion of brassboard units, meeting form, fit, and function identified in the procurement specification with the exception of reliability requirements and high voltage withstand requirements. Approximate timeframe to be 01 April 2021 – 10 May 2021.
* Incorporation of design updates from CDR and brassboard testing and begin build of production units. Approximate timeframe to be 11 May 2021 – 30 June 2021.
* Qualification and delivery of all production units. Approximate timeframe to be 01 July 2021 – 30 September 2021.

This SOW supports a contract between BUYER and SELLER for the tasks to be performed by the SELLER to design the \*\*\*.

## Scope

This SOW defines the SELLER’s responsibilities for furnishing personnel, facilities, materials, and services required to design the \*\*\*.

## Period of Performance

The period of performance will be as defined in the official subcontract documentation.

## Non-Proprietary Information

All concepts, design, documentation and data delivered under this contract must be delivered with unlimited rights, government purpose rights, or limited rights and marked accordingly, as specified in the applicable contract clause. Deliverables may not be marked as proprietary.

## Disclosure

The work in support of this SOW is considered competition sensitive for the BUYER. The SELLER shall not disclose the fact that they have a contract with BUYER for this effort, nor any details of the design or design discussions, without the express written consent of BUYER.

Similarly, the BUYER shall not disclose the fact that they have a contract with SELLER outside the program and corporate channels, nor any details of the design or design discussions, without the express written consent of the SELLER.

# Applicable Documents

The following documents form a part of this SOW to the extent specified herein. In the event of a conflict between the documents specified below and the content of the SOW, the SOW shall take precedence. In all cases, the BUYER shall be notified of any conflicts. Nothing in this document, however, supersedes applicable law and regulations unless a specific exemption has been obtained and incorporated as part of the contract. The following documents of the most recent released issue at the time of the award form a part of this SOW to the extent specified herein.

## Subcontract Documents

Table 2-1 Subcontract Documents

|  |  |
| --- | --- |
| **Document Number** | **Title** |
|  |  |

## Supersession

If any of the documents cited in this section are changed during the period of performance of this subcontract, the SELLER shall not use the later issue without prior written approval from the BUYER’s Subcontract Administrator (SCA). In the event that the SELLER becomes aware of changes to the Applicable Documents, the SELLER shall notify the BUYER’s SCA who will provide direction.

# Seller Tasks

The SELLER shall provide all necessary labor, materials, and facilities required to perform the work described by this SOW and to meet all delivery requirements and the terms of the related subcontract.

## Management Tasks

### Program Management

The SELLER shall appoint a Subcontract Program Manager (SPM) specifically charged with the primary responsibility for services, equipment, and data to be delivered under the applicable subcontract according to this SOW. The SPM shall serve as a single point of contact between the SELLER and the BUYER and shall maintain close contact with the BUYER’s Technical Lead and SCA. Contact information for BUYER’s representatives is included in the subcontract documentation.

### Weekly Status Review

The BUYER and SELLER shall review the subcontractor’s status weekly and discuss technical, cost and schedule status including program milestones/events/actions due during the upcoming week. A mutually acceptable day and time for the meetings shall be arranged during the contract kickoff review. The meetings will be via telephone.

### Monthly Status Review

The BUYER and SELLER shall conduct a monthly review in person at the SELLER’s facility. This review shall take the place of the Weekly Status Review identified in section 3.1.2. The dates for the in-person reviews will be agreed upon by both BUYER and SELLER a minimum of 14 days prior to the review.

### Monthly Status Report

The SELLER shall submit Monthly Status Reports (MSR) (CDRL-001) by close of business on the fifth working day after the SELLER’s accounting month end during the period of performance. The monthly status report shall be electronically sent to the PM, SCM and Technical Lead. Content of the MSR will include the following items at a minimum:

1. Subcontract Status Summary
   1. Programmatic accomplishments
   2. Technical status and accomplishments
2. Issues & Concerns
3. Action Item Review/Status
4. Schedule Update
5. Identification of Long Lead Materials necessary to meet schedule for delivery of future products

### Program Status Reviews

The SELLER shall hold a Program Status Review (PSR) meeting with the BUYER’s representatives, coinciding with the reviews defined below, to review the progress of the program and discuss technical, status, management status, and discuss the current monthly status report (MSR). The meetings shall be held at the SELLER’s facility. Program action items shall be agreed upon at the meeting, and the agreements included as part of the monthly program review minutes.

### Master Schedule

The SELLER shall submit a schedule (CDRL-002) for the duration of the contract phase, as well as a notional schedule for completion of design and production. The schedule shall show how the subcontractor will meet deliverables, program milestones and risk mitigation milestones. The schedule status shall be provided to the BUYER’s technical representative, SCM, and SCA in conjunction with the monthly status report.

### Quality Management

The SELLER shall plan, implement, and maintain a quality management system that is compliant with the BUYER's Mission Systems Clauses in the contractual documentation. The quality management program (CDRL-006) shall be described as part of the first MSR.

### Configuration & Data Management

The SELLER shall maintain a configuration management system for all items required by this SOW that assures the configuration identification, control, status accounting, reporting, and auditing of all deliverable items. The SELLER shall maintain a configuration management system that adheres to established SELLER CM Policies and Procedures provided to the BUYER (CDRL-005), and that is subject to BUYER review and approval. Authorization to proceed with changes to the baseline configuration shall be provided to the SELLER by means of appropriate contractual direction prior to change implementation.

### Drawings

The SELLER shall provide one (1) legible reproducible set and a soft copy set of all SELLER drawings for any contractual deliverable units (prototypes, brassboards, production units, etc.) in accordance with any established non-disclosure agreement in effect. Documents shall include all fabrication and assembly drawings and BOMs.

### Customer Furnished Equipment

The SELLER shall maintain a log of any customer furnished equipment to include its model number, serial number and location. The log shall be furnished upon request of the BUYERS Subcontract Administrator.

### Place of Performance

The SELLER shall perform the tasks associated with this statement of work at the SELLER’s facility.

## Technical Tasks

### Engineering

The SELLER shall perform all necessary design, engineering, analyses, modeling, and documentation required to define and build the stacked voltage converter in the prototype, brassboard, and deliverable form.

### Interface Definition

The SELLER shall support the BUYER in refining the interface definition to the \*\*\* to include physical dimensions, electrical interfaces, connectors, isolation, surge requirements, command and status, and thermal interfaces.

### Reliability Analysis

The SELLER shall provide a reliability estimate or prediction for the production voltage converters based on the SELLER’s other designs and planned component quality and stress levels. The SELLER shall use Telcordia SR322, Issue 4 for reliability calculations. The reliability estimate shall take into account the operational temperatures provided by the BUYER, and part stress levels de-rated in accordance with GEIA-SSTD-008 or equivalent. Any use of equivalent document shall be subject to BUYER review and approval. The reliability analysis shall include description of any approved derating exceptions, and analyses showing any limited life components exceed design and operational life requirements. The initial reliability analysis (CDRL-008) shall be submitted to the PM, SCM and SCA as part of the May MSR and updated monthly for each subsequent MSR submittal.

The SELLER shall update the reliability prediction as the design matures.

The SELLER shall mitigate any Single Point Failures in the \*\*\* design that would prevent the overall system from functioning, including input and output bus shorts.

The SELLER shall track and report all failures occurring during development, integration and test of the prototype units to support the BUYER’s failure trend analysis.

### Thermal Modeling

The SELLER shall perform and provide the results of thermal modeling that shows \*\*\*.

### Structural Modeling

The SELLER shall perform and provide the results of structural modeling that shows the critical stresses and margin to yield for the \*\*\* design. Structural analysis results (CDRL-011) are to be submitted in conjunction with Preliminary Design Review package (CDRL-004) to the PM, SCM and SCA and updated for Critical Design Review Package (CDRL-009).

### Milestone Reviews

The SELLER shall conduct milestone reviews with the BUYER identified below. Minutes of the actions and agreements at each review (CDRL-003) shall be submitted to the PM, SCM and SCA with the final review package.

Table 3-1 Milestone Reviews

|  |  |
| --- | --- |
| Review | Due Date |
| Preliminary Design Review |  |
| Critical Design Review |  |
| Demonstration Test Readiness Review | Prior to beginning of testing on deliverable production units |

#### Preliminary Design Review

The SELLER shall conduct a Preliminary Design Review no later than \*\*\* on a mutually agreed date that the BUYER will attend. A draft version of the Preliminary Design Review Package (PDR) (CDRL-004) will be electronically sent to the BUYERs PM, SCM and Technical Lead 10 working days prior to the review. Topics covered in the Preliminary Design Review will include the following as a minimum:

1. Detailed schematics and board layouts
2. Chassis and mechanical design drawings
3. Thermal modeling analysis
4. Structural analysis
5. Predicted performance estimates
6. Updated schedule
7. CM process
8. Action Item Status

The Preliminary Design Review shall serve as a control gate for agreement on modifications, performance characteristics and physical characteristics prior to committing to the initial fabrication of the brassboard voltage converter. The final presentation package and minutes taken at the Preliminary Design Review shall be prepared and submitted to the BUYER within 3 working days after the meeting. Program action items shall be agreed upon at the meeting, and the agreements included as part of the minutes.

#### Critical Design Review

The SELLER shall conduct a Critical Design Review no later than \*\*\* on a mutually agreed date that the BUYER will attend. A draft version of the Critical Design Review Package (CDR) (CDRL-009) will be electronically sent to the BUYERs PM, SCM and Technical Lead 10 working days prior to the review. Topics covered in the CDR will include the following as a minimum:

1. Brassboard unit schematics and board layouts
2. Brassboard unit chassis and mechanical design drawings
3. Updated schematics and board layouts for production units
4. Updated chassis and mechanical design drawings for production units
5. Updated thermal modeling analysis for production units
6. Updated performance estimates for production units
7. Updated schedule
8. Proposed test plan for deliverable units
9. Action Item Status

The Critical Design Review shall serve as a control gate for agreement on modifications, performance characteristics and physical characteristics prior to committing to the initial fabrication of the deliverable voltage converter. The final presentation package and minutes taken at the CDR shall be prepared and submitted to the BUYER within 3 working days after the meeting. Program action items shall be agreed upon at the meeting, and the agreements included as part of the minutes.

#### Test Readiness Reviews

The SELLER shall conduct a Test Readiness Review in conjunction with the completed build of the first qualification unit on a mutually agreed date that the BUYER will attend. A draft version of the Test Readiness Review Package (TRR) (CDRL-010) will be electronically sent to the BUYERs PM, SCM and Technical Lead 10 working days prior to the review. Topics covered in the TRR will include the following as a minimum:

1. Verification Matrix showing traceability of all requirements to test plans
2. Completed test plans
3. Completed test procedures
4. Identification and description of test setup and test personnel

The Test Readiness Review shall serve as a control gate for beginning of design verification testing on a deliverable qualification unit. The final presentation package and minutes taken at the Test Readiness Review shall be prepared and submitted to the BUYER within 3 working days after the meeting. Program action items shall be agreed upon at the meeting, and the agreements included as part of the minutes.

### Engineering Consultation and Support

The SELLER shall provide engineering support to the BUYER in support of the BUYER’s development and demonstration of the higher level power subsystem. Engineering support shall include, as necessary, assistance and inputs for the BUYER’s design reviews with the end customer, assistance in setting up the units for an end customer demonstration at the contractor’s facility. The SELLER shall bid engineering support as follows:

Table 3-2 Engineering Support to Buyer.

|  |  |
| --- | --- |
| Support Task | Engineering Hours |
| Support Interface definition to include connectors, pin outs, command and control protocols, etc. | 24 Hours |
| Support BUYERs Critical Design Review with Block Diagrams, Charts, and Responses to Questions | 80 Hours |
| Support Technical Exchange Meetings as requested by the BUYER | 40 Hours |

# HARDWARE DELIVERABLES

## Delivery Quantities and Schedule

The SELLER shall adhere to the delivery schedule shown below in Table 4-1. The quantity listed in Table 4-1 represent the quantity required to be delivered to the BUYER.

Table 4-1. Hardware Deliverable List \*\*\*

|  |  |  |
| --- | --- | --- |
| QTY | Description | Due Date |
| 4 | Prototype Boards |  |
| 10 | Brassboard Units |  |
| 8 | Qualification Units |  |
| 8 | Production Run #1 |  |
| 8 | Production Run #2 |  |
| 4 | Spares |  |

## Delivery Instructions

The SELLER shall deliver all units in Table 4-1, unless notified otherwise, to the BUYER’s facility in Sacramento, California, as listed in the contract documents. When preparing units for shipment or delivery the SELLER shall package the \*\*\* to protect them from electrostatic discharge and from physical damage due to vibration, shock, or temperature.

# contract data requirements list (CDRL) \*\*\*

The Contract Data Requirements List (CDRL) is shown in Table 5-1.

Table 5-1. Subcontract Data Requirements List

|  |  |  |
| --- | --- | --- |
| CDRL# | Description | Due Date |
| 001 | Monthly Status Report | 5 working days after accounting month end |
| 002 | Master Schedule | Updates with the MSR packages 5 working days after month end |
| 003 | Milestone Review Meeting Minutes | 3 working days after design change review meeting |
| 004 | Preliminary Design Review Package | Draft 10 working days prior to review  Final 3 working days after review with minutes |
| 005 | SELLER’s Configuration Management Plan | Delivered as part of Preliminary Design Review Package |
| 006 | Quality Assurance Program Plan | Delivered as part of Preliminary Design Review Package  Update at Critical Design Review |
| 007 | Thermal Analysis Results | Delivered as part of Preliminary Design Review Package  Update at Critical Design Review |
| 008 | Reliability Analysis | Initial at May MSR  Updates as part of subsequent MSRs |
| 009 | Critical Design Review Package | Draft 10 working days prior to review  Final 3 working days after review with minutes |
| 010 | Test Readiness Review Package | Draft 10 working days prior to review  Final 3 working days after review with minutes |
| 011 | Structural Analysis Results | Delivered as part of Preliminary Design Review Package  Update at Critical Design Review |
| 012 | Qualification Data Package | Delivered 3 working days after completion of qualification testing program |
| 013 | Hardware Acceptance Data Package | Delivered with each hardware deliverable unit, starting with brassboard units |

# acronyms and abbreviations

Below is the list of acronyms and abbreviations

Table 6-1 Acronyms and Definitions

| Abbreviation | Definition |
| --- | --- |
| ARO | After Receipt of Order |
| DRP | Design Concept Review Package |
| ICD | Interface Control Document |
| MSR | Monthly Status Report |
| PSR | Program Status Review |
| RRP | Requirements Review Package |
| SCA | Subcontract Administrator |
| SDP | Software Development Platform |
| SCM | Subcontract Manager |
| SOW | Statement of Work |
| CDRL | Subcontract Data Requirements List |
| SPM | Subcontract Program Manager |
|  |  |