

**Canarie IIP-03 “Undersea Window” Project Milestone 1 Report
Appendix 3
Report on Underwater Vehicle Modifications and Component Deployment
Plans**

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1. Underwater vehicle modification specifications completed

The remotely operated vehicle (ROV) will be modified in order to meet some of the current project requirements. In particular, the specific requirements and the ensuing modifications are:

- The ROV will be required to operate at a maximum depth of 100 meters (previously the ROV could only operate to a depth of 65 meters). Therefore, the following hardware modifications will be made to the ROV:
 - The seals on the thrusters (propulsion units comprised of a propeller and a sealed electric motor) to be replaced with lip seals rated to a depth of 200 meters.
 - The tether connecting the ROV to the control module (located on the surface support vessel) is currently only 80 meters long. The tether will be upgraded to a higher quality material and extended to 150 meters in length (50 meter safety margin built in). The new tether will allow the ROV to operate at the VENUS Saanich Inlet node depth and carry all necessary power and communication signals.
 - Some of the mounting and structural members on the existing ROV will be upgraded to meet the demands of the Canarie project.
- In order to accommodate the modifications to the hardware, it will also be essential to upgrade the ROV’s software. In particular:
 - The ROVs control software must now accommodate for the extra drag created by the different and longer tether. Furthermore, the control algorithms will be modified to compensate for the changes in the ROV’s dynamic behaviour due to the tether and minor structural modifications.

- ROV buoyancy will change and that also necessitates upgrades to the control software.

The above specifications have been finalised and the engineers are now in a position to authorise the work packages to implement the changes. Once the hardware and software changes are completed, the ROV will be wet-tested in the ocean to allow further fine tuning and to also ensure that the ROV performs as per the required specifications.

2. Underwater deployment plan competed

It was decided that the sophisticated tether management system would not be necessary due to the small diameter tether connecting the high definition camera housing to the VENUS node. Originally, it was assumed that a larger diameter tether would be required. This would have entailed building a sophisticated tether management system that could spool the tether in, or out, as required (i.e. during movement of the camera housing and its platform). The design of such a system was therefore eliminated from the Milestone and subsequent deliverables. However, some form of tether anchoring will be required at the end closest to the VENUS node. This is a safety measure to ensure that the connector attached directly to the VENUS node will not be damaged in the event that the camera housing tether suffers any severe and direct tensile load (e.g. a “tug” on the tether caused by an ocean swell when the housing, platform and associated support vessel are in motion). This change will not affect the overall deployment. The ROV, support vessel and camera platform system will still be utilized as per the original plan.

The deployment plan for the camera housing, pan-tilt and camera support are in process. These items are being designed to accommodate the several possible camera housings currently under consideration. When the camera housing is finalised, the detail design work on the platform and pan-tilt system will be completed.