Pelagic Benthic Coupling Camera Tripod Lighting System Requirements

Revisions

3/26/15	Initial	BH

1. Scope of the Project

   MBARI operates a long duration time series observatory at Station M, which is in 4000 meters of water about 120 nm off central California in the Eastern Pacific Ocean. This observatory has been taking hourly images for over 18 years. We are interested in extending the service interval of this observatory and one of the drivers for that interval is to replenish the energy storage and one of the dominant energy consumers is the existing xenon strobe system. Two, 250J xenon strobes are used and they have a guide number of about 32 and area placed about 1m on either side of the camera, oriented as shown in Figure 1 and 2 below. The camera system was upgraded from a 35mm film camera to a Canon 5D DSLR camera in 2007 and a second upgrade to a Canon 5D Mk2 is planned for 2015. The increased sensitivity of these cameras over the original film should require less light to provide an equivalent, or better image of the seafloor. One of the lighting challenges is to adequately illuminate the seafloor far from the camera without saturating the ground in front of oblique view of the camera. We are looking for a lighting solution that will consume less energy, does not require major changes to the existing system and provides even light distribution on the seafloor to produce equivalent or better images.

2. Requirements

   2.1. User/High-Level

   2.1.1. A lighting system is needed for operation continuously at Station M that consumes less energy than the 0.4 Whr/image used by the existing dual xenon strobes.

   2.1.2. The new lighting system shall provide similar illumination intensity and coverage to the current xenon-based system.

   2.1.3. The new lighting system shall not require changes to the existing electrical system, or tripod structure.

   2.2. Design-Derived

   2.3. The lighting system shall be depth rated to at least 4000m [2.1.1]

   2.4. The lighting system shall be fabricated out of materials that will survive 20 years of continuous deployment, e.g. Titanium, plastic, FRP. [2.1.1]

   2.5. The lighting system shall draw no more than 2 amps peak current and operate with a bus voltage of 22-32 vdc. [2.1.3]

2.6. Once per hour the camera will apply bus power to the lighting system to charge the ballast as much as necessary for a time not to exceed one minute and 0.4 WHr/image. Then the camera will trigger the lighting system by grounding a trigger line to produce light for the programmed strobe duration. Bus power is removed from the lighting system immediately after triggering. The strobe duration shall be configurable through a serial data deck cable but the deck cable should not be needed for normal operation. [2.1.3]

2.7. The lighting system shall be bright enough so the camera exposure length is shorter than 100 ms and a maximum ISO setting of 3200 is needed to produce images comparable to existing images of which Figure 4 is an example. [2.1.3]

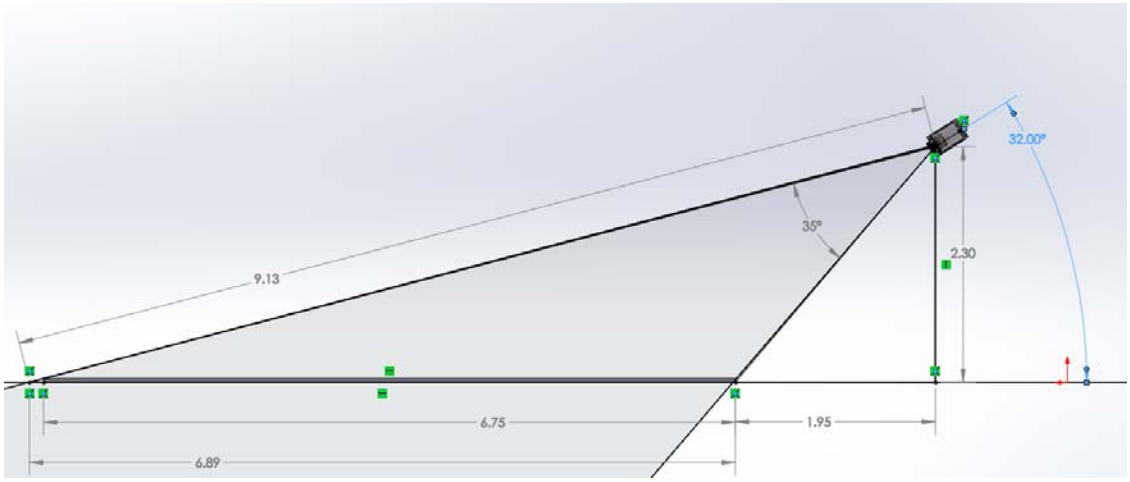

Figure 1: Side View of Tripod FOV

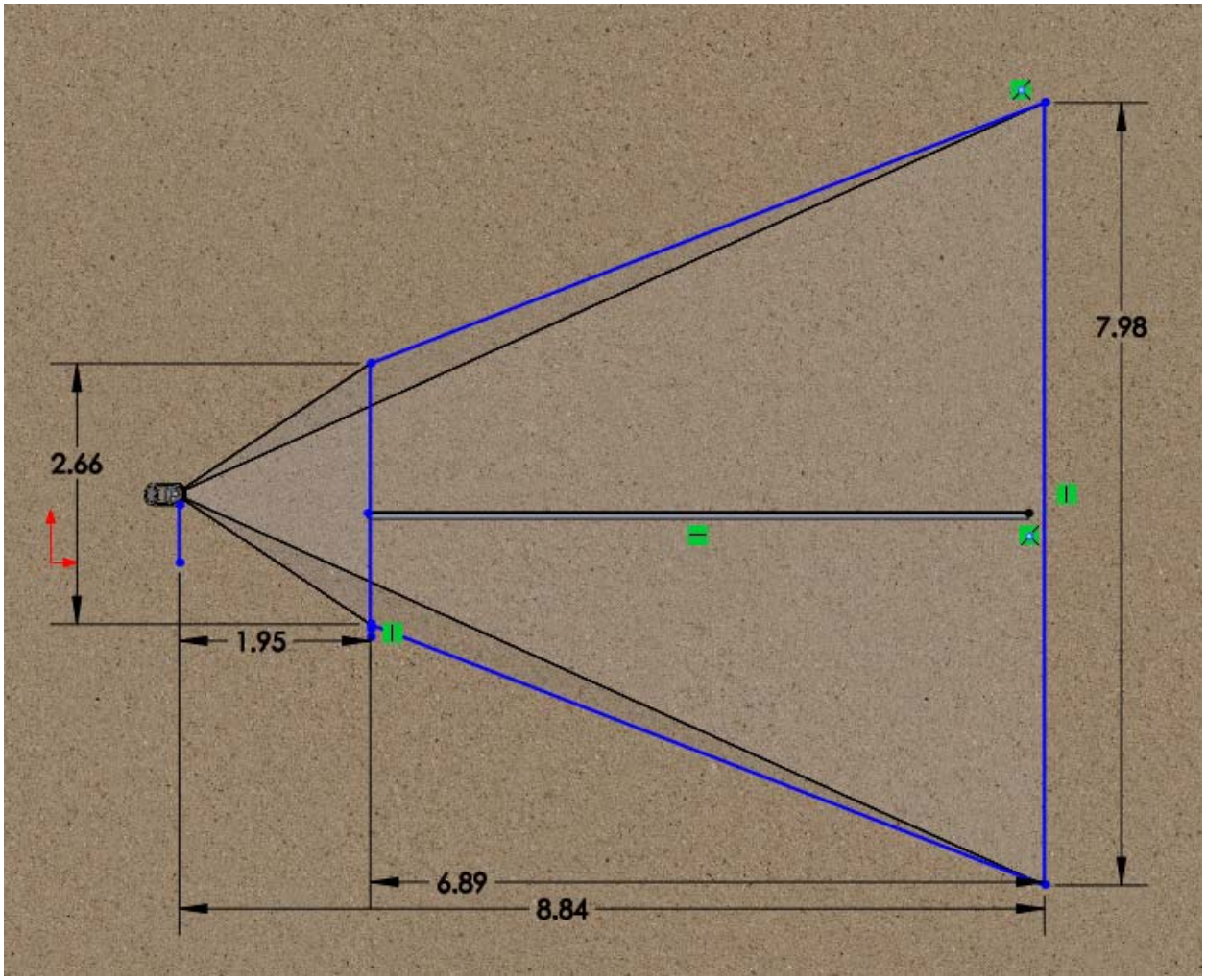

Figure 2: Plan View of Tripod FOV. Imaged area on Seafloor is 36.6 m^2

Figure 3 Camera Tripod on deck

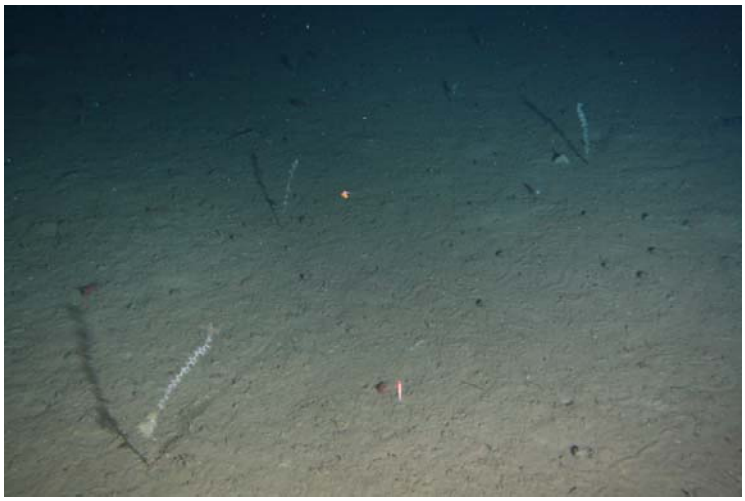

Figure 4 Typical tripod image