

Draft Environmental Impact Statement

Infrastructure Improvements at

the Yap International Airport and

the Yap Seaport

Yap State, Federated States of Micronesia

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APRIL 2026

Appendix E
ATON Foundation Report (Jan 2025)





Aids to Navigation Foundation Survey Report

Contract No. N62473-19-D-2432
Task Order No. N62473-23-F-4522

**FY26 MCON Project P-1200 Yap Port and Channel
Improvements**

Yap Island
Federated States of Micronesia

15 January 2025



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1 Introduction

The purpose of this report is to present photographic documentation of the inner reef and bottom conditions at the location of the existing Aids to Navigation (ATON) foundations in the channel entrance to Yap port. This information will assist in determining potential environmental impacts and possible mitigation strategies. To assess the existing structure foundations, an in-water field survey was conducted from January 8th-11th by GHD employees from the Maritime and Coastal Group. The team measured water depth and foundation dimensions at each location, and took multiple underwater photographs of each foundation including the immediate surrounding area, abandoned ATON foundations, and other debris in the vicinity.

All single pile foundations are generally located on the fringing reef in water depths ranging from 5 ft to 10 ft compared to mean high water levels. The footprint of the new fixed aids is expected to be roughly the same as the existing aids, resulting in minimal impact to the reef in these locations. Given that the existing ATONs were installed within the past 5 years, there is generally little coral attached to the foundations with few exceptions.

In many locations, there were one or more abandoned ATON foundations remaining on the reef. It appears they were abandoned in place, with old driven piles being bent over or cut off at the time new ATONs were installed. Appendix A provides the results of the ATON field survey for all existing ATON locations.

2 Channel Markers and Ranges

The types of ATON found in Yap are shown in Figure 2-1. ATON in Yap follow the IALA-A convention, with red, even-numbered aids on the left when entering port and green, odd-numbered aids on the right.



Figure 2-1 Typical Aids to Navigation in Yap

2.1 Lateral Channel Markers

Proposed lateral channel markers for this project consist of single pile and three-pile fixed ATON. Typical designs for lateral markers are shown in Figure 2-2. As shown, the fixed lights are attached to pile-supported structures while the piles themselves are anchored into a concrete gravity footing. The lights are powered via solar panels and rechargeable batteries mounted on the aid. The fixed aids have reflective dayboards indicating the number: odd-numbered dayboards are triangular and green while even-numbered dayboards are square and red. The overall height of the aid is based on the height of eye of the design vessels as well as the distance between adjacent ATON. For this project the center of the light on top of the aid (focal height) is 15 ft above MHW.

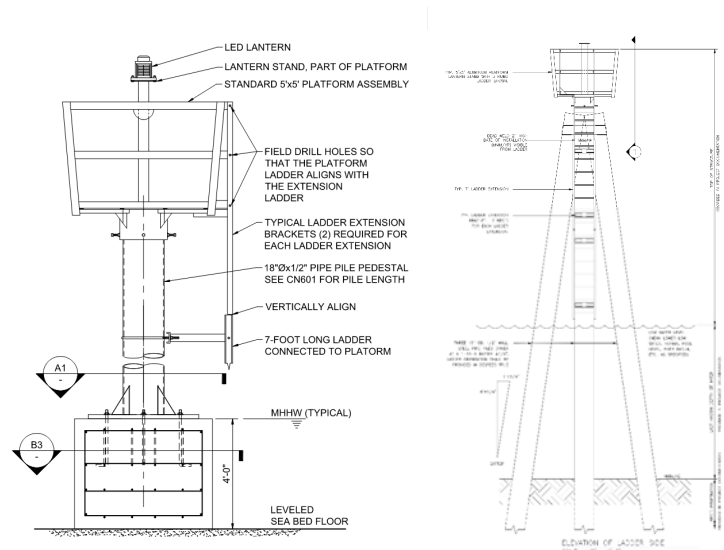


Figure 2-2 Typical Fixed Channel Markers

For the Yap Channel (Figure 2-3), there are no significant changes recommended to the fixed aid constellations. The project will replace the existing fixed channel markers with larger, lit aids as initially identified in the Port and Waterways Safety Assessment (PAWSA) and confirmed in the navigation simulations. This is specifically in response to the larger proposed design vessels and to extend potential transits to nighttime.

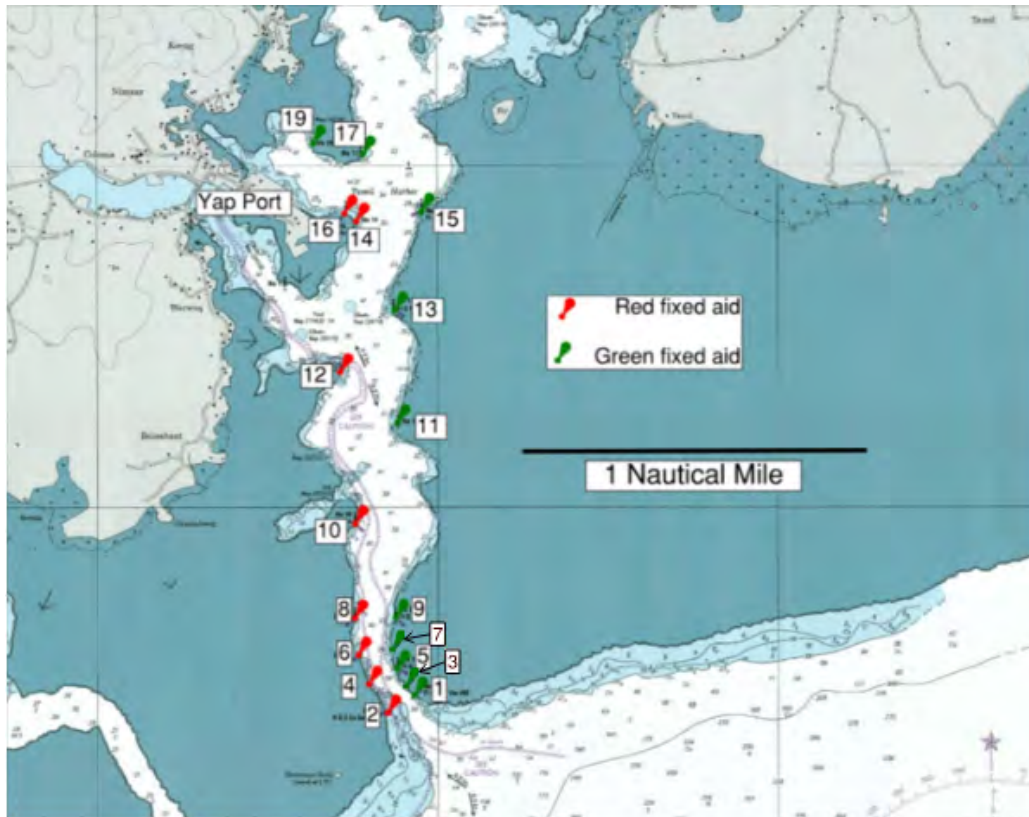


Figure 2-3 Aids to Navigation for the transit to Yap Port, from NOAA Chart 81187

2.2 Range Markers

There are currently no ranges for the Yap Channel. As build drawings obtained from the port indicate there once was a terrestrial sectorized light on a tower, however this structure was demolished and the Stone Money Bank/Meeting House now stand where it once was located. With the shift of the channels centerline the previous site is no longer feasible and an in-water front and rear range system is recommended. Proposed range marker locations are shown in figure 2-4.

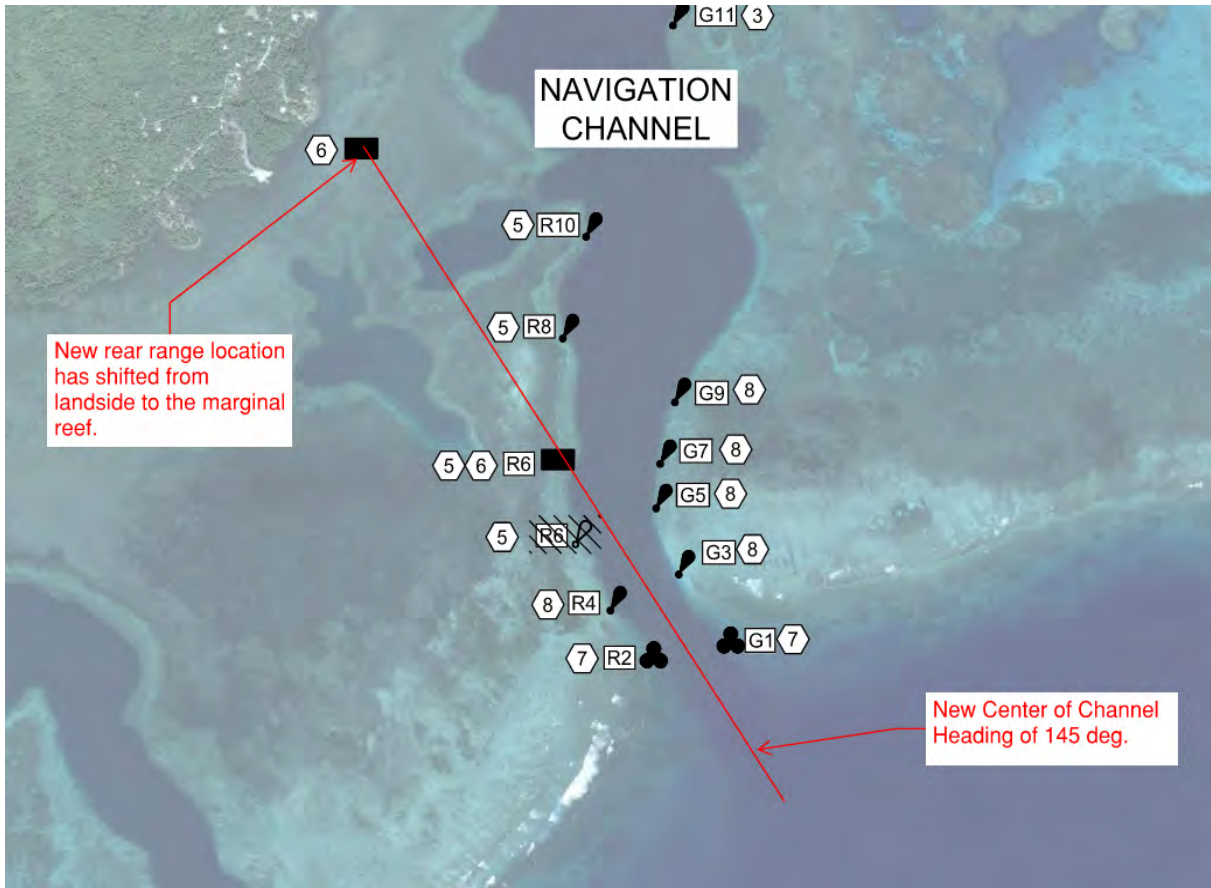




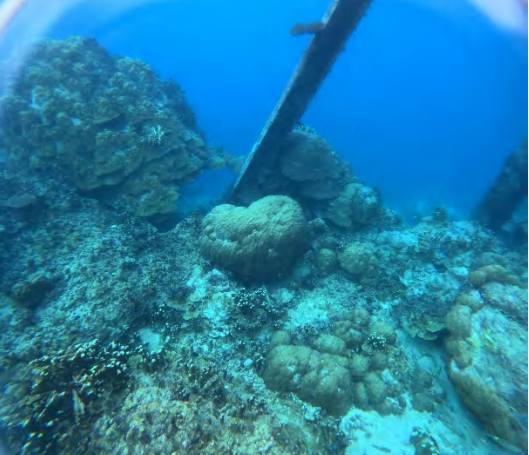





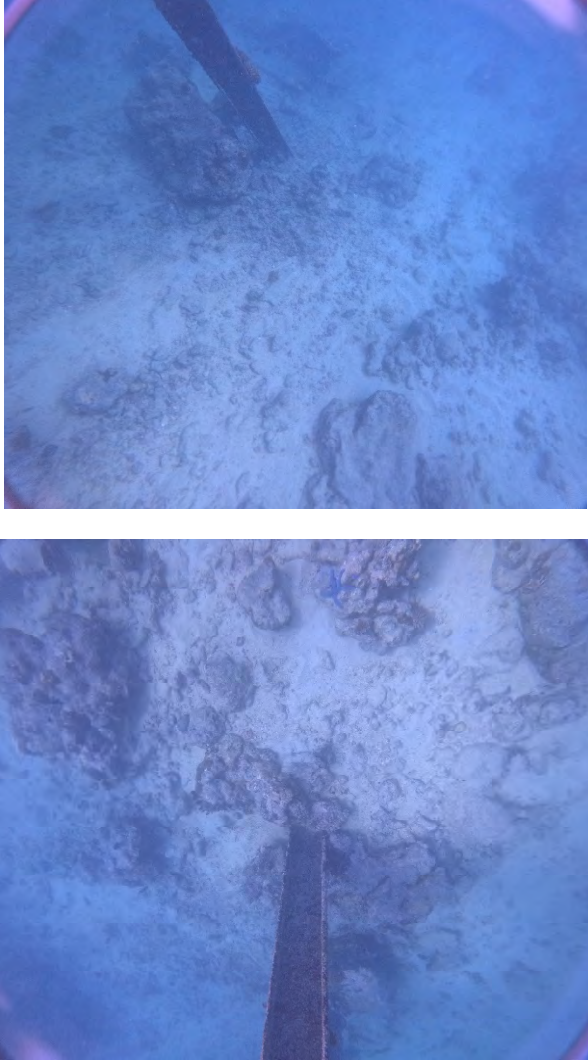
Figure 2-4 Proposed Yap Range and center of channel



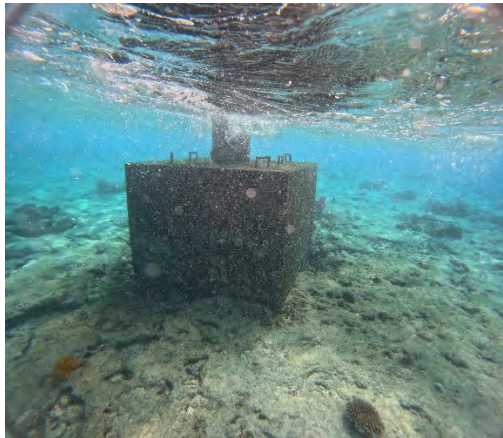
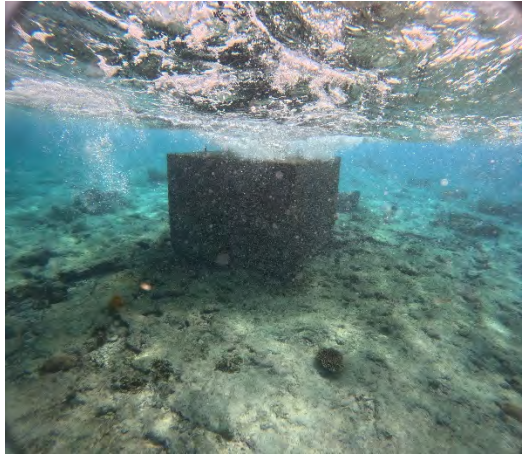

This project will construct the range towers for additional visibility and a longer navigational track. Range markers will enable approaching ships to locate the channel from a greater distance and use them to navigate to the center of the channel prior to passing the island's fringing reef and entering the channel. These large structures consist of a steel skeletal tower mounted on a larger four-pile structure. The range boards (daytime) and range light (nighttime) will be mounted on the steel tower with ladder access from the rear of the tower. These proposed ranges are in remote areas of Yap; therefore, they would be designed to accommodate solar panels and batteries rather than receiving shore power via a cable.






Appendix A – ATON Field Survey



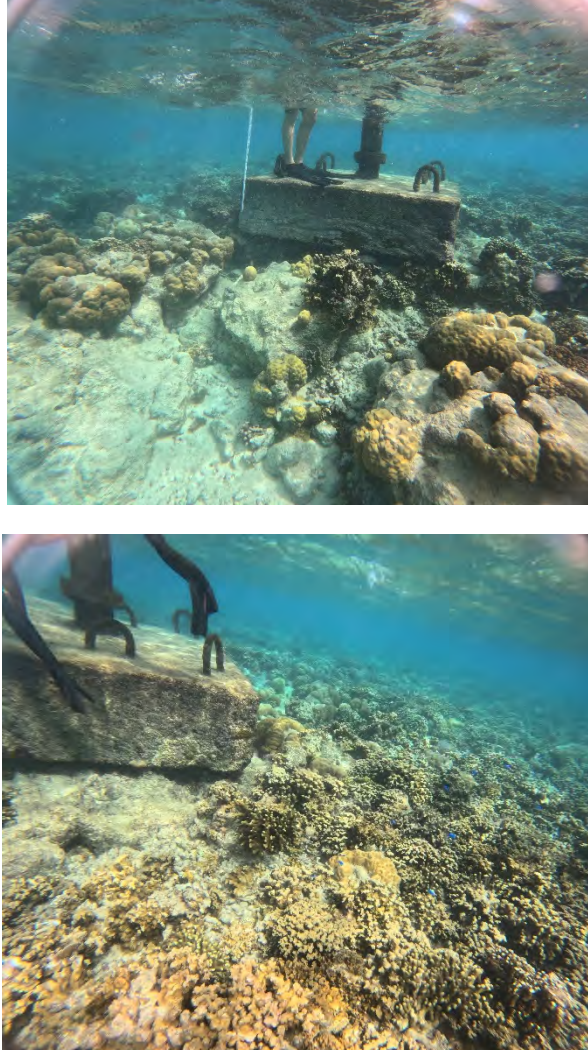
Yap Channel






Channel Marker #	Existing ATON Photo	Foundation Photos	Foundation Photos	Foundation Dimensions	Water Depth (FT, MWH)	Notes
G1		  	 	N/A	22.1	<p>Fixed aid #1 is a three pile structure with driven piles. Large coral heads are present around the three legs. The World Bank project replaced the light and dayboards but left the piles in place. Cathodic protection is installed on one of the three legs. Surface rust is present at and above the splash zone, however steel pile cross sections appear to be intact.</p>



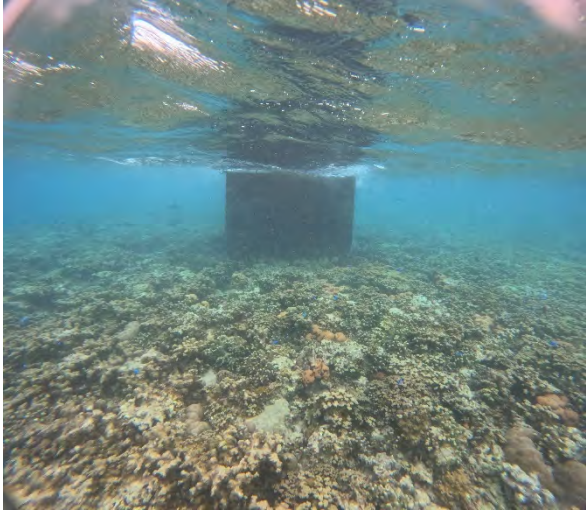


R2				N/A	23.9	<p>Fixed aid #2 is a three pile structure with driven piles. The bottom is mainly a sandy bottom at this location with much less coral growth on this side of the channel. The World Bank project replaced the light and dayboards but left the piles in place. Cathodic protection is installed on one of the three legs. Surface rust is present at and above the splash zone, however steel pile cross sections appear to be intact.</p>
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G3		 	 	60" X 60" X 44"	5.8	<p>Little to no coral present at this location. This is a newer aid that was installed via a World Bank project within the past 5 years. Although there is corrosion protection installed on the pile, there is visible signs of surface rust at and above the splash zone Dayboard is broken on one side.</p>
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<p>R4</p>		 	 	<p>60" X 60" X 44"</p>	<p>6.9</p>	<p>Little to no coral present at this location. This is a newer aid that was installed via a World Bank project within the past 5 years. Although there is corrosion protection installed on the pile, there is visible signs of surface rust at and above the splash zone. Old concrete bases and driven pile remnants remain on the bottom along with other debris.</p>
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<p>G5</p>	 A photograph showing the surface view of aid G5. It features a dark green, triangular top section mounted on a vertical pole, situated in the middle of a blue body of water under a clear sky.	 Two underwater photographs showing the foundation of aid G5. The top image shows a concrete base with several metal rings, surrounded by coral and other marine life. The bottom image shows a similar view from a different angle, highlighting the concrete structure and the surrounding seabed.	 Two underwater photographs showing the foundation of aid G5. The top image shows a concrete base with several metal rings, surrounded by coral and other marine life. The bottom image shows a similar view from a different angle, highlighting the concrete structure and the surrounding seabed.	<p>76" x 76" x 21"</p>	<p>5.8</p>	<p>Older single pile Aid with replacement light. No visible reason for this aid no being replaced other than its location further from the edge of the channel. Foundation is sitting on top of a bed of coral and does not appear the coral has attached to it.</p>
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<p>R6</p>		 	 	<p>60" X 60" X 44"</p>	<p>6.2</p>	<p>This aid was initially planned to be the site of the new front range, however due to a shift in the channel centerline the location will no longer work for the front range. It is recommended to replace this aid with a standard single pile aid. Visible day boards front and back. This is a newer aid that was installed via a World Bank project within the past 5 years. Although there is corrosion protection installed on the pile, there is visible signs of surface rust at and above the splash zone.</p>
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<p>G7</p>		 	 	<p>60" X 60" X 44"</p>	<p>5.4</p>	<p>Visible day boards front and back. This is a newer aid that was installed via a World Bank project within the past 5 years. Although there is corrosion protection installed on the pile, there is visible signs of surface rust at and above the splash zone. Foundation rests on top of the reef with coral under and around the concrete block.</p>
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<p>FR</p>	<p>N/A</p>			<p>Proposed 4 pile 10' X 10' platform with foundation blocks on each leg that measure approximately 6 ft square in this location</p>	<p>~4.5</p>	<p>This is the location for the proposed four pile front range tower. The design calls for the four (4) piles to be mounted to 6ft X 5ft concrete gravity blocks which will support a 10' X 10' platform with a 20 f tall tower mounted on top. The tower will have dayboards and lights for daytime and nighttime navigation.</p> <p>This area is shallow and there are lots of coral in the area. To erect the range tower it will likely be necessary to remove coral in order to place the concrete foundations on a flat supportive surface using bedding stone.</p>
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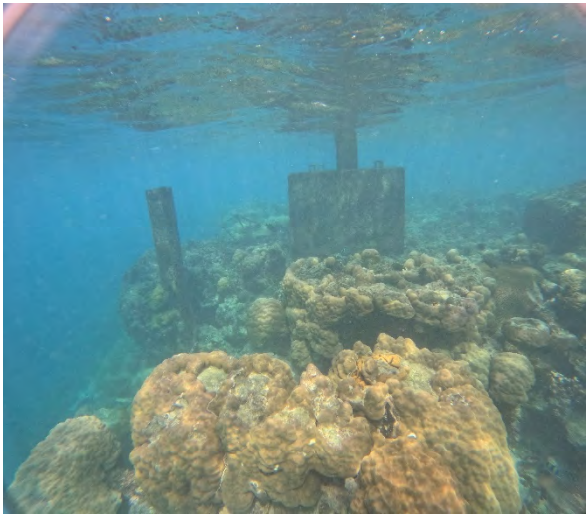
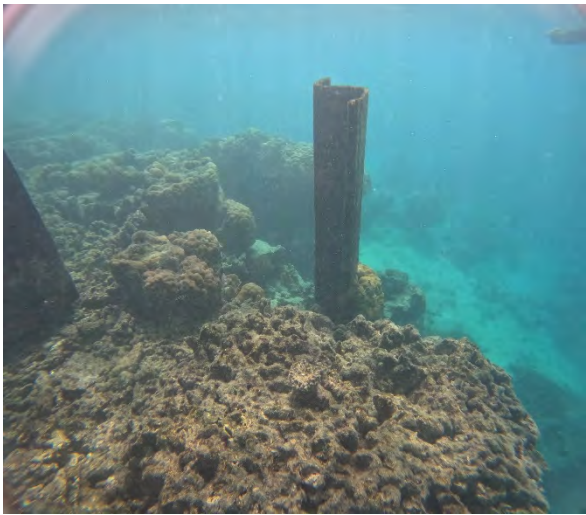
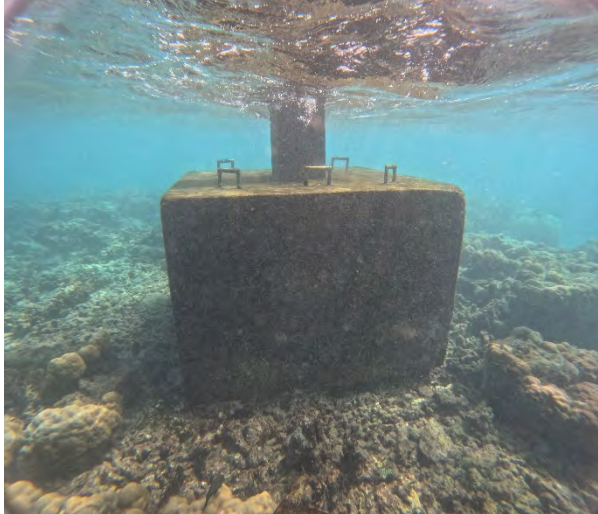


R8




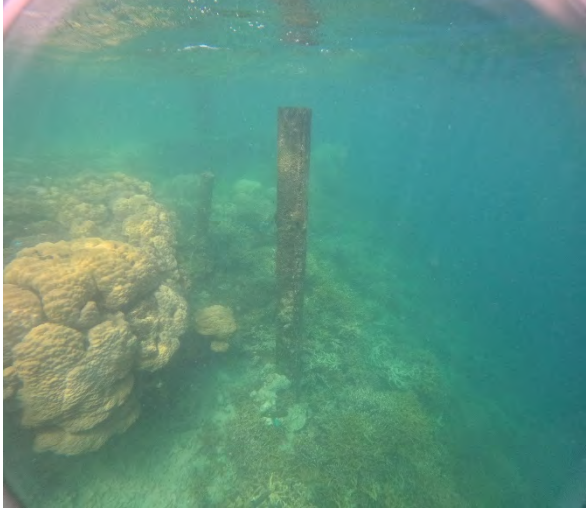



60" X 60" X 44"

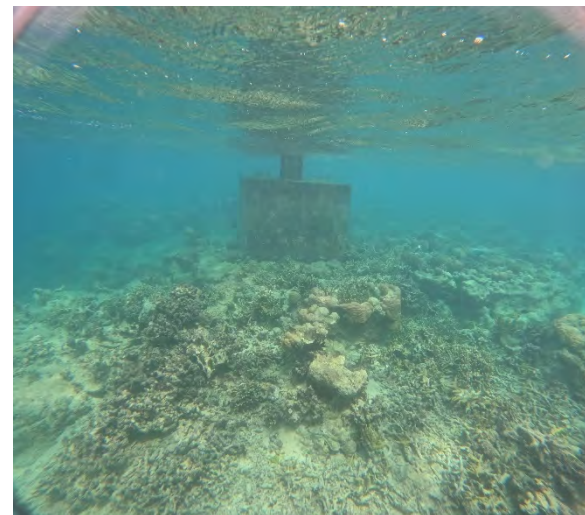
6.3

Visible day boards front and back. This is a newer aid that was installed via a World Bank project within the past 5 years. Although there is corrosion protection installed on the pile, there is visible signs of surface rust at and above the splash zone. There is a lot of coral around this foundation. It appears that either a hole in the coral was found or created when this aid was placed as it sits below the surrounding coral heads. Evidence of older aids are present, but not hazardous to navigation.

<p>G9</p>		  	  	<p>60" X 6000" X 44"</p>	<p>5.6</p>	<p>Damaged day boards front and back. This is a newer aid that was installed via a World Bank project within the past 5 years. Although there is corrosion protection installed on the pile, there is visible signs of surface rust at and above the splash zone. Evidence of older aids are present. The old driven pile appears to have been cut off below the waterline. It is recommended that it be either removed or cutoff at the mudline to eliminate the navigational hazard present.</p>
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<p>R10</p>	 <p>A photograph of a navigation aid (R10) in the open ocean. The aid consists of a vertical metal post with a red and white top section and a white sign with the number '10' in red. The water is blue with some whitecaps, and the sky is overcast.</p>	  <p>Two underwater photographs showing the base of the aid. The top photo shows a concrete foundation with a metal post attached. The bottom photo shows the same foundation with a diver visible in the background, providing a sense of scale.</p>	  <p>Two underwater photographs showing an older, rusted metal pile. The pile is surrounded by coral and other marine life. The water is clear and blue.</p>	<p>60" X 60" X 44"</p>	<p>8.2</p>	<p>Visible day boards front and back. This is a newer aid that was installed via a World Bank project within the past 5 years. Although there is corrosion protection installed on the pile, there is visible signs of surface rust at and above the splash zone.. Evidence of older aids are present. The old driven pile appears to have been cut off below the waterline. It is recommended that it be either removed or cutoff at the mudline to eliminate the navigational hazard present.</p>
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G11







60: X 60" X 44"

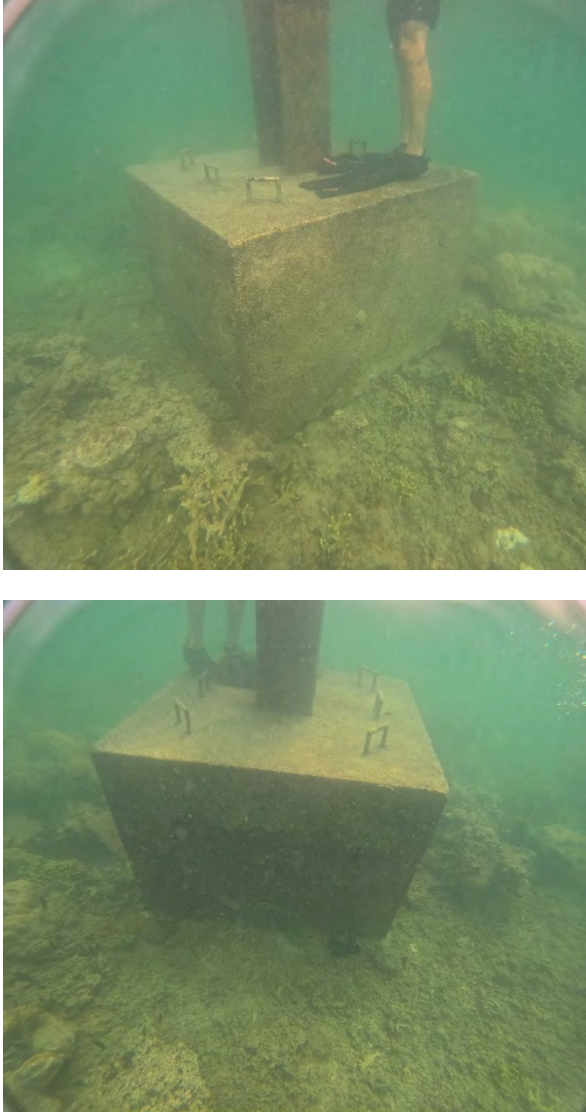
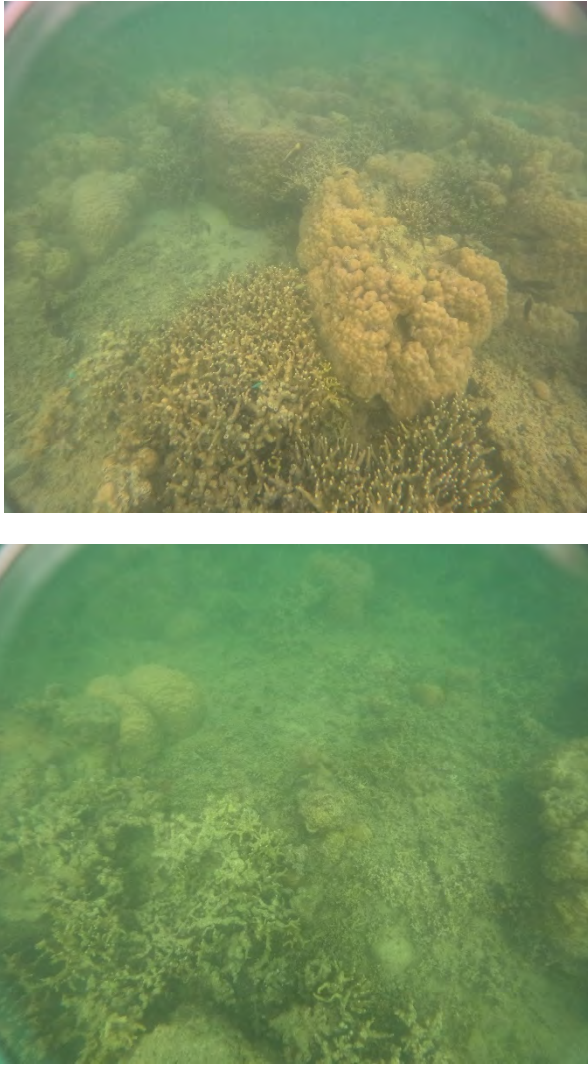
5.3








Visible day boards front and back. This is a newer aid that was installed via a World Bank project within the past 5 years. Although there is corrosion protection installed on the pile, there is visible signs of surface rust at and above the splash zone. The foundation is placed on the coral, but no coral has attached to the foundation itself.

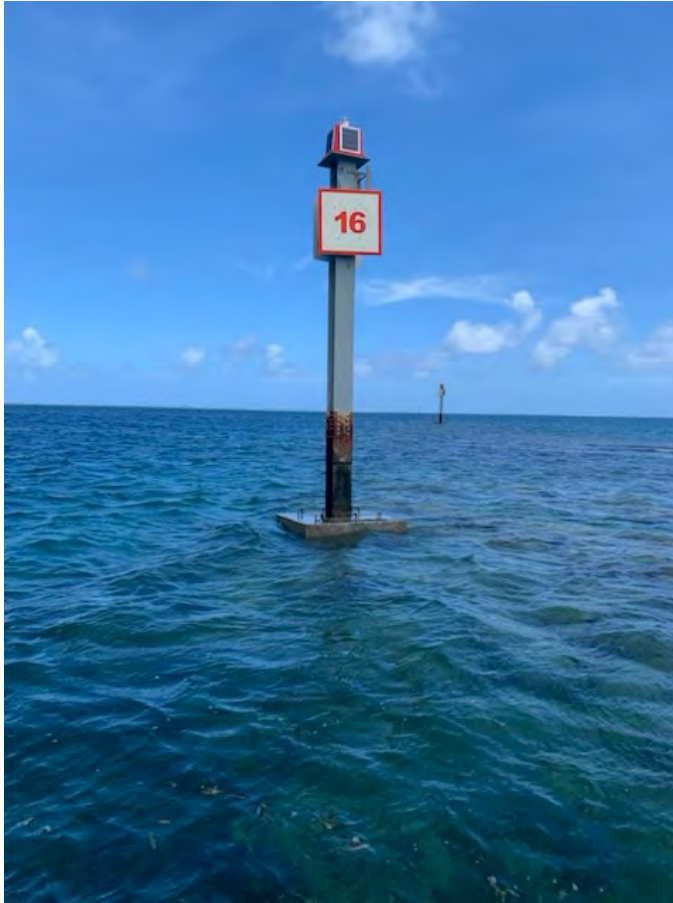



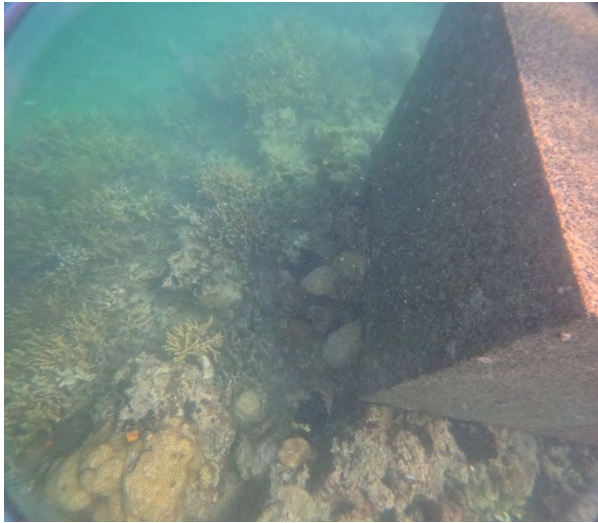
<p>R12</p>				<p>60" X 60" X 44"</p>	<p>8.1</p>	<p>Visible day boards front and back. This is a newer aid that was installed via a World Bank project within the past 5 years. Signs of surface rust at Although there is corrosion protection installed on the pile, there is visible signs of surface rust at and above the splash zone. Foundation appears to be sitting on top of some larger coral but there is little coral attached to the foundation itself.</p>
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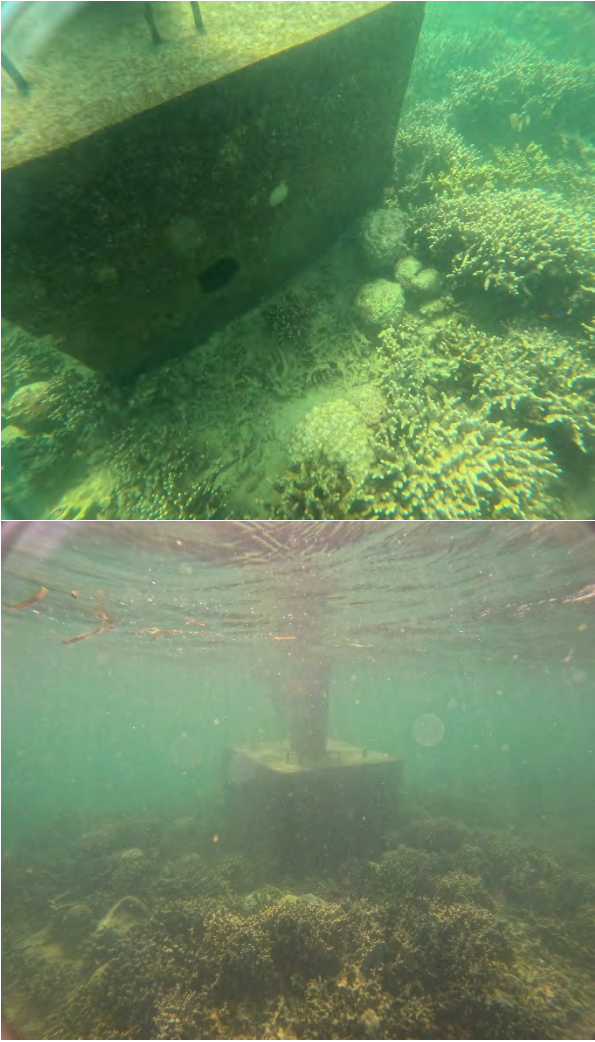
<p>RR</p>	<p>N/A</p>			<p>Proposed 4 pile 10' X 10' platform with foundation blocks on each leg that measure approximately 6 ft square in this location</p>	<p>4.1</p>	<p>This is the location for the proposed four pile rear range tower. The design calls for the four (4) piles to be mounted to 6ft X 5ft concrete gravity blocks which will support a 10' X 10' platform with a 20 f tall tower mounted on top. The tower will have dayboards and lights for daytime and nighttime navigation.</p> <p>This area is shallow and there is a lot of sandy areas with seagrass, but not much coral. Placing the concrete foundations would be relatively easy in this location.</p>
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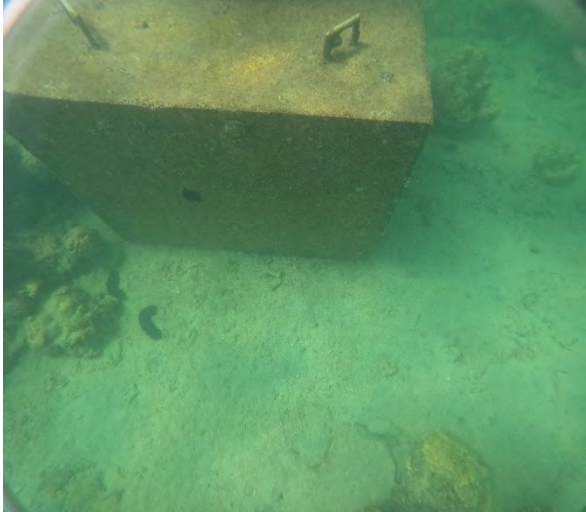



<p>G13</p>		  	  	<p>60" X 60" X 44"</p>	<p>6.0</p>	<p>Visible day boards front and back. This is a newer aid that was installed via a World Bank project within the past 5 years. Although there is corrosion protection installed on the pile, there is visible signs of surface rust at and above the splash zone. There are some corals around the foundation, but it is mostly rubble and sea grass in the immediate area around the foundation. There is evidence of old ATON's in the area. The driven pile that was left is just below the waterline and should be removed or cut off at the mudline to eliminate a navigational hazard.</p>
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<p>R14</p>				<p>60" X 60" X 44"</p>	<p>6.7</p>	<p>Visible day boards front and back. This is a newer aid that was installed via a World Bank project within the past 5 years. Although there is corrosion protection installed on the pile, there is visible signs of surface rust at and above the splash zone. There are some corals around the foundation, but it is mostly rubble in the immediate area around the foundation. Visibility is poor in this area. Approximately 15-20 ft from the channel's edge.</p>
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<p>G15</p>		  	  	<p>60" X 60" X 44"</p>	<p>7.9</p>	<p>Visible day boards front and back. This is a newer aid that was installed via a World Bank project within the past 5 years. Although there is corrosion protection installed on the pile, there is visible signs of surface rust at and above the splash zone. The foundation is resting on rubble with no coral in the immediate footprint. There are corals and seagrass in the general vicinity. Lots of debris from previous ATON's but not considered a navigational hazard. Visibility is poor in this area.</p>
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R16		 	 	60" X 60" X 44"	7.9	<p>Visible day boards front and back. This is a newer aid that was installed via a World Bank project within the past 5 years. Although there is corrosion protection installed on the pile, there is visible signs of surface rust at and above the splash zone. Foundation is placed on top of the coral. It does not appear as though any coral has attached to the foundation since it's installation. There is seagrass in the area. No additional debris was found in the area.</p>
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<p>G17</p>				<p>60" X 60" X 44"</p>	<p>7.5</p>	<p>Visible day boards front and back. This is a newer aid that was installed via a World Bank project within the past 5 years. Although there is corrosion protection installed on the pile, there is visible signs of surface rust at and above the splash zone. The foundation is resting in an area where corals are present but does not appear to have any corals attached to it. There is seagrass present in the vicinity. There is no debris or abandoned ATON's present. Visibility is low in this area.</p>
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<p>G19</p>		  	  	<p>60" X 60" X 44"</p>	<p>8.5</p>	<p>Visible day boards front and back. This is a newer aid that was installed via a World Bank project within the past 5 years. Although there is corrosion protection installed on the pile, there is visible signs of surface rust at and above the splash zone. The foundation is sitting on sand with some corals and seagrass in the surrounding area. There is not signs of old ATONs debris in the area. Visibility is poor.</p>
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