

DIRECTORATE FOR  
GEOSCIENCES

OFFICE OF POLAR PROGRAMS

# Antarctic Research Vessel (ARV)

UNOLS RVTEC Meeting

October 22, 2024

## NSF ARV Team

Tim McGovern, ARV Program Manager

Caitlin Jarecki ARV Assistant Program Manager (NAVSEA)

Mike Prince, ARV Project Manager



National Science Foundation  
WHERE DISCOVERIES BEGIN



Antarctic Research Vessel  
RVIB *Nathaniel B. Palmer*



	<i>Nathaniel B. Palmer</i>	Antarctic Research Vessel	
Length	309 ft	365 ft	<b>Bigger</b>
Sci/Tech Berthing	45	<b>55*</b>	<b>More scientists</b>
Total Lab Space	3,805 sq ft	4,497 sq ft	<b>More lab space</b>
Working Deck Space	4,054 sq ft	7,197 sq ft	<b>More deck space</b>
Endurance	65 days	<b>90 days*</b>	<b>Longer endurance</b>

**AND...**  
greater icebreaking capability  
**≥4.5 ft @ 3 kts (Polar Class 3)\***

\*Key Performance Parameter (KPP)  
*Current Design & Hull Form meets all KPPs*

# ARV Placemat with Specifications



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## Antarctic Research Vessel (ARV) Preliminary Design Placemat



### REFERENCE MISSION

Duration	90 days
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### DIMENSIONS

Length, Overall	365.0 ft
Length, BP	349.0 ft
Beam, Overall	80.0 ft
Beam, WL	79.3 ft
Design Draft	32.5 ft
Working Deck Freeboard	13.0 ft
Displacement (Design Draft)	13,430 LT
Light Ship Weight (including margins)	9,790 LT
Deadweight	3,640 LT

### ACCOMMODATIONS

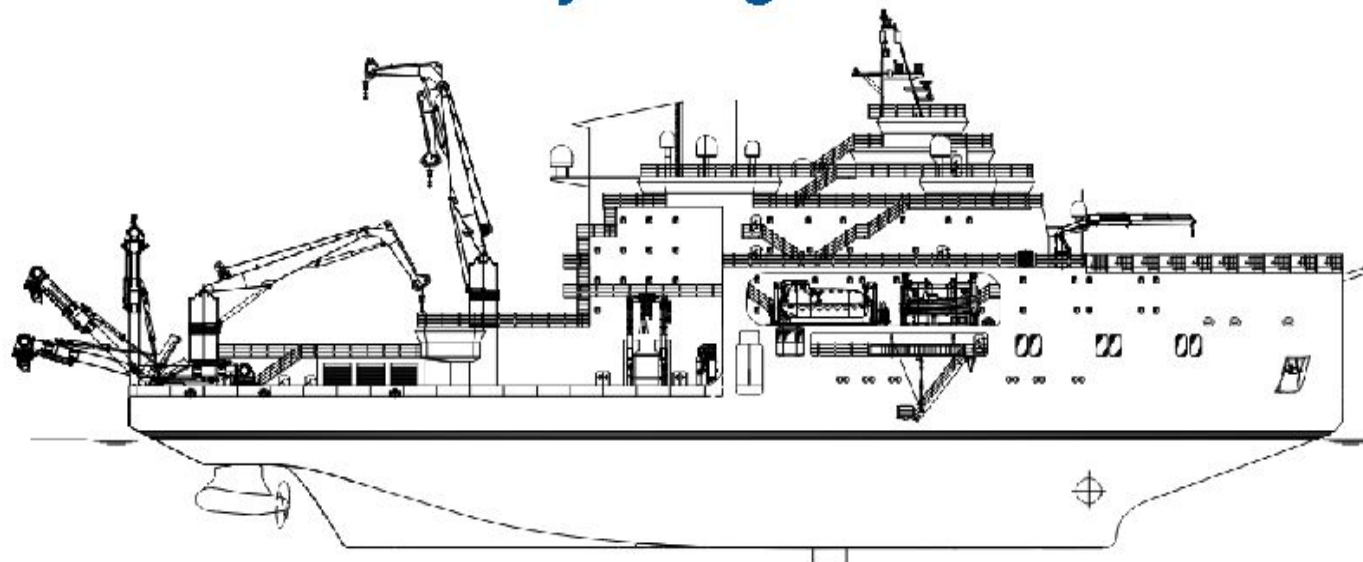
Ship's Crew	29
Science Complement	55 (including 2 ADA-accessible berths)

### PROVISIONS

Freeze	90 days
Chill	90 days
Dry	90 days

### AVIATION

UAV Launch/Recovery	150 lbs
UAV Hangar	1,472 ft <sup>2</sup>
Helicopter Landing	Bell 407 Airbus H125



### MACHINERY SYSTEMS

Azimuthing Podded Propulsors	2 x 9.5 MW
Bow Thrusters	1 x 1.9 MW
Ship Power Plant	22.3 eMW
Propeller	2 x 16.0 ft FPP

### AUXILIARY SYSTEMS

A/C Plants	Qty 3 @ 205t
Fire Suppression	NOVEC and Water Mist
Mission Fuel Capacity	60,000 gal
Ship Service Battery	2.7 MWh
Wastewater Holding	20 days

### COMMUNICATIONS

HF Transmit and Receive
Ku, Ka, C, and UHF SATCOM
GMDSS
INMARSAT
UHF/VHF LOS Comms
UAS Comms
Fleet Broadband

### NAVIGATION

AIS
ECDIS
S & X Band Radar
Ice Radar
DGPS

### MISSION EQUIPMENT

2 Main Deck Cranes	Maximum reach: 65ft 70,000 lbs @ 50ft
Portable Utility Crane	4,000 lbs @ 40ft
Forward Crane	4,000 lbs @ 40ft
Stern A-Frame	80,000 lbs slewing
Side A-Frame	
Meteorology Mast	1
Atmospheric Mast	1
CTD Hydroboom	Fast-acting, Reaches water level
Piston Core LARS	40m
Multibeam Sonar Suite	
Sonar Drop Keel	0 ft / 3 ft / 10 ft
Container Quantity	20 TEU

### PERFORMANCE

Open Water	
Maximum	> 17 kt
Cruise	11 kt
Quiet	8 kt
Ice	
Continuous 3 kt	> 4.5 ft + 1 ft snow
Continuous 6 kt	> 1.6 ft
Turning out	> 4.5 ft
Range	> 17,000 nm
Towing	
4 kt	25,000 lbs
6 kt	10,000 lbs

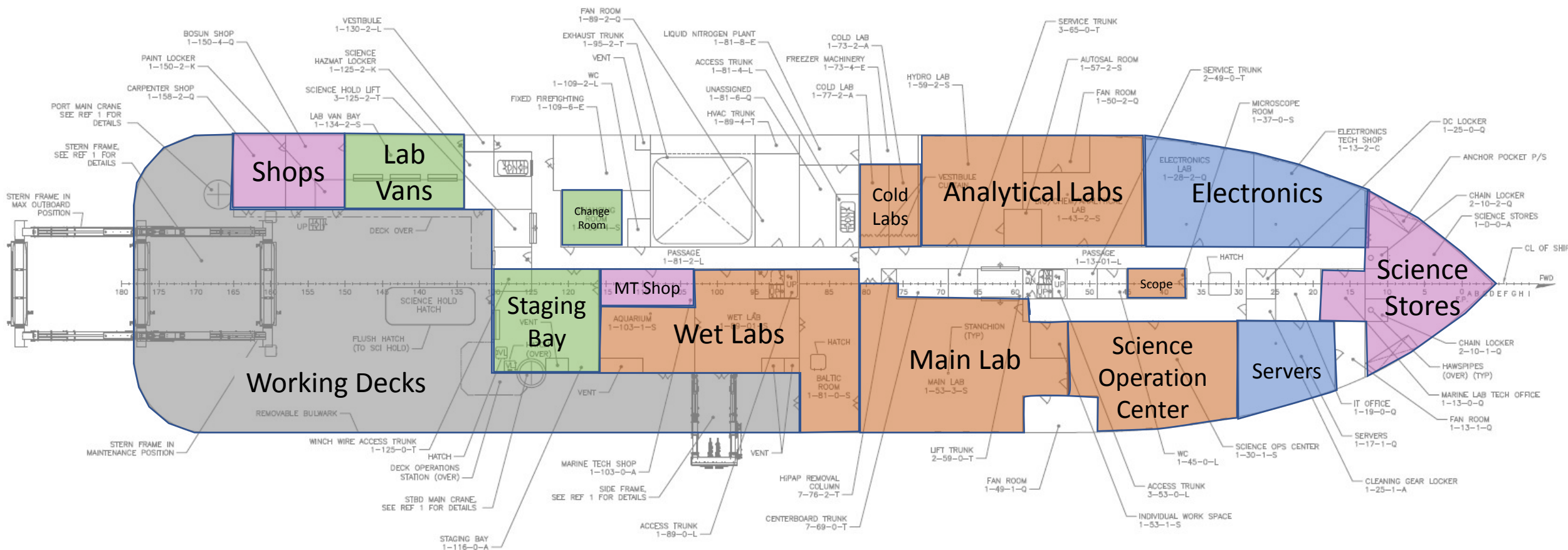
### CLASSIFICATION

ABS #A1 Oceanographic	#AMS
CCO-POLAR (-35°C, 45°C)	Ice Class PC3
#ACCU	CRC
Unrestricted service	R2
EEDI-PH3	ENVIRO
HAB++(WB)	BW T+
ESS-LIBRARY	HYBRID IEPS
ILM	UWILD
POT	

### MISSION SPACES

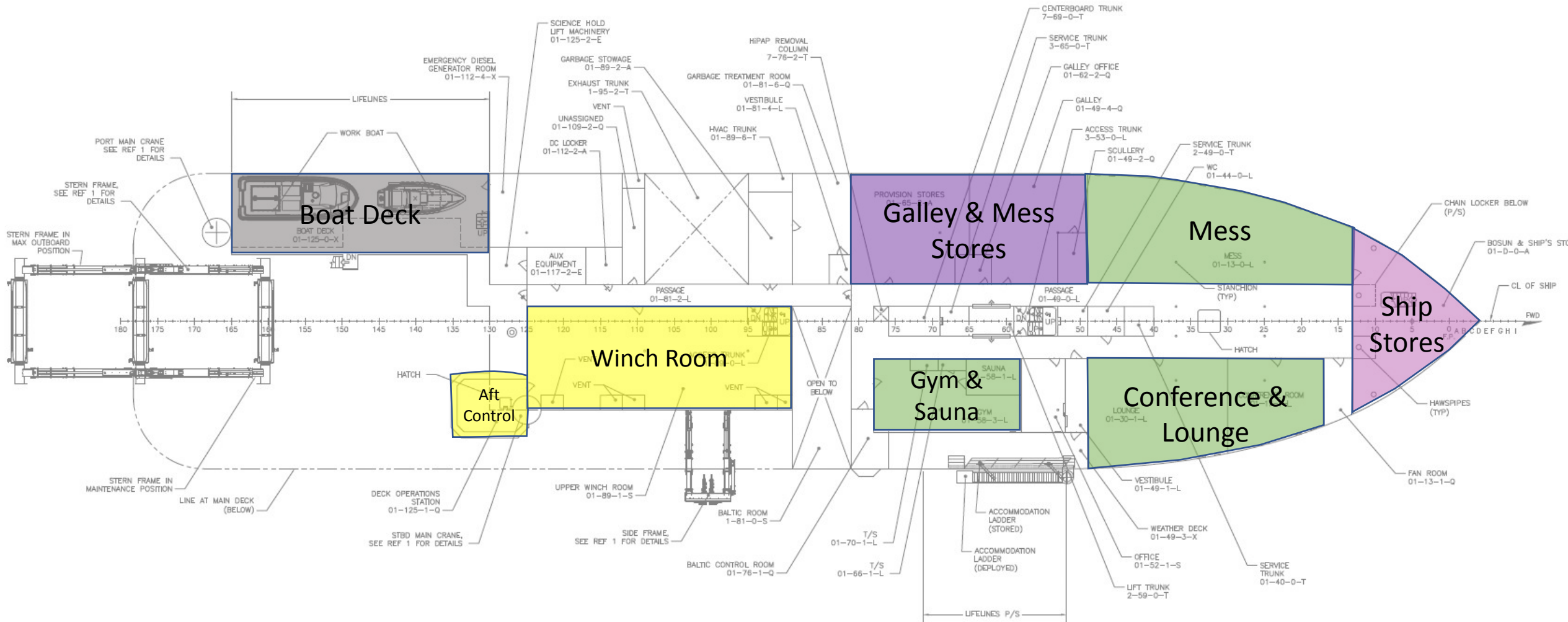
Containers	8 in Science Hold 12 on Weather Decks
Lab Area Total	8,263 ft <sup>2</sup>
Aft Work Deck	7,724 ft <sup>2</sup>
Science Stores	42,571 ft <sup>2</sup>
Side Deck Length	170 ft.
Baltic Room Area	704 ft <sup>2</sup>
HAZMAT Storage	214 ft <sup>2</sup>
Science Observation Deck	1,163 ft <sup>2</sup>

# General Arrangement – Main Deck

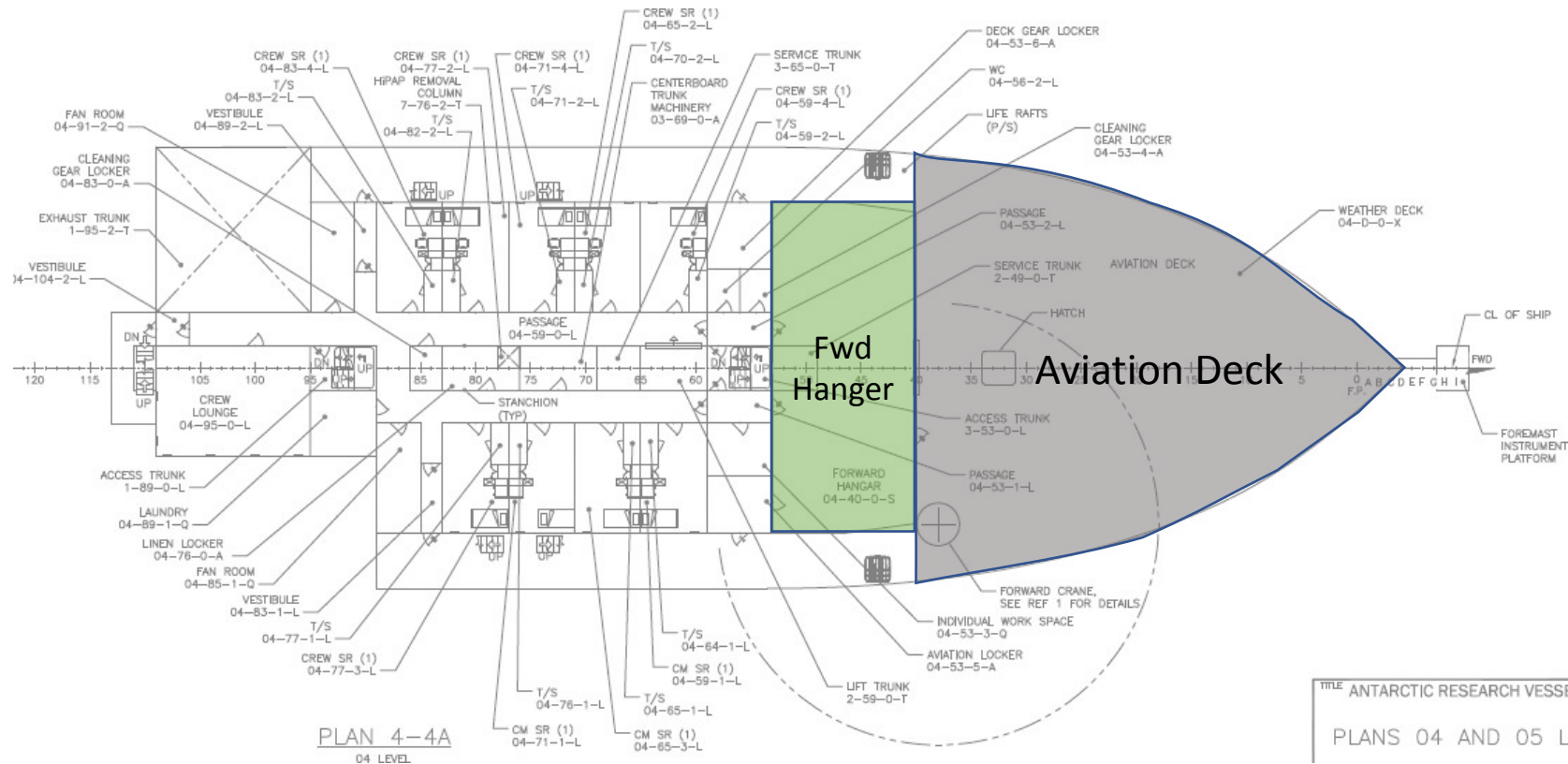


Over 7,000 sq. ft aft working deck

# General Arrangement – 01 Deck



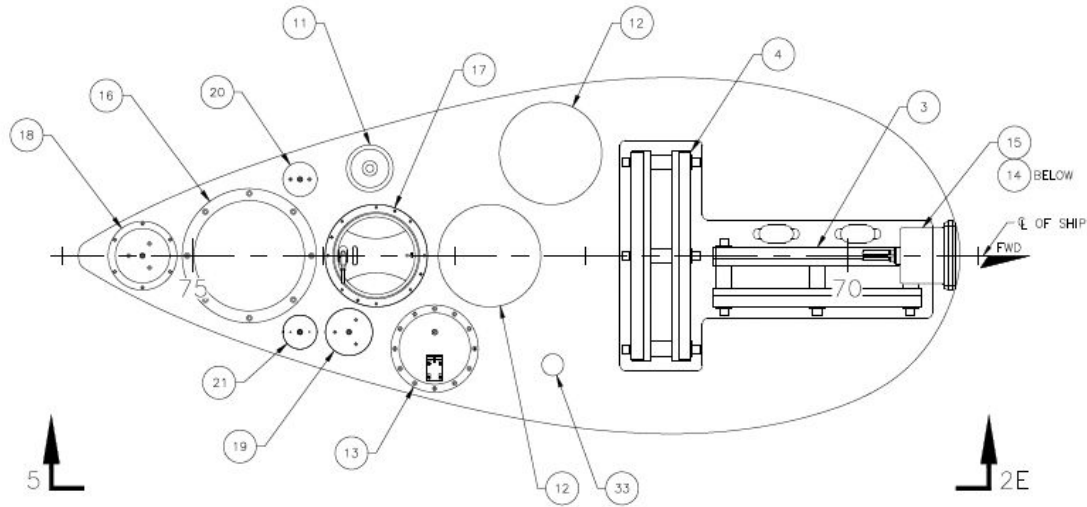
# General Arrangement – 04 Aviation Deck



# Acoustic Systems



## Drop Keel



### Drop Keel Systems

EK-80 Bio-Acoustic System – 18, 38, 70, 120, 200 & 333 kHz

EM-712 Multibeam – 1 x 1 array

2 Spare Transducer Wells

Hydrophone, Speed Log

Fwd. Looking SONAR & Camera

Possible Side Scan SONAR

### SONAR Flat Systems

ADCP – 38, 75, 150, & 300 kHz

EM-124 Multibeam - 1 x 1 array

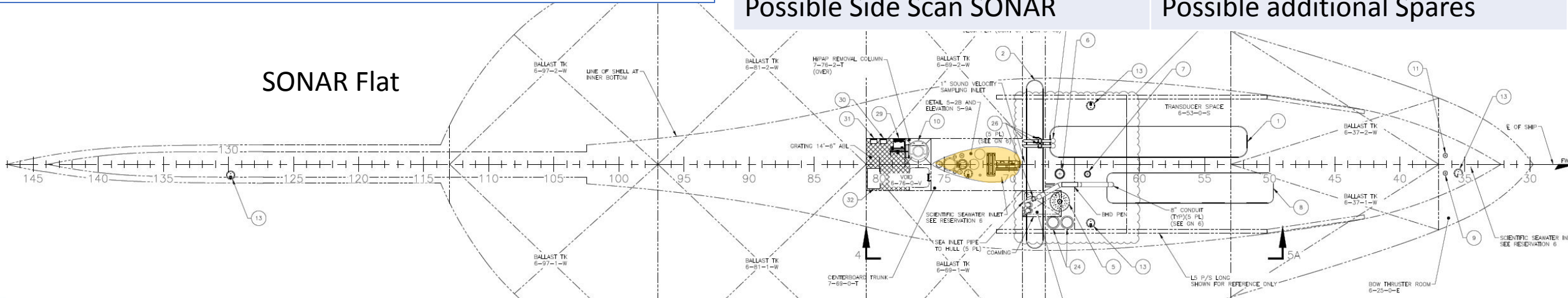
SBP 29 Sub-Bottom Profiler  
(uses EM124 receive array)

USBL – HiPAP 502P

Hydrophones, cameras

Possible additional Spares

## SONAR Flat



## Science Small Boats

20 – 30' RHIB (2) – Open Boat w/large payload, low dead rise hull, air collar/fendering system, bow pulpit, light davit, bolt pattern for mounting instruments.

~ 30' Science Survey Work Boat – Handling system, light winch, instrumentation, acoustic systems, Navigation and Safety Systems.

~ 30' Landing Craft – looking at innovative solutions





# Preliminary Design Rendering



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# Preliminary Design Rendering



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# Preliminary Design Rendering



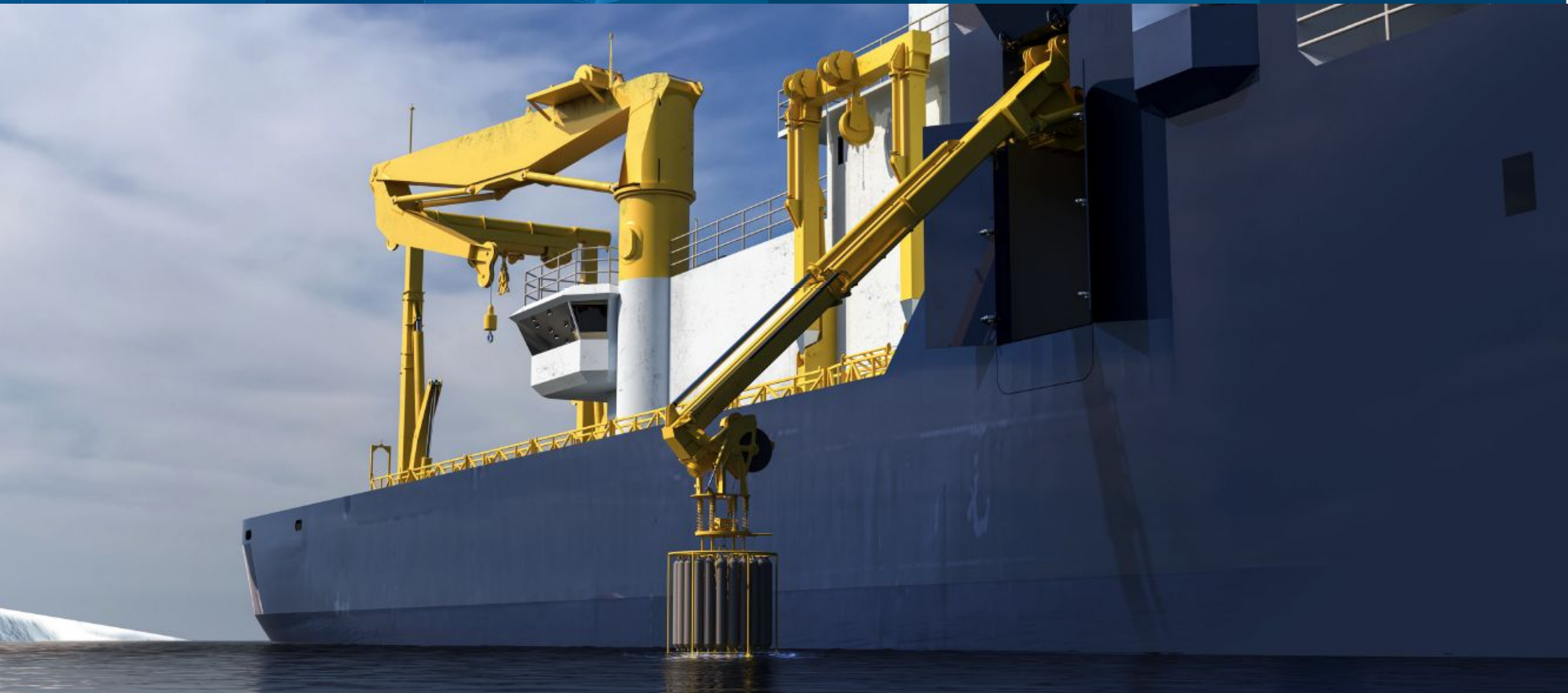
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# Preliminary Design Rendering



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# Science Community Engagement



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National Academies of Sciences, Engineering,  
and Medicine

**Future Directions for Southern Ocean and  
Antarctic Nearshore and Coastal Research**

<https://www.nationalacademies.org/our-work/future-directions-for-southern-ocean-and-antarctic-nearshore-and-coastal-research>



Science Advisory Subcommittee (SASC)

Reports:

<https://future.usap.gov/arv-community-input/>

- Dr. Amy Leventer, (Chair) Colgate University
- Ms. Alice Doyle, UNOLS
- Dr. Kristin O'Brien, UAF; GEO AC Rep

Past Members

- Dr. Carlos Moffatt, Univ of Delaware
- Dr. Deborah Steinberg, VIMS
- Dr. Patricia Quinn, NOAA/PMEL
- Dr. Clare Reimers, OSU
- Dr. Bruce Appelgate, UCSD/Scripps

**\* Seeking nominations for 4 new members**





## New Antarctic R

Planning for the Next Generation of Ocean

### Ship Design

#### Current Science Miss

Key performance parameters, operation

Science Mission Requirements (PDF)

#### Placemat

The ARV Preliminary Design Placemat is propulsion power, tank capacities, and o

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### SASC Reports

- ARV Science Advisory Sub-Committee of the OPP A
- ARV Science Advisory Sub-Committee of the OPP A
- ARV Science Advisory Sub-Committee of the OPP A
- Progress of Antarctic Research Vessel Design, Febru
- ARV Science Advisory Sub-Committee of the OPP A
- ARV Science Advisory Sub-Committee of the OPP A

For the most up to date sub-committee reports, please visi

[View All Advisory Committee Reports](#)

### Frequently Asked Questions (F

Please click the questions below to view answers. If you h

1. Why do we need a new ship?
2. How will ARV compare to the Nathaniel B. Pal
3. What type of expeditions will the ARV be able t
4. What unique features or capabilities will be de
5. What is being done to limit ARV's impact to the
6. When will ARV be delivered?
7. Will the ARV be capable of drill operations?
8. Will there be flight operations on the ARV?
9. Will science be gapped between Nathaniel B. P
10. Will ARV be used to supply Palmer Station? W
11. Can ARV break out McMurdo?
12. Will ARV operate in the Arctic also?
13. Will the ship be built in the US?
14. Do we know who will operate the ship?



## New Antarctic Research Vessel (ARV)

Planning for the Next Generation of Oceanographic Research Vessel



### Documents Library

#### Preliminary Design

- ARV 3D Rendering
- 5E1-003-D101 3D Rendering of Wholeship (Exterior Only) P2

#### Design Drawing

- 5E1-001-D001 General Arrangement Rev P5
- 5E1-002-D101 Topside Arrangement P4
- 5E1-301-D101 Scientific Electronic Systems Arrangement P3
- 5E1-415-D001 Shipwide Network Diagram P3
- 5E1-520-D001 Seawater Service System Rev P2
- 5E1-580-D001 Handling Systems and Scientific Package Deployment Rev P4
- 5E1-601-D001 Science Space Arrangement Rev P4

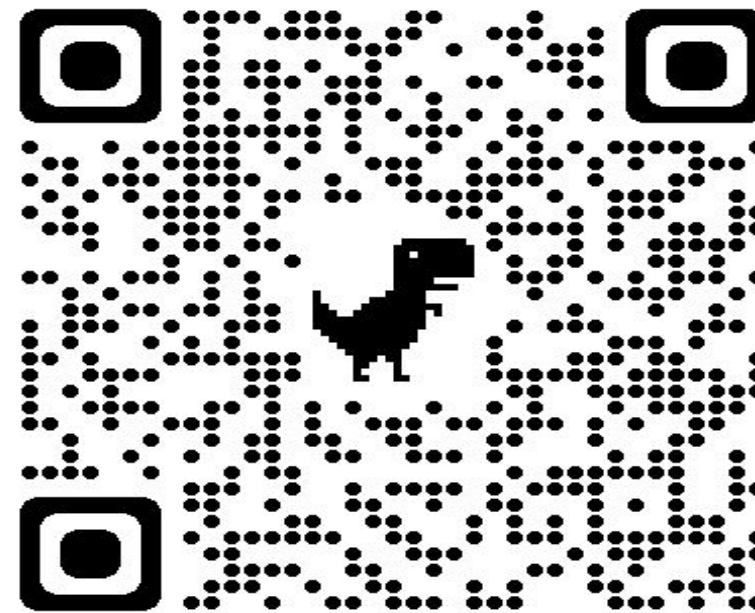
#### Specifications

- 5E1-583-R002 Landing Craft Builder Specification
- 5E1-583-R004. RHIB Builder Specification

#### Reports and Presentations

- 5E1-003-R001 Design Summary Report Rev P3
- 5E1-020-R001 Design Reference Mission DRM Study Rev A
- 5E1-020-R101 Science Systems Report Rev P2
- 5E1-050-R201 Icebreaking Performance Report P2
- 5E1-052-R101 Green Ship Alternatives Study Report Rev P2
- 5E1-065-R001 Dynamic Positioning System Performance Report P3
- 5E1-070-R401 Polar Operations Design Features Report P0
- 5E1-073-R001 Habitability Study Rev P2
- 5E1-079-R101 Seakeeping Performance Report P3
- 5E1-098-R101 Model Test Report (Open Water and Ice) P2
- 5E1-130-R101 Enhanced Aviation Deck Capabilities Assessment P0

[future.usap.gov/arv](https://future.usap.gov/arv)

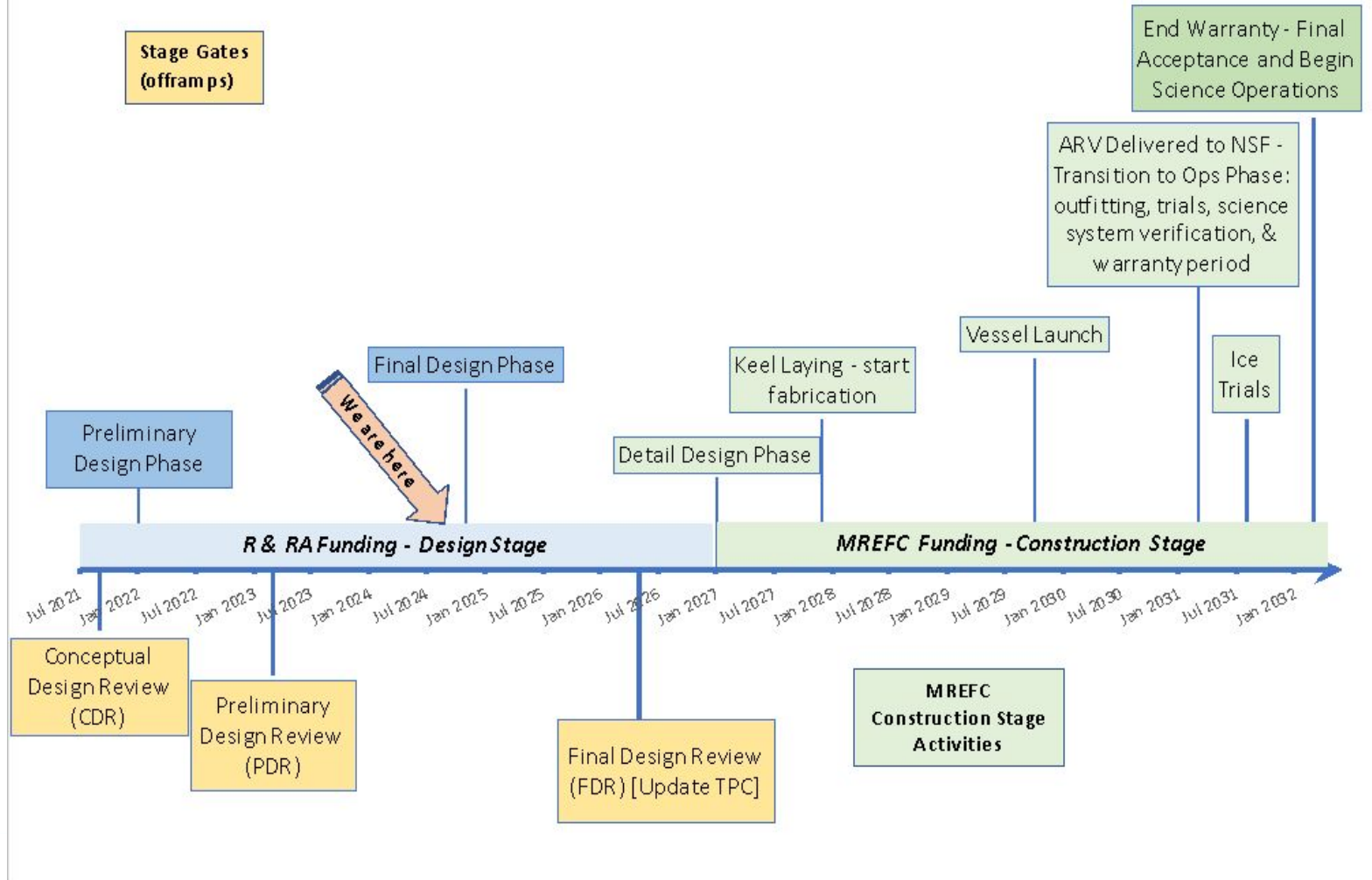


# ARV Schedule



ARV Project Timeline - Rev - August 2024

Draft Reflecting a 10 month delay in start of Final Design Phase to November 2024



## Next Steps:

- RFP and Selection of the Vessel Integrator to complete the project. (CY 24)
- Final Design Phase (CY 24-26)
- Final Design Review (CY 26)
- Appropriation and Approvals to start Construction Stage (Late in CY 26)

# Questions?

