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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy											Date: February 2020	
Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy I BA 7: Operational Systems Development</i>					R-1 Program Element (Number/Name) PE 0206629M I (U) <i>Amphibious Assault Vehicle</i>							
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	219.156	18.757	5.476	6.469	-	6.469	9.486	7.108	6.115	6.241	Continuing	Continuing
2938: <i>Amphibious Assault Vehicle</i>	219.156	18.757	5.476	6.469	-	6.469	9.486	7.108	6.115	6.241	Continuing	Continuing

Note

Prior funding is reflected in PE 0206623M/Project 0021.

A. Mission Description and Budget Item Justification

The Assault Amphibious Vehicle (AAV) program provides life-cycle support to ensure cost-effective combat readiness for the AAV Family of Vehicles (FOV). This is accomplished through engineering changes resulting from continuous review of sub-systems to maintain system supportability, safety, reduce total ownership costs, improve fleet readiness, address obsolescence issues, and improve vehicle performance. The AAV FOV is expected to continue to be in service until 2030 as it is replaced by ACV. The Recovery variant will provide recovery support and design trade offs for the ACV until an ACV Recovery variant is fielded. The AAV program also included a Survivability Upgrade, which was designed to increase Personnel (P-Variant) and Command (C-Variant) survivability and force protection, while maintaining the required land and water mobility performance.

The USMC decided to terminate the Survivability Upgrade program near the end of FY2018 in order to better align with the National Defense Strategy. Program life-cycle support for the AAV Family of Vehicles (FOV) will continue herein under the AAV Modifications Line.

B. Program Change Summary (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	20.690	5.476	13.260	-	13.260
Current President's Budget	18.757	5.476	6.469	-	6.469
Total Adjustments	-1.933	0.000	-6.791	-	-6.791
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.549	0.000			
• SBIR/STTR Transfer	-0.384	0.000			
• Program Adjustments	0.000	0.000	-6.782	-	-6.782
• Rate/Misc Adjustments	0.000	0.000	-0.009	-	-0.009

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<u>Change Summary Explanation</u> The FY 2021 funding request was reduced by \$2.782M to account for the availability of prior year execution balances. The increase from FY2020 to FY2021 (\$0.993M) is primarily attributed to increased funding for government and contractor engineering services to evaluate engineering change proposal modifications, post AAV SU termination, in order to maintain modern amphibious assault capabilities within the legacy AAV Fleet.		

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy										Date: February 2020		
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0206629M / (U)Amphibious Assault Vehicle				Project (Number/Name) 2938 / Amphibious Assault Vehicle			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
2938: Amphibious Assault Vehicle	219.156	18.757	5.476	6.469	-	6.469	9.486	7.108	6.115	6.241	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

The increase from FY2020 to FY2021 (\$0.993M) is primarily attributed to increased funding for government and contractor engineering services to evaluate engineering change proposal modifications, post AAV SU termination, in order to maintain modern amphibious assault capabilities within the legacy AAV Fleet.

A. Mission Description and Budget Item Justification

The Assault Amphibious Vehicle (AAV) program provides life-cycle support to ensure cost-effective combat readiness for the AAV Family of Vehicles (FOV). This is accomplished through engineering changes resulting from continuous review of sub-systems to maintain system supportability, safety, reduce total ownership costs, improve fleet readiness, address obsolescence issues, and improve vehicle performance. The AAV FOV is expected to continue to be in service until 2030 as it is replaced by ACV. The Recovery variant will provide recovery support and design trade offs for the ACV until an ACV Recovery variant is fielded. The AAV program also included a Survivability Upgrade, which was designed to increase Personnel (P-Variant) and Command (C-Variant) survivability and force protection, while maintaining the required land and water mobility performance.

The USMC decided to terminate the Survivability Upgrade program near the end of FY2018 in order to better align with the National Defense Strategy. Program life-cycle support for the AAV Family of Vehicles (FOV) will continue herein under the AAV Modifications Line.

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Product Development	10.735	2.741	2.480	0.000	2.480
Articles:	-	-	-	-	-
Description: This cost element provides funding for design and development engineering for the AAV Modifications Line. The AAV Modifications Line provides Nonrecurring Engineering (NRE) and design for AAV safety, obsolescence, and performance improvement engineering for the AAV Family of Vehicles (FOV).					
FY 2020 Plans:					
-Continue legacy Platform Command and Control (C2) design and integration efforts to include C2 software/hardware tech refresh.					

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Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206629M / (U)Amphibious Assault Vehicle	Project (Number/Name) 2938 / Amphibious Assault Vehicle

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>-Complete Recovery-variant nonrecurring engineering efforts. The Recovery variant will provide recovery support and design trade offs for the Amphibious Combat Vehicle (ACV) until a Recovery variant is fielded.</p> <p>FY 2021 Base Plans: -Continue legacy Platform Command and Control (C2) design and integration efforts to include C2 software/hardware tech refresh. The C2 design and integration effort continues due to the Command-variant requiring quarterly software releases each year to maintain the vehicles security certification.</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The decrease of \$0.261M from FY2020 to FY2021 primarily reflects completion of the Recovery-variant nonrecurring engineering efforts in FY2020.</p>					
<p>Title: Support</p> <p align="right">Articles:</p> <p>Description: Provide government engineering and technical support for AAV safety, obsolescence, and performance modifications.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Completed modeling and simulation efforts for the Hydrodynamic analyses. - Continue Assault Amphibious Vehicle (AAV) C7 Software updates using government engineering support subject matter experts (SME). - Continue to provide technical and engineering services in support of AAV obsolescence and performance modifications. - Continue utilizing the Enterprise Product Lifecycle Management Tool (ePLM) Integrated Decision Environment (IDE) to support analyses of the legacy AAV. - Continue to provide material and travel associated with these efforts. <p>FY 2021 Base Plans:</p> <ul style="list-style-type: none"> - Continue Assault Amphibious Vehicle (AAV) C7 Software updates using government engineering support subject matter experts (SME). - Continue to provide technical and engineering services in support of AAV obsolescence and performance modifications. 	2.364	1.278	2.868	0.000	2.868
	-	-	-	-	-

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>- Continue utilizing the Enterprise Product Lifecycle Management Tool (ePLM) Integrated Decision Environment (IDE) to support analyses of the legacy AAV.</p> <p>- Continue to provide material and travel associated with these efforts.</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The increase of \$1.590M from FY2020 to FY2021 is attributed to funding for a nonrecurring engineering analysis of the Deployable Supplemental Buoyancy and Egress Device (DSBED) and funding to government engineering services including corrosion support, sustainment engineering, product lifecycle support, and hydrodynamic modeling and simulation which were not funded in FY2020 but are required to evaluate and sustain the legacy system.</p>					
<p>Title: Test and Evaluation</p> <p align="right">Articles:</p> <p>Description: Developmental, Operational and Live Fire Test and Evaluation of safety improvements, upgrades, modifications and fact of life changes to ensure operational suitability and effectiveness of the AAV family of vehicles.</p> <p>FY 2020 Plans: - Initiate Recovery-variant Developmental Test & Evaluation for first article testing.</p> <p>FY 2021 Base Plans: -N/A</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The decrease of \$0.349M between FY2020 and FY2021 reflects the completion of the Developmental Testing for the Recovery-variant test efforts.</p>	1.509 -	0.349 -	0.000 -	0.000 -	0.000 -
<p>Title: Management and Engineering Technical Services</p> <p align="right">Articles:</p> <p>Description: Management support services and technical support for program office and field activities.</p>	4.149 -	1.108 -	1.121 -	0.000 -	1.121 -

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>FY 2020 Plans: -Continue support of ECP development, trade studies and analyses, supply chain and government property management in support of AAV sustainment modification efforts. -Continue logistic support for systems integration efforts.</p> <p>FY 2021 Base Plans: -Continue support of ECP development, trade studies and analyses, supply chain and government property management in support of AAV sustainment modification efforts. -Continue logistic support for systems integration efforts.</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: No significant change from FY20 to FY21.</p>					
Accomplishments/Planned Programs Subtotals	18.757	5.476	6.469	0.000	6.469

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• PMC/2021: AAV Product Improvement Program	96.836	39.495	87.476	-	87.476	87.400	36.104	21.855	24.351	Continuing	Continuing

Remarks

D. Acquisition Strategy
The USMC competitively awarded two contracts in FY2014 for development efforts in support of upgrading Personnel-variant (P-Variant) Assault Amphibious Vehicles Survivability Upgrade (AAV SU). Down-select to one contractor for manufacture of prototype vehicles occurred in February 2015. Milestone C was achieved in August 2017. The program's main focus was on improving Marine force protection capabilities. To support the required capabilities, the Survivability Upgrade program sought to incorporate Non-Developmental Items (NDI) and/or Commercial off the Shelf (COTS) solutions into the existing P-Variant and also the C-Variant Reliability, Availability, Maintainability/Rebuild to Standard (RAM/RS) configuration of AAV. The acquisition strategy sought to minimize cost and schedule, and maximize value, technology readiness, and commonality, while ensuring the selected manufacturer met the capability attributes established for the RAM/RS. RDT&E funded competitive designs and contract options for Engineering and Manufacturing Development (EMD). Initial Operational Capability (IOC) was scheduled for FY2020; however, the USMC decided to terminate the program in order to better align with the National Defense Strategy. Program life-cycle support for the AAV Family of Vehicles (FOV) will continue herein under the AAV Modifications Line.

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The AAV Modifications Line includes government and contractor life-cycle support to ensure cost-effective combat readiness for the AAV Family of Vehicles (FOV). This is accomplished through continuous review of sub-systems to maintain system supportability, safety, procurement of replacement systems for obsolescence, and fielding of Engineering Change Proposals (ECP). The improvements to the fleet reduce total ownership costs and improve sustainability. The AAV Modifications Line procures modernized components and subsystems that impact safe and reliable use of the AAV such as Tactical Communication Modernization (TCM) to meet NSA's cryptographic modernization mandates, quarterly technical refresh of servers and laptops for Command-variant (C-Variant), and associated production support for the AAV FOV. The AAV FOV is expected to continue to be in service until 2030 as it is replaced by ACV.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy											Date: February 2020				
Appropriation/Budget Activity 1319 / 7						R-1 Program Element (Number/Name) PE 0206629M / (U)Amphibious Assault Vehicle					Project (Number/Name) 2938 / Amphibious Assault Vehicle				

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Syst Design & Dev / EMD	C/FFP	MCSC/SAIC : Charleston, SC	138.072	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Syst Design & Dev	C/FFP	Various : Various	0.000	10.248	Feb 2019	2.741	Feb 2020	2.480	Feb 2021	-		2.480	0.000	15.469	-
Other Product Development	C/BA	Various : Various	6.028	0.486	Mar 2019	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Subtotal			144.100	10.734		2.741		2.480		-		2.480	Continuing	Continuing	N/A

Remarks
The decrease of \$0.261M from FY2020 to FY2021 reflects completion of the Recovery-variant nonrecurring engineering efforts in FY2020.

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Travel	Various	Various : Various	1.028	0.047	Oct 2018	0.046	Oct 2019	0.047	Oct 2020	-		0.047	Continuing	Continuing	Continuing
In-House Technical Support	Various	Various : Various	21.278	2.316	Feb 2019	1.232	Feb 2020	2.821	Feb 2021	-		2.821	Continuing	Continuing	Continuing
Subtotal			22.306	2.363		1.278		2.868		-		2.868	Continuing	Continuing	N/A

Remarks
The increase of \$1.590M from FY2020 to FY2021 is attributed to increased funding for government engineering services to evaluate on-going change proposal modifications.

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Developmental Testing (DT)	Various	Various : Various	16.981	1.509	Feb 2019	0.349	Feb 2020	0.000		-		0.000	Continuing	Continuing	Continuing
Operational Testing (OT)	WR	MCOTEA : Quantico, VA	1.022	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Live Fire Test and Evaluation (LFT&E)	Various	Various : Various	8.639	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy											Date: February 2020				
Appropriation/Budget Activity 1319 / 7						R-1 Program Element (Number/Name) PE 0206629M / (U)Amphibious Assault Vehicle					Project (Number/Name) 2938 / Amphibious Assault Vehicle				

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			26.642	1.509		0.349		0.000		-		0.000	Continuing	Continuing	N/A

Remarks
The decrease of \$0.349M between FY2020 and FY2021 reflects the completion of the Developmental Testing for the Recovery-variant test efforts.

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Management Support Svcs	C/FFP	MCSC : Quantico, VA	11.976	1.996	Apr 2019	1.108	Apr 2020	1.121	Apr 2021	-		1.121	Continuing	Continuing	Continuing
Engineering and Technical Services	Various	Various : Various	14.132	2.155	Mar 2019	0.000		0.000	Mar 2021	-		0.000	Continuing	Continuing	Continuing
Subtotal			26.108	4.151		1.108		1.121		-		1.121	Continuing	Continuing	N/A

			Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			219.156	18.757		5.476		6.469		-		6.469	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy

Date: February 2020

Appropriation/Budget Activity
1319 / 7

R-1 Program Element (Number/Name)
PE 0206629M / (U)Amphibious Assault
Vehicle

Project (Number/Name)
2938 / Amphibious Assault Vehicle

AAV MODIFICATIONS PB-21 PROGRAM SCHEDULE

As of: 27 December 2019

FISCAL YEAR	Quarter	FY19				FY20				FY21				FY22				FY23				FY24				FY25			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Procure & Install 330 Ship Sets																													
Remote Weapon Station		Contract Award																											
RWS Total	330		DT/E3																										
Conversion Kit & BII Total	330		80																										
Procure & Install 389 Intercom Ship Sets																													
AAV C2 Modernization Intercoms			C7 ECP																										
66 Sunk Total	389		35																										
P	322																												
C	35			35																									
R	32			0																									
Procure & Install 389 Ship Sets																													
AAV C2 Modernization Radios (TCM)																													
Total	389																												
P	322																												
C	35																												
R	32																												
Procure & Install 389 Ship Sets																													
AAV A-PNT																													
Total	389																												
P	322																												
C	35																												
R	32																												
Production and Delivery, 389 Ship Sets																													
AAV Hydraulics Modernization																													
Total	389																												
P	322																												
C	35																												
R	32																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206629M / (U)Amphibious Assault Vehicle	Project (Number/Name) 2938 / Amphibious Assault Vehicle

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 2938				
PDR - Hydraulics Modernization	2	2019	2	2019
CDR - Hydraulics Modernization	4	2019	4	2019
ECP Approval - Hydraulics Modernization	2	2020	2	2020
TCM Integration & Test	1	2020	2	2020
TCM - ECP Approval	3	2020	3	2020
TCM - Contract Award	2	2021	2	2021
RWS - DT/E3	1	2019	3	2019
RWS - ECP Approval & Contract Award	2	2020	2	2020
Recovery-Variant (AAVR7) Modernization - Phase 2 Struct & Stab Analyses	1	2019	4	2019
CDR - AAVR7 Modernization	4	2019	4	2019
ECP Integration - AAVR7 Modernization	1	2021	1	2021
DT - AAVR7 Modernization	4	2020	1	2021