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**Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Navy** **Date:** February 2016

<b>Appropriation/Budget Activity</b> 1319: <i>Research, Development, Test &amp; Evaluation, Navy / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604311N / <i>LPD-17 Class Systems Integration</i>
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COST (\$ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
Total Program Element	32.443	0.363	0.747	0.580	-	0.580	0.862	0.853	0.812	0.829	Continuing	Continuing
2283: <i>LPD-17 Class System Integration</i>	32.443	0.363	0.747	0.580	-	0.580	0.862	0.853	0.812	0.829	Continuing	Continuing

**Program MDAP/MAIS Code:** 542

**A. Mission Description and Budget Item Justification**

The LPD 17 Class ships are functional replacements for 41 ships of four classes of amphibious ships. These new ships embark, transport, and land elements of Marine landing forces in an assault by helicopters, landing craft, and amphibious vehicles. Tactics, techniques, and tools for naval expeditionary warfare continue to evolve. The LPD 17 Class configuration must continue to adapt to this evolutionary process, because these ships are expected to be in service until almost 2050. The LPD 17 design includes system configurations that reduce operating and support costs and facilitate operational performance improvements. System engineering and integration efforts that began in FY97 will develop further reductions in life cycle costs and will integrate performance upgrades in a rapid, affordable manner. Possible research and development investigations include improvements in Hull, Mechanical and Electrical systems, advanced sensors, advanced computers, advanced command and control software, advanced information system technologies, and ship based logistics support. Cost reduction and improved performance will be accomplished through sustained modeling and simulation efforts, resolutions of equipment obsolescence issues, prototype development, continued personnel reduction efforts, system performance tradeoff evaluations, and naval expeditionary warfare system engineering. Feedback from the Fleet for integrating system configurations will be accomplished through Naval Surface Warfare Centers (Philadelphia, Dahlgren, Port Hueneme, Panama City). These efforts will result in well defined specifications and drawings in system in system integration design packages that provide technical baseline for follow on ship procurements.

**B. Program Change Summary (\$ in Millions)**

	<u>FY 2015</u>	<u>FY 2016</u>	<u>FY 2017 Base</u>	<u>FY 2017 OCO</u>	<u>FY 2017 Total</u>
Previous President's Budget	0.376	0.747	0.767	-	0.767
Current President's Budget	0.363	0.747	0.580	-	0.580
Total Adjustments	-0.013	0.000	-0.187	-	-0.187
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.013	0.000			
• Rate/Misc Adjustments	0.000	0.000	-0.187	-	-0.187

**Change Summary Explanation**

FY 2015 funding request reflects a reduction of \$0.013 million for SBIR transfer.

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FY 2017 funding request reflects reductions of \$0.150 million to account for the availability of prior year balances, \$0.013 million for rates/miscellaneous adjustments, and \$0.024 million for the Department of the Navy to comply with the Bipartisan Budget Act of 2015.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2017 Navy										<b>Date:</b> February 2016		
<b>Appropriation/Budget Activity</b> 1319 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604311N / LPD-17 Class Systems Integration				<b>Project (Number/Name)</b> 2283 / LPD-17 Class System Integration			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
2283: LPD-17 Class System Integration	32.443	0.363	0.747	0.580	-	0.580	0.862	0.853	0.812	0.829	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The LPD 17 Class ships are functional replacements for 41 ships of four classes of amphibious ships. These new ships embark, transport, and land elements of Marine landing forces in an assault by helicopters, landing craft, and amphibious vehicles. Tactics, techniques, and tools for naval expeditionary warfare continue to evolve. The LPD 17 Class configuration must continue to adapt to this evolutionary process, because these ships are expected to be in service until almost 2050. The LPD 17 design includes system configurations that reduce operating and support costs and facilitate operational performance improvements. System engineering and integration efforts that began in FY97 will develop further reductions in life cycle costs and will integrate performance upgrades in a rapid, affordable manner. Possible research and development investigations include improvements in Hull, Mechanical and Electrical systems, advanced sensors, advanced computers, advanced command and control software, advanced information system technologies, and ship based logistics support. Cost reduction and improved performance will be accomplished through sustained modeling and simulation efforts, resolutions of equipment obsolescence issues, prototype development, continued personnel reduction efforts, system performance tradeoff evaluations, and naval expeditionary warfare system engineering. Feedback from the Fleet for integrating system configurations will be accomplished through Naval Surface Warfare Centers (Philadelphia, Dahlgren, Port Hueneme, Panama City). These efforts will result in well defined specifications and drawings in system in system integration design packages that provide technical baseline for follow on ship procurements.

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

	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>
<b>Title:</b> Systems Engineering/Integration	0.363	0.747	0.580	0.000	0.580
<b>Articles:</b>	-	-	-	-	-
<b>Description:</b> Continued Naval Expeditionary Warfare Systems Engineering efforts and integration efforts for unique LPD 17 Class systems, including efforts to resolve obsolescence issues impacting the class.					
<b>FY 2015 Accomplishments:</b> Environmental Qualification Testing (EQT) and Information Assurance (IA) of Integrated Ship Electronics (SWAN, ECS, HM&E Network) and machinery obsolescence issues.  Continued Reliability and Obsolescence studies for Mission Systems.  Completed HM&E machinery control system network integration studies.					

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<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604311N / <i>LPD-17 Class Systems Integration</i>	<b>Project (Number/Name)</b> 2283 / <i>LPD-17 Class System Integration</i>

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

	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>
Completed Propulsion system (MPDE, MRG, shafting) installation improvements and foundation.					
Completed High Efficiency Small-Capacity (HES-C) Air Conditioning Plant Prototype development, Pronghorn Air Conditioning Plant Chlorination System Prototype installation, testing, and Geislinger Coupling Alignment Studies.					
Continued development of HES-C AC Plant prototype testing and qualification. Continued development of Advanced Variable Speed Drive unit to control HES-C AC Plants that will be installed on LPD 17 class ships (LPD 26-28) and potentially on other Navy platforms. Initiated MPDE lube oil un-loader valve studies.					
<b>FY 2016 Plans:</b> Develop Fiber Optic Monitoring System prototype.					
Continued HES-C A/C plant development/procurement for installation in LPDs 26-28.					
Continue Reliability and Obsolescence studies for shipboard equipment. Tasks include Transparent Armored Window replacement studies, SSDG Seawater Piping Analyses, Pronghorn SBIR Phase III - AC Plant Chlorinator Sensor replacement.					
<b>FY 2017 Base Plans:</b> Continue development of Fiber Optic Cable Plant Monitoring System under SBIR Phase II and transition to Phase III.					
Continue HES-C A/C plant development/procurement for installation in LPDs 26-28.					
Continue evaluation of commercial electric motors/controllers and lube oil purifier improvements.					
Initiate shipboard studies for LPD 28 HM&E obsolescence and new commercial systems. Develop design, qualification, and testing projects to evaluate: structural changes for Boat Valley/RAS - FAS/and Troop Berthing; expanded use of commercial systems for cost savings; and machinery/engineering control system integration with new systems and networks.					
Initiate shipboard tests for Additive Manufacturing (3D Printing) of HM&E parts.					

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<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604311N / <i>LPD-17 Class Systems Integration</i>	<b>Project (Number/Name)</b> 2283 / <i>LPD-17 Class System Integration</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>
Continue Reliability and Obsolescence studies.					
<b>FY 2017 OCO Plans:</b> N/A					
<b>Accomplishments/Planned Programs Subtotals</b>	0.363	0.747	0.580	0.000	0.580

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• SCN/5300: <i>Completion of Prior Year Shipbuilding Programs</i>	54.096	61.593	45.060	-	45.060	0.000	0.000	0.000	0.000	0.000	2,050.849
• SCN/3036: <i>LPD-17</i>	1,000.000	550.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	17,500.430

**Remarks**

**D. Acquisition Strategy**

FY15 and out: continue developmental sole source efforts

**E. Performance Metrics**

N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Navy** **Date:** February 2016

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604311N / LPD-17 Class Systems Integration	<b>Project (Number/Name)</b> 2283 / LPD-17 Class System Integration
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<b>Product Development (\$ in Millions)</b>				<b>FY 2015</b>		<b>FY 2016</b>		<b>FY 2017 Base</b>		<b>FY 2017 OCO</b>		<b>FY 2017 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Systems Engineering and Integration	WR	NSWC Crane : Crane, IN	13.236	0.000		0.000		0.000		-		0.000	0.000	13.236	-
Systems Engineering and Integration	C/CPFF	Raytheon Company : San Diego, CA	2.286	0.146	Dec 2014	0.150	Dec 2015	0.213	Nov 2016	-		0.213	Continuing	Continuing	Continuing
LSD(X) Systems Integration (Next Gen.)	C/CPFF	CSC, Alion Science : Washington, DC	0.549	0.000		0.000		0.000		-		0.000	0.000	0.549	-
LSD(X) Systems Integration (Next Gen.)	WR	NSWC Carderock, NSWC Dahlgren : NSWC Beth, MD; NSWC Dahlgren, VA	0.100	0.000		0.000		0.000		-		0.000	0.000	0.100	-
DAWF	Various	Various : Various	0.005	0.000		0.000		0.000		-		0.000	0.000	0.005	-
Systems Engineering and Integration	C/CPFF	Huntington Ingalls Industries : Pascagoula, MS	0.097	0.100	Dec 2014	0.377	Dec 2015	0.175	Dec 2016	-		0.175	0.000	0.749	-
Systems Engineering and Integration	WR	NSWC, Philadelphia : Philadelphia, PA	0.678	0.117	Nov 2014	0.220	Nov 2015	0.192	Nov 2016	-		0.192	Continuing	Continuing	Continuing
Systems Engineering and Integration	WR	NSWC, Port Hueneme : Port Hueneme, CA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
<b>Subtotal</b>			16.951	0.363		0.747		0.580		-		0.580	-	-	-

**Remarks**  
 FY2017 key events include Initiating shipboard studies for LPD 28 HM&E obsolescence and new commercial systems. Developing design, qualification, and testing projects to evaluate: structural changes for Boat Valley/RAS - FAS/and Troop Berthing; expanded use of commercial systems for cost savings; and machinery/engineering control system integration with new systems and networks. Initiating shipboard tests for Additive Manufacturing (3D Printing) of HM&E parts.

<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2015</b>		<b>FY 2016</b>		<b>FY 2017 Base</b>		<b>FY 2017 OCO</b>		<b>FY 2017 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
OT&E/Interoperability	WR	OPTEVFOR : WR	15.492	0.000		0.000		0.000		-		0.000	0.000	15.492	-
<b>Subtotal</b>			15.492	0.000		0.000		0.000		-		0.000	0.000	15.492	-

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2017 Navy</b>							<b>Date:</b> February 2016				
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	<b>Prior Years</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>		
<b>Project Cost Totals</b>	32.443	0.363	0.747	0.580	-	0.580	-	-	-		

**Remarks**  
 The funds for FY 17 are in support of the continuation of the development of Fiber Optic Cable Plant Monitoring System and the continuation of the development of a new Advanced Variable Speed Drive unit to control HES-C AC Plants that will be installed on LPD 17 class ships LPD 26-28 and potentially on other Navy platforms.

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Exhibit R-4, RDT&E Schedule Profile: PB 2017 Navy

Date: February 2016

Appropriation/Budget Activity  
1319 / 5

R-1 Program Element (Number/Name)  
PE 0604311N / LPD-17 Class Systems  
Integration

Project (Number/Name)  
2283 / LPD-17 Class System Integration

Fiscal Year	2015				2016				2017				2018				2019				2020				2021			
Quarter	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
HES-C												▲																
Fiber Optic Monitoring												▲																
Future Obsol. issue resolution																												▲
Deliveries								▲ LPD 26				▲ LPD 27																

**LPD-28 Delivers FY22**

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2017 Navy		<b>Date:</b> February 2016
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Proj 2283</b>				
Delivery (LPD 26)	3	2016	3	2016
Delivery (LPD 27)	4	2017	4	2017
Fiber Optic Monitoring	1	2016	4	2017
Future Obsol. Issue Resolution	1	2015	4	2021
HES-C	1	2015	4	2017

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