Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Navy											Date: February 2015	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603563N / *Ship Concept Advanced Design*							
COST ($ in Millions)	**Prior Years**	**FY 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**Cost To Complete**	**Total Cost**
Total Program Element	144.720	17.604	17.864	11.888	-	11.888	10.445	10.334	5.147	5.274	Continuing	Continuing
2196: *Design, Tools, Plans and Concepts*	1.021	0.461	0.433	0.443	-	0.443	0.449	0.454	0.464	0.474	Continuing	Continuing
3161: *NAVSEA Tech Authority*	143.699	17.143	11.838	11.445	-	11.445	9.996	9.880	4.683	4.800	Continuing	Continuing
3376: *Strategic Sealift*	0.000	-	5.593	-	-	-	-	-	-	-	-	5.593

A. Mission Description and Budget Item Justification

Explore alternative surface ship force structures, advanced surface ship and unmanned surface vehicles concepts, and the potential technologies for these force structures and advanced concepts in support of pre-acquisition mission needs analysis, mission area analysis, and planning. The objective is a more affordable, mission capable surface ship force including increased ship production capability; ships with reduce manning, reduced operating and support costs, and greater utilization of the latest technology. The program directly supports the Navy Shipbuilding Plan with state-of-the-art design tools and methods for surface ship force structure alternative studies, ship & unmanned vehicle concept studies, and the actual conduct of surface ship force structure alternative studies and advanced design concept studies for the ships that may become part of the shipbuilding plan.

Project 2196 - This project funds concept development engineering, mission effectiveness analysis, and other analyses for formulation of future surface ship force structure along with development of the tools to accomplish these efforts. Efforts include advanced ship concept studies, ship and ship systems technology assessments, and the development and upgrade of ship concept design and engineering tools, methods, and criteria.

Project 3161 - This project funds a prioritized portfolio of time-sensitive initiatives through integrated efforts in Cross Platform Systems Development (CPSD), furthering Sea Enterprise through the development of support elements meeting relevant needs of the warfare community. The areas of exploration for CPSD include surface ship concept advanced development, next generation unmanned surface vehicle, high speed ships, tool integration and technical data exchange, cybersecurity, embedded interoperability engineering, and mission capability systems engineering. The research products developed by this project directly support and influence both immediate fleet requirements and future acquisition programs by providing a range of technically acceptable alternatives and evaluation of emerging technologies.

In particular, tasks within this project continue to directly support interoperability testing and certification for Littoral Combat Ship (LCS) and other platforms in deploying battle groups, development and certification of Operator Guidance tools for surface combatants (CG 47, DDG 51, DDG 1000), Total Ownership Cost (TOC) pilot programs, future
flexible and modular warship analyses, and development of specifications and processes to reduce production costs of platforms.

Tasks within this project continue to directly support the Test and Evaluation Master Plan (TEMP) execution for multiple ship classes including, LCS, JHSV, and DDG 1000 reducing Live Fire Test and Evaluation (LFT&E) costs, furthered validation of hydrodynamic simulation tool supporting DDG 1000 Hull Form Plan (HFP), have increased technology readiness level for aluminum combatants, developed tools to execute the CG 47 Cracking Task Force recommendations, increased situational

Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Navy	Date: February 2015
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603563N *I Ship Concept Advanced Design*

awareness for deploying strike groups. This project supports NAVSEA's core mission and allows for improved performance and reduced cost of current and future naval platforms.

Project 3376 - Strategic Sealift Research and Development - Develops new concepts and technologies which can be applied to or will enable future strategic sealift, and Seabasing systems. The technologies include ship configuration concepts, equipment to increase cargo handling and cargo loading/unloading rates (including commercial and merchant ship systems), improved man/machine interfaces, improved structural configurations and materials, and Logistics-Over-the-Shore (LOTS) equipment and system improvements. FY 2014 and earlier efforts were funded under NDSF BA 04 Project 3116 Strategic Sealift Research and Development. Effort moves back to NDSF BA 04 Project 3116 Strategic Sealift Research and Development in FY 16.

Note: NDSF BA 04 Project 3116 Strategic Sealift Research and Development amounts: FY 2014: $6.288M

B. Program Change Summary ($ in Millions)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Previous President's Budget	17.501	17.864	19.365	-	19.365
Current President's Budget	17.604	17.864	11.888	-	11.888
Total Adjustments	0.103	-	-7.477	-	-7.477
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.229	-			
• SBIR/STTR Transfer	-0.126	-			
• Program Adjustments	-	-	-7.392	-	-7.392
• Rate/Misc Adjustments	-	-	-0.085	-	-0.085

Change Summary Explanation

Programmatic:

Project 3161: The CPSD Program was adjusted based on reduced level of effort. Added additional funding to support increased cybersecurity technologies for application to emerging shipboard and combat system control system architectures and mitigate vulnerabilities across Platform IT (PIT) capabilities.

Financial: Moved project 3376 back to NDSF BA 04 Project 3116 Strategic Sealift Research and Development in FY 16.

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy			Date: February 2015
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603563N / *Ship Concept Advanced Design*	Project (Number/Name) 2196 / *Design, Tools, Plans and Concepts*	

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
2196: *Design, Tools, Plans and Concepts*	1.021	0.461	0.433	0.443	-	0.443	0.449	0.454	0.464	0.474	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project provides the foundation for an affordable and mission capable surface ship force. It also supports the next step in the development of a transformed naval force by accomplishing the pre-milestone A (especially pre-concept decision) efforts for all potential surface ships. These efforts are the required first step in the integration of total ship systems, including combat systems, weapons systems and Hull, Mechanical and Electrical (HM&E) systems. Inadequate early planning and ship concept formulation can result in down-stream design, construction and operational problems. A more subtle and severely negative impact of neglecting this early effort is that the "best" concepts and technologies may never even be considered and our greatest potential ship design advances never realized. Designs and technologies must meet the threat. This project supports this requirement.

This project funds concept development engineering, mission effectiveness analysis, and other analyses for formulation of future surface ship force structure along with development of the tools to accomplish these efforts. Advanced ship concept studies, ship and ship systems technology assessments, and the development and upgrade of ship concept design and engineering tools, methods, and criteria are also funded in this project.

This project accomplishes the following: (1) Develops alternative surface ship force structure concepts including the ships and unmanned vehicles; (2) Evaluates the mission capability effectiveness and costs for these alternative surface fleet architectures; (3) Performs fleet war fighting/mission effectiveness assessment studies; (4) Identifies future surface ship requirements and characteristics necessary to meet future threats and support mission needs; (5) Investigates new affordable ship concepts and evaluates technologies necessary to support these concepts; (6) Provides design methods and automated design tools to develop and evaluate ship concepts; and (7) Supports development of Initial Capabilities Documents (ICD) and analogous early requirements documents for future ships. These efforts are done to support mission analysis; mission needs development and technology assessment in support of future fleet concepts and potential ship acquisition programs. These efforts are fundamental to the Navy's formulation of the future fleet.

Supports concept exploration and mission needs assessment for potential future ship acquisition programs, however, these are not direct efforts for specific, authorized shipbuilding programs. This project supports and maintains this country's naval ship design and engineering capabilities in the area of very early stage (Concept Design) design tools, criteria, and methods.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Title: Ship Concepts and Mission Need Analysis	0.391	0.433	0.443	-	0.443
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 2196 / *Design, Tools, Plans and Concepts*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Description: Develop ship concepts and perform analysis for potential ships and Force Architecture 5-10 years out in shipbuilding plan. ***FY 2014 Accomplishments:*** Continued concept designs for small and medium surface combatants that develop agile, fuel efficient and flexible platforms capable of operating in required environments. These efforts are enabling the design of future affordable surface combatants with increased reliable, efficient, long range, high speed and optimized payload capabilities, including payloads such as unmanned vehicles. ***FY 2015 Plans:*** Developing concepts of integrating unmanned vehicles aboard surface ships. Refining cost analyses of surface ship design and construction. Further improvements of surface ship design tools. Continuing concept development efforts to explore flexible, modular surface combatants. ***FY 2016 Base Plans:*** Continue improving tools that relate ship costs to ship capabilities. Explore concepts of surface ships that can deploy swarms of unmanned autonomous systems, and react to such swarms deployed by the enemy. Analyze the impact of distributed high energy storage systems on ship design. ***FY 2016 OCO Plans:*** N/A					
Title: Total Ship Technology Assessment (TSTA)	0.070	-	-	-	-
Articles:	-	-	-	-	-
Description: Analyze the benefits and impacts of new ship, Hull, Mechanical & Electrical (HM&E) concepts, technologies and warfare systems. ***FY 2014 Accomplishments:*** Commenced development of small scale tools to automate challenging and/or labor intensive naval architecture activities (such as weight reports, liquid loading vs. trim scenarios) and to add capability to existing software tools. The products aid in the in-house technical capability of the Navy in conducting pre-AoA studies for surface ships. ***FY 2015 Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 2196 / *Design, Tools, Plans and Concepts*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
N/A ***FY 2016 Base Plans:*** N/A ***FY 2016 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.461	0.433	0.443	-	0.443

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• RDTEN/0204202N: *DDG-1000*	189.580	202.517	103.199	-	103.199	20.126	13.132	-	-	Continuing	Continuing
• RDTEN/0603512N: *Carrier Systems Development*	77.993	5.959	8.348	-	8.348	7.539	7.531	5.668	5.787	Continuing	Continuing
• RDTEN/0603564N: *Ship Preliminary Design/Feasibility*	37.380	1.773	4.332	-	4.332	2.500	2.500	-	-	Continuing	Continuing
• RDTEN/0604567N: *Ship Contract Design/Live Fire T&E*	174.375	40.016	49.712	-	49.712	40.880	45.950	47.121	36.013	Continuing	Continuing
• RDTEN/0603582N: *Combat System Integration*	4.270	20.881	35.901	-	35.901	35.213	31.985	29.556	30.259	Continuing	Continuing

Remarks

D. Acquisition Strategy

This is a non-acquisition program that develops, evaluates, and validates early stages of total ship concepts and technologies in support of SCN planning and potential future ship acquisition programs. This program also supports development, demonstration, evaluation, and validation of engineering tools, methods, and criteria for those concept designs and assessments.

E. Performance Metrics

Quarterly Program Reviews

Exhibit R-3, RDT&E Project Cost Analysis: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 2196 / *Design, Tools, Plans and Concepts*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	C/CPFF	Various Contractors : Various	0.400	0.090	Jun 2014	0.097	Feb 2015	0.096	Apr 2016	-		0.096	Continuing	Continuing	Continuing
Systems Engineering	WR	NSWC : Various	0.334	0.297	Nov 2013	0.275	Nov 2014	0.277	Nov 2015	-		0.277	Continuing	Continuing	Continuing
Engineering Development	C/CPFF	Various Contractors : Various	0.171	-		-		-		-		-	Continuing	Continuing	Continuing
Engineering Development	WR	NSWC : Various	0.062	0.074	Nov 2013	0.061	Nov 2014	0.070	Nov 2015	-		0.070	Continuing	Continuing	Continuing
Demonstration & Evaluation	C/CPFF	Various Contractors : Various	0.029	-		-		-		-		-	Continuing	Continuing	Continuing
Test & Evaluation	C/CPFF	Various Contractors : Various	0.020	-		-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	1.016	0.461		0.433		0.443		-		0.443	-	-	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Travel	Allot	NAVSEA HQ : Washington, DC	0.005	-		-		-		-		-	-	0.005	-
		Subtotal	0.005	-		-		-		-		-	-	0.005	-

	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	1.021	0.461		0.433		0.443		-		0.443	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 2196 / *Design, Tools, Plans and Concepts*

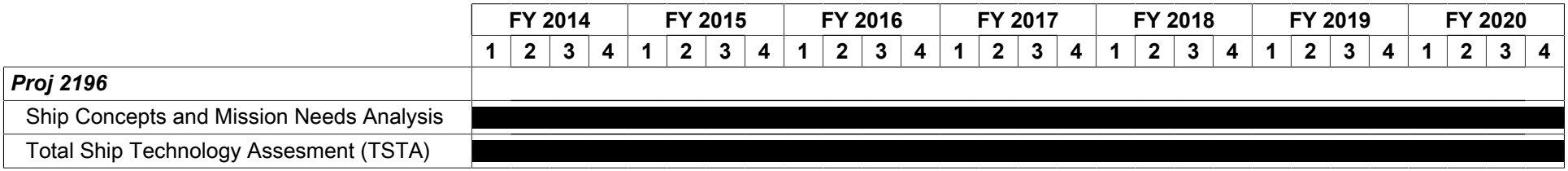

Exhibit R-4A, RDT&E Schedule Details: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 2196 / *Design, Tools, Plans and Concepts*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2196				
Ship Concepts and Mission Needs Analysis	1	2014	4	2020
Total Ship Technology Assesment (TSTA)	1	2014	4	2020

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy			Date: February 2015
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603563N / *Ship Concept Advanced Design*	Project (Number/Name) 3161 / *NAVSEA Tech Authority*	

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
3161: *NAVSEA Tech Authority*	143.699	17.143	11.838	11.445	-	11.445	9.996	9.880	4.683	4.800	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project has been established to support NAVSEA Technical Authority through coordinated, collaborative, cross-platform systems development resulting in advanced capabilities across business lines through development adaptation and extension of processes, procedures, and tools necessary to develop and explore alternative surface ship force structures; advanced surface ship and unmanned surface vehicle concepts; interoperability; and development of systems level engineering criteria and options to support these force structures and advanced concepts as part of pre-acquisition mission needs analysis, mission area analysis, SCN, and R&D planning. The objective is the coordination of ongoing early-stage concept design and development efforts for cross-platform applicability to result in more affordable, mission-capable, and interoperable surface ship forces including ships that are less expensive to build with reduced manning, reduced operating and support costs, and greater utilization of the latest technology.

NAVSEA Tech Authority efforts under Project 3161, known as the Cross Platform Systems Development (CPSD) Program enhance ongoing efforts within Project 2196 and transition directly to early-stage ship design for Ship Preliminary Design and Feasibility Studies and other Program Executive Office (PEO) ship design programs. While these efforts support concept exploration and mission needs assessment for potential future ship acquisition programs, they are not direct efforts for specific, authorized shipbuilding programs. This project is the only R&D effort (Government or commercial) that provides a coordinated, collaborative approach to the development of: cross-platform naval ship and weapon system design, as well as engineering capabilities in the areas of design tools, criteria, and methods. This project also provides innovative solutions for current Fleet issues involving Technical Authority, such as current interoperability issues with new systems or platforms.

Naval Ship System Engineering Technical Authority recapitalization and product development consolidates platform advanced concept development and design tool development in CPSD 1.0 (Platform Concept Advanced Development) and CPSD 2.0 (Platform Design and Certification Tools/Engineering and Tech Data Exchange Development); and aligned standards and requirements development for modularity and system / component commonality within CPSD 3.0 (Ship Systems Engineering/ Modular Ship Systems Development). Program product areas support: platform-centric force architecture and concept development and tools (CPSD 1.0, CPSD 2.0), engineering products and system development (CPSD 3.0, CPSD 5.0), and system interoperability and mission capability for delivering ships (CPSDs 6.0, 8.0, 9.0). CPSD develops and transitions products to Technical Warrant Holder (TWH) community and develop prioritized plans and activities for future products from emerging cross platform technical requirements and associated capabilities.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Title: Platform Concept Advanced Development (CPSD 1.0)	1.158	1.091	0.670	-	0.670
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Description: This effort directly supports the Navy's ability to understand risk and associated cost of surface warfare assets; Pre-Milestone A ships, and unmanned surface vehicle (USV) design and analysis. ***FY 2014 Accomplishments:*** Continued to develop the NAVSEA ship concept development processes for supporting the Long Range Shipbuilding Strategy (LRSS), Capability Based Analyses (CBAs), Analyses of Alternatives (AOAs), inform ship design policy and new technology impact assessment. Developed design space exploration methods that leverage previous Navy design tool investments by employing behavior models of higher fidelity. This will allow much more comprehensive trade studies in support of Capabilities Based Assessments and Analyses of Alternatives. Continued next generation surface ship, and unmanned vehicle concept exploration. ***FY 2015 Plans:*** Exploring concepts for flexible and modular surface ships that meet Long Range Shipbuilding Strategy capability goals at reduced cost. Develop concepts for surface ship designs that optimize the use of unmanned vehicles. Exploring ways to extend mission modularity concepts from LCS to other surface ship platforms. ***FY 2016 Base Plans:*** Refine concepts and support specification development for flexible and modular future surface combatants. Support the execution of cross-platform aspects of the previously-developed Flexible Warship Roadmap. ***FY 2016 OCO Plans:*** N/A					
Title: Platform Design and Certification Tools/Engineering and Tech Data Exchange (CPSD 2.0)	1.775	1.673	1.028	-	1.028
Articles:	-	-	-	-	-
Description: This effort supports the development of validation tools to certify the safety and mission capability of platform concepts and subsequently ships and submarines; establishes the integrated NAVSEA suite. This effort advances platform design methods, design validation tools, cost tools, manpower tools, and tools to aid in rapid total platform definition. ***FY 2014 Accomplishments:***					

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Continued to develop tools that allow for reliable, efficient, long-range, high-speed platforms with optimized payload capabilities. Continued to develop early stage ship design tools supporting total ownership cost reductions through enhancements of performance based cost models and manpower assessments tools. ***FY 2015 Plans:*** Developing a tool to assess the performance of a hull array sonar after loss of one or more hydrophones. Studying historical thirty year shipbuilding plans for insights into key drivers impacting fleet inventory levels, mix, and balance. Refining ship design tools to better incorporate combat system capabilities. ***FY 2016 Base Plans:*** Refine and transition hull array sonar tool. Improve ship design tools to better incorporate distributed high energy storage systems, as well as directed energy weapons. Continue enhancement of fleet architecture and force shaping tools to incorporate the future introduction of unmanned systems in large numbers. ***FY 2016 OCO Plans:*** N/A					
Title: Ship Systems Engineering /Modular Ship Systems Development (CPSD 3.0)	2.107	1.732	1.064	-	1.064
Articles:	-	-	-	-	-
Description: This effort supports Ship system development with a focus on technology transition, modularity, ship system technology integration, and design standards for new ship classes for pre-Analysis of Alternatives (AoA) studies and ongoing program of record (PoR) ship modernization. ***FY 2014 Accomplishments:*** Continued to improve processes for technology upgrades during midlife overhauls that allow for affordable fleet/force modernization. Allowed for long term strategic use of platform and system modularity to enable an affordable future fleet. Continued analysis of fracture mechanics assessment for failure of aluminum structure after a cracking incident to determine inspection periodicity and temporary repair techniques for in-service CG, DDG LCS, and JHSV platforms. ***FY 2015 Plans:*** Exploring cross platform approaches to solving corrosion problems, techniques and applications not being developed by other programs. Developing the use of composite materials for use in more shipboard applications. Exploring methods to reduce the rejection rate of LM2500 turbine blades during overhaul with the intent of					

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
reducing overhaul costs. Exploring methods of extending propulsion shaft life through improved shaft coatings and couplings. ***FY 2016 Base Plans:*** Analyze the logistical and engineering aspects of the application of 3D modeling and printing technology. Assess the current state of technology of robotic methods of cleaning, welding, painting, and inspecting shipboard tank and void spaces. ***FY 2016 OCO Plans:*** N/A					
Title: High Speed Ships and Craft Engineering (CPSD 5.0)	9.546	4.780	3.064	-	3.064
Articles:	-	-	-	-	-
Description: This effort supports the development of concepts for future high speed ships that promise improved mission effectiveness in mobility, survivability, and warfare mission areas. ***FY 2014 Accomplishments:*** Continued the development of improved platform stealth and survivability. Continued to develop a R&D engineering model to support the development, design, acquisition, R&D testing and acceptance of a future modular mission ice capable surface combatant. Continued the development of analytical tools, and continued a prescribed set of model tests and extensive analyses to support development of surface ship Safe Operating Envelope (SOE) and Heavy Weather Guidance (HWG) products. The analytical methods developed include a simulation tool required to characterize ship motions in environments not within the Navy's ability to test. Continued to support the integration of capability on the ship and associated training guidance for the ship's crew. ***FY 2015 Plans:*** Continuing development of analytical tools for the generation of surface ship Operator Guidance products. Completing and delivering surface ship HWG. Continue Verification, Validation, and Accreditation (VV&A) of the simulation tool for characterizing ship motions in environments not within ability to test. Continuing simulation runs of ship motions in prescribed environmental conditions required to develop the surface ship Operator Guidance. Continue to support the integration of capability on the ship and associated training guidance for the ship's crew. Participate in efforts to improve understanding of hydrodynamic performance of multi-hull ships. ***FY 2016 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Continue the development of analytical tools for the generation surface ship Operator Guidance products. Complete Verification, Validation, and Accreditation (VV&A) of the simulation tool for characterizing ship motions in environments not within ability to test. Complete simulation runs of ship motions in prescribed environmental conditions required to develop the surface ship Operator Guidance. Continue to support the integration of capability on the ship and associated training guidance for the ship's crew. ***FY 2016 OCO Plans:*** N/A					
Title: Alternative Power Systems Engineering (CPSD 6.0) ***Articles:*** ***Description:*** This effort investigates concepts for ships with alternative power/propulsion systems evaluating effectiveness in mobility, survivability, and warfare mission areas. ***FY 2014 Accomplishments:*** Completed development of a non-propagating, fire-limiting lithium ion battery. ***FY 2015 Plans:*** Evaluating pod propulsor for future ship concept design. ***FY 2016 Base Plans:*** Evaluate energy harvesting technology for mobility and primary mission systems. Investigate concepts supporting Forward Deployed Energy (FDE) techniques for refueling unmanned vehicles. ***FY 2016 OCO Plans:*** N/A	1.148 -	1.081 -	0.665 -	- -	0.665 -
Title: Embedded Interoperability (I/O) Engineering (CPSD 8.0) ***Articles:*** ***Description:*** Description: This effort establishes and executes a dedicated process for evaluating the interoperability performance of warfare systems early in the acquisition cycle, prior to certification. Embedded I/O ensures that fewer mission critical system failures degrade the ultimately fielded war fighting capability. Focus on emerging Open Architecture warfare systems, including LCS Class. ***FY 2014 Accomplishments:***	0.519 -	0.642 -	0.355 -	- -	0.355 -

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Continued the focus on development of high performance, low cost communication solutions for improved information dominance and interoperability. ***FY 2015 Plans:*** Exploring methods of further reducing costs of achieving certified interoperable systems. Exploring ways to standardize and reduce the number of surface electro-optic and infrared systems and their interfaces. Further improving the generation of strike group interoperability and the generation of Capabilities and Limitations documents. ***FY 2016 Base Plans:*** Develop concepts making use of virtual reality and automated data assistants to lessen the information overload problem for ship combat system operators. ***FY 2016 OCO Plans:*** N/A					
Title: Mission Capability Systems Engineering (CPSD 9.0) ***Articles:*** ***Description:*** This effort supports the development of force-level systems engineering criteria and guidance at the Systems of Systems (SoS) and Family of Systems (FoS) level. This effort allows for the enhanced warfighter and system performance with reduced personnel costs. ***FY 2014 Accomplishments:*** Created a federated network architecture (combat systems, HM&E, and C4I) in future Surface Combatants with the focus on integration into both LCS classes. ***FY 2015 Plans:*** Complete federated network architecture study that enhances and aligns combat system and operations procedures. Assess certified cybersecurity technologies for application to emerging shipboard and combat system control system architectures. ***FY 2016 Base Plans:*** Study the concepts of modularity and open architecture in combat systems and propose parallel concepts for hull, mechanical, and electrical systems. Study advanced cybersecurity technologies for application to shipboard, and other naval combatant systems. ***FY 2016 OCO Plans:***	0.890 -	0.839 -	4.599 -	- -	4.599 -

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
N/A					
Accomplishments/Planned Programs Subtotals	17.143	11.838	11.445	-	11.445

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• RDTEN/0204202N: *DDG-1000*	189.580	202.517	103.195	-	103.195	20.126	13.132	-	-	-	1,755.677
• RDTEN/0603512N: *Carrier Systems Development*	77.993	5.959	8.348	-	8.348	7.539	7.531	5.668	5.787	Continuing	Continuing
• RDTEN/0603564N: *Ship Preliminary Design/ Feasibility Studies*	37.380	1.773	4.332	-	4.332	2.500	2.500	-	-	Continuing	Continuing
• RDTEN/0604567N: *Ship Contract Design/Live Fire T&E*	174.375	40.016	49.712	-	49.712	40.880	45.950	47.121	36.013	Continuing	Continuing
• RDTEN/0603582N: *Combat System Integration*	4.270	20.881	35.901	-	35.901	35.213	31.985	29.556	30.259	Continuing	Continuing

Remarks

D. Acquisition Strategy

This is a non-acquisition program that develops, evaluates, and validates early stages of total ship concepts and technologies in support of SCN planning and potential future ship acquisition programs. This program also supports development, demonstration, evaluation, and validation of engineering tools, methods, and criteria for those concept designs and assessments. This program provides validated engineering tools, methods, and criteria for ship, and weapon system concept designs and assessments while fostering collaboration and coordination of efforts resulting in more effective use of funding.

E. Performance Metrics

Quarterly Program Reviews

Exhibit R-3, RDT&E Project Cost Analysis: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	C/CPFF	Various Contractors : Various	15.666	1.400	May 2014	1.400	Feb 2015	1.120	Feb 2016	-		1.120	Continuing	Continuing	Continuing
Systems Engineering	WR	NSWC, NUWC, CDSA : Various	52.625	5.845	Mar 2014	4.359	Dec 2014	5.412	Dec 2015	-		5.412	Continuing	Continuing	Continuing
Engineering Development	C/CPFF	DRS : Stevensville, MD	2.769	0.444	Feb 2014	0.036	Dec 2014	0.010	Dec 2015	-		0.010	Continuing	Continuing	Continuing
Engineering Development	WR	NSWC, NUWC : Various	45.074	4.941	Mar 2014	3.450	Dec 2014	3.472	Dec 2015	-		3.472	Continuing	Continuing	Continuing
Demonstration & Evaluation	WR	NSWC : Various	17.603	1.173	Mar 2014	1.268	Nov 2014	0.500	Nov 2015	-		0.500	Continuing	Continuing	Continuing
Demonstration & Evaluation	WR	SPAWAR : Various	1.922	-	Mar 2014	-	Mar 2015	-		-		-	Continuing	Continuing	Continuing
Test and Evaluation	WR	NSWC : Various	7.295	3.310	Nov 2013	1.305	Nov 2014	0.921	Nov 2015	-		0.921	Continuing	Continuing	Continuing
		Subtotal	142.954	17.113		11.818		11.435		-		11.435	-	-	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PM/Travel	Allot	NAVSEA HQ : Washington, DC	0.600	0.030	Oct 2013	0.020	Oct 2014	0.010	Oct 2015	-		0.010	Continuing	Continuing	Continuing
DAWDF	Various	Not Specified : Not Specified	0.145	-		-		-		-		-	-	0.145	-
		Subtotal	0.745	0.030		0.020		0.010		-		0.010	-	-	-

	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	143.699	17.143		11.838		11.445		-		11.445	-	-	-

Remarks

Award Dates reflect estimated completion of incremental funding execution.

Exhibit R-4, RDT&E Schedule Profile: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

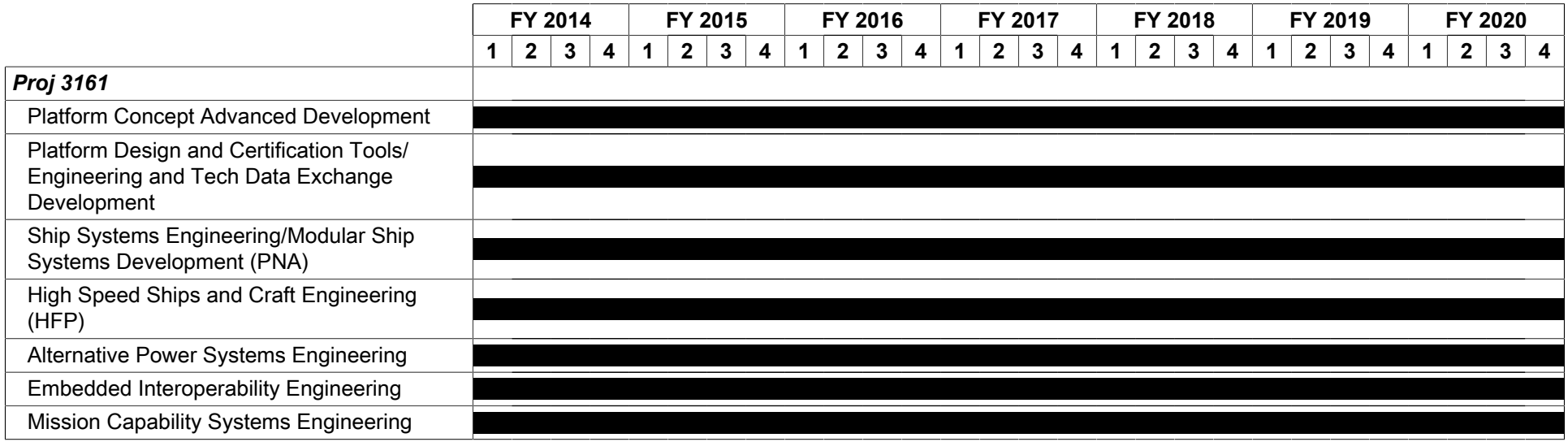

Exhibit R-4A, RDT&E Schedule Details: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3161 / *NAVSEA Tech Authority*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3161				
Platform Concept Advanced Development	1	2014	4	2020
Platform Design and Certification Tools/Engineering and Tech Data Exchange Development	1	2014	4	2020
Ship Systems Engineering/Modular Ship Systems Development (PNA)	1	2014	4	2020
High Speed Ships and Craft Engineering (HFP)	1	2014	4	2020
Alternative Power Systems Engineering	1	2014	4	2020
Embedded Interoperability Engineering	1	2014	4	2020
Mission Capability Systems Engineering	1	2014	4	2020

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy			Date: February 2015
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603563N / *Ship Concept Advanced Design*	Project (Number/Name) 3376 / *Strategic Sealift*	

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
3376: *Strategic Sealift*	-	-	5.593	-	-	-	-	-	-	-	-	5.593
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project 3376 - Strategic Sealift Research and Development - Develops new concepts and technologies which can be applied to or will enable future strategic sealift, and Seabasing systems. The technologies include ship configuration concepts, equipment to increase cargo handling and cargo loading/unloading rates (including commercial and merchant ship systems), improved man/machine interfaces, improved structural configurations and materials, and Logistics-Over-the-Shore (LOTS) equipment and system improvements.

Effort moves back to NDSF BA 04 Project 3116 Strategic Sealift Research and Development in FY 16.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Title: Shipboard Crane Systems/Shipboard Cargo Systems	-	1.250	-	-	-
Articles:	-	-	-	-	-
FY 2014 Accomplishments: N/A					
FY 2015 Plans: FY15 - Continued investigation and demonstration of shipboard crane/cargo systems improvements.					
FY 2016 Base Plans: N/A					
FY 2016 OCO Plans: N/A					
Title: Sealift Concept Development	-	1.283	-	-	-
Articles:	-	-	-	-	-
FY 2014 Accomplishments: N/A					
FY 2015 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3376 / *Strategic Sealift*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
FY15 - Continued providing Advanced Planning, Sealift Research, and Technology development and program guidance. ***FY 2016 Base Plans:*** N/A ***FY 2016 OCO Plans:*** N/A					
Title: Lighter/HSV Seabase to Shore Cargo Transfer	-	3.060	-	-	-
Articles:	-	-	-	-	-
FY 2014 Accomplishments: N/A ***FY 2015 Plans:*** FY15 - Continued development and demonstration of at-sea vehicle transfer capability. ***FY 2016 Base Plans:*** N/A ***FY 2016 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	-	5.593	-	-	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• NDSF/3116: *Strategic Sealift Research and Development*	6.288	-	5.502	-	5.502	5.523	5.773	5.898	6.017	Continuing	Continuing

Remarks

D. Acquisition Strategy

Not applicable for SEALIFT R&D efforts.

E. Performance Metrics

Annual Program Review.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3376 / *Strategic Sealift*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Sealift Concept Development	WR	Various Contractors : Various	0.000	-		1.283	Jan 2015	-		-		-	-	1.283	-
Shipboard Crane Systems	WR	Various Contractors : Various	0.000	-		1.250	Jan 2015	-		-		-	-	1.250	-
Lighter/HSV Seabase to Shore Cargo Transfer	WR	Various Contractors : Various	0.000	-		3.060	Jan 2015	-		-		-	-	3.060	-
		Subtotal	0.000	-		5.593		-		-		-	-	5.593	-

	Prior Years	FY 2014		FY 2015		FY 2016 Base		FY 2016 OCO		FY 2016 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	-		5.593		-		-		-	-	5.593	-

Remarks

FY2014 and earlier efforts were funded under NDSF BA 04 Project 3116 Strategic Sealift Research and Development. Due to Congressional direction to fund Sealift requirements in NDSF, beginning FY2016, Strategic Sealift Research and Development will move back to NDSF BA 04 Project 3116 from PE 0603563N PU3376.

Exhibit R-4, RDT&E Schedule Profile: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3376 / *Strategic Sealift*

	FY 2014				FY 2015				FY 2016				FY 2017				FY 2018				FY 2019				FY 2020			
	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
Proj 3376																												
Shipboard Crane Systems/Shipboard Cargo Systems					[redacted]																							
Sealift Concept Development					[redacted]																							
Lighter/HSV Seabase to Shore Cargo Transfer					[redacted]																							

Exhibit R-4A, RDT&E Schedule Details: PB 2016 Navy		Date: February 2015
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603563N / *Ship Concept Advanced Design*	**Project (Number/Name)** 3376 / *Strategic Sealift*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3376				
Shipboard Crane Systems/Shipboard Cargo Systems	1	2015	4	2015
Sealift Concept Development	1	2015	4	2015
Lighter/HSV Seabase to Shore Cargo Transfer	1	2015	4	2015