EXHIBIT R-2, RDT&E Budget Item Justification							DATE: **June 2001**			
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/4**					R-1 ITEM NOMENCLATURE SHIP CONCEPT ADVANCED DESIGN, PE 0603563N					
COST ($ in Millions	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	Cost to Complete	Total Cost
Total PE Cost	**31.995**	**5.115**	**1.949**						**Continuing**	**Continuing**
Design Tools, Plans & Concepts / S2196	**9.640**	**5.115**	**1.949**						**Continuing**	**Continuing**
Trident SSGN Conversion / F2759	**12.675**	**0.000**	**0.000**						**0.000**	**0.000**
Automated Maintenance Environment/22760	**9.680**	**0.000**	**0.000**						**0.000**	**0.000**
Quantity of RDT&E Articles	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**		

A. (U) Mission Description and Budget Item Justification:

The efforts within this PE directly support the Navy's ability to design more affordable mission capable ships with reduced manning, increased producibility, 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 ship concept studies, and the actual conduct of advanced design concept studies for the ships that may become part of the SCN plan. The program provides the foundation for affordable surface ship design, construction, and life cycle support and is a required first step in the integration of total ship systems, including combat systems and hull, mechanical and electrical (HM&E) systems.

(U) Project S2196 - This project funds 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. FY 00 contains funds to develop a smart propulsor product modeling capability and Standards for Exchange of Product Model Data (STEP development - Navy CAE Technology).

(U) Project F2759 - This project funds TRIDENT SSGN design conversion efforts in FY 2000. PE 0604564N / S2610 funded FY1999 efforts. FY 2001 efforts are funded in PE 0603559N / S2413.

(U) Project 22760 - These projects fund development of an Automated Maintenance Environment (AME) for surface ships.

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: **June 2001**
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/4**	R-1 ITEM NOMENCLATURE SHIP CONCEPT ADVANCED DESIGN, PE 0603563N

B. Program Change Summary:

	FY 2000	FY 2001	FY 2002
(U) FY 2001 President's Budget:	28.659	0.162	2.968
(U) Appropriated Value:	28.659	5.162	
(U) Adjustments to FY2000/2001 Appropriated Value/FY2001 President's Budget:	3.336	4.953	-1.019
(U) FY 2002 President's Budget Submit:	31.995	5.115	1.949

(U) Funding: FY 2000 funding changes reflects Below Threshold Reprogrammings of $+1.050M for Smart Propulsor Product Model and $+3.000M for Trident SSGN Conversion, -$0.562M for SBIR, -$0.112M for Congressional Rescission, and -$0.040M other adjustments.
FY 2001 funding change is: $5M for Human Systems Integration for AME, -$.036M for .7% Congressional Pro-Rata reduction and -$.011M for other adjustments.
FY 2002 funding decrease is due to: -$0.968M for various adjustments, -$0.081M for NWCF rate adjustments and +$.030 other adjustments.

(U) Schedule: None

(U) Technical: Each on-going and future ship acquisition program individually will plan for and develop their needed engineering tools and methods for ship design and engineering done in the feasibility and ship design stages including certification of industry designs.

EXHIBIT R-2a, RDT&E Project Justification							DATE: **June 2001**			
APPROPRIATION/BUDGET ACTIVITY **RDT&E,N/4**	PROGRAM ELEMENT NAME AND NUMBER SHIP CONCEPT ADVANCED DESIGN, PE 0603563N				PROJECT NAME AND NUMBER DESIGN TOOLS, PLANS & CONCEPTS / S2196					
COST ($ in Millions)	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2005	FY 2006	Cost to Complete	Total Cost
Project Cost (S2196)	**9.640**	**5.115**	**1.949**						**Continuing**	**Continuing**
RDT&E Articles Qty										

A. (U) Mission Description and Budget Item Justification: The efforts within this project directly support the Navy's ability to design more affordable mission capable ships with reduced manning, increased producibility, reduced operating and support costs, and greater utilization of the latest technology. This project directly supports the Navy Shipbuilding Plan with state-of-the-art design tools and methods for ship concept studies, and the actual conduct of design concept studies for the ships in that plan. This project provides the foundation for affordable surface ship design, construction, and life cycle support and is a required first step in the integration of total ship systems, including combat 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.

(U) This project accomplishes the following: (1) identifies future surface ship requirements and characteristics necessary to meet future threats and support mission needs; (2) investigates new affordable ship concepts and evaluates technologies necessary to support these concepts; (3) provides design methods and automated design tools to develop and evaluate ship concepts; and (4) supports development of Mission Need Statements (MNS) 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 foundational to the Navy's formulation of the future fleet.

(U) Efforts under Project S2196 transition directly to early stage ship design in PE 0603564N, Ship Preliminary Design and Feasibility Studies. 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 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.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 2000 ACCOMPLISHMENTS:

(U) ($0.522) Pre-Milestone 0 Ship Concepts and Mission Need Analysis: Developed ship concepts and performed mission area analysis (MAA) for potential ships 5-10 years out in the SCN plan, including ship size, configuration, capabilities and rough order of magnitude (ROM) ship costs. Conducted pre-Milestone 0 ship concept studies for medical capabilities afloat, future mine countermeasures ships, and other potential ship concepts / configurations in support of SCN planning. Developed potential future fleet architecture concepts.

(U) ($0.400) Total Ship Technology Assessment: Analyzed the benefits and impacts of new ship and hull, mechanical & electrical (HM&E) concepts and technologies. Identified, characterized and assessed new and emergent technologies and update the HM&E technology database. Supported integration and transition of new technologies in total ship concepts. Updated baseline ship concepts and technology attribute database for use in technology assessments. Supported development of total ship and HM&E technology roadmaps.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **June 2001**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E,N/4	SHIP CONCEPT ADVANCED DESIGN, PE 0603563N	DESIGN TOOLS, PLANS & CONCEPTS / S2196

(U) ($1.240) Ship Design and Engineering Tools, Methods, and Criteria. Improved capability for rapid and accurate ship performance/cost/risk assessments and tradeoff studies. Improved surface ship synthesis/assessment models in the following areas: improved performance assessment capabilities, increased ability to handle alternative distributed system architectures, updated and enhanced capabilities to handle new ship configurations, hull form alternatives, signature reduction features, characterized advanced machinery technologies, addressed minimum required shipboard manning, reduced construction cost, and increased capabilities to determine ship size impacts of new technologies. Improved interoperability of Navy and shipbuilder design systems. Continued development of interoperability standards and capability between and among: synthesis/assessment models, cost estimation models, operational effectiveness models, shipbuilder computer aided design (CAD) models, and Navy-developed analysis tools by participation in and support for collaborative efforts such as the Navy Industry Digital Data Exchange Standards Committee (NIDDESC) and the Maritech Advanced Shipbuilding Enterprise (ASE). Support NAVSEA Professor of Ship Production research grant.

(U) ($1.130) Simulation Based Ship Design & Engineering: Continued to adapt state-of-the-art visualization and simulation techniques for ship design and engineering applications. Reviewed pending ship design needs and ship technology developments to identify top priority simulation requirements. Acquired, validated, adapted, and implemented commercial visualization and simulation tools for the areas such as piping systems simulation and ergonomic models in crew reduction performance simulation. Validated and implemented visualization and simulation tools from DARPA, ONR, and other government sources for areas such as ship motions, maneuvering, powering, personnel flow, stores flow, structural response, command and communications systems, electric power systems, piping systems, HVAC systems, and combat systems. Developed custom visualization and simulation tools where no alternate source exists in areas such as signature visualization and simulation. Continued development of interoperability standards and capability between visualization and simulation tools, ship synthesis/assessment models and computer aided design (CAD) models.

(U) ($0.950) Reliability Based Structural Design Criteria: Began development of methodology for overall strength analysis of surface ships. Added new reliability inputs and assessment techniques to design rules. Incorporated methods for predicting extreme and cumulative lifetime loads into design rules. Collected and analyzed long-term hydrodynamic loads data. Correlated full scale loads measurements with model test results. Validated and adapted advanced seaway loads prediction methods for use with design rules. Developed methodology for bow form effects on hull loads. Established safety indices for naval ship structures components (unstiffened and stiffened plates). Continued performing large scale grillage strength tests. Assessed grillage strength test data. Updated design data sheet for compressive strength of plating stiffeners and grillages. Began integration of all four parts of the reliability-based load and resistance factor design (LRFD) structural rules for naval surface ships. Validated processes and utilized technologies/improved design methods on existing ships and new designs. Supported transition to industry through the Ship Structure Committee (SSC).

(U) ($0.870) Total Ownership Cost Methods and Modeling: Developed total ownership cost modeling and cost decision making tools for ships. Supported Navy-Shipbuilding Industry cost model development team. Enhanced the PODAC cost model capability to incorporate separately estimated cost for specific or special systems. Executed development plan for risk and schedule capabilities of PODAC cost model. Collected and analyzed cost data of shipbuilders for development of activity based cost estimation factors. Continued to develop PODAC cost model estimating ratios for shipbuilding interim products, parametric scaleable systems, and shipboard equipment for ships. Developed cost estimation ratios for world class shipbuilding processes and practices and for new ship production processes, technologies, and materials. Continued integration of operating and support (O&S) cost modeling and analysis capabilities. Developed O&S cost estimating ratios for naval ships through analysis of Visibility And Management of Operating and Support Costs (VAMOSC) and other historical O&S databases. Continued work on design data analysis module to link PODAC with computer-aided ship design tools.

(U) ($2.579) Smart Propulsor Product Model efforts. Developed a smart computer product modeling capability for naval ship propulsors.

(U) ($1.949) Standards for the Exchange of Product Model Data.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **June 2001**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E,N/4	SHIP CONCEPT ADVANCED DESIGN, PE 0603563N	DESIGN TOOLS, PLANS & CONCEPTS / S2196

(U) FY 2001 PLAN:

(U) ($0.161) Ship Concept Design and Engineering Tools, Methods, and Criteria. Improve capability for rapid and accurate ship tradeoff studies using surface ship synthesis/assessment models.
(U) ($4.954) Automated Maintenance Environment

(U) FY 2002 PLAN:

(U) ($0.389) Ship Concepts and Mission Need Analysis: Develop ship concepts and perform mission area analysis (MAA) for potential ships 5-10 years out in the SCN plan, including ship size, configuration, capabilities and rough order of magnitude (ROM) ship costs. Conduct pre-Milestone A ship concept studies for potential ship concepts / configurations in support of SCN planning. Assess the future ship concepts as part of potential future fleet architecture concepts.

(U) ($0.195) Total Ship Technology Assessment: Analyze the benefits and impacts of new ship and hull, mechanical & electrical (HM&E) concepts and technologies. Identify, characterize and assess new and emergent technologies. Support integration and transition of new technologies in total ship concepts. Support development of total ship and HM&E technology roadmaps.

(U) ($1.365) Ship Concept Design and Engineering Tools, Methods, and Criteria. Improve capability for rapid and accurate ship performance/cost/risk assessments and tradeoff studies. Improve surface ship synthesis/assessment models in the following areas: improve performance assessment capabilities, update and enhance capabilities to handle new ship configurations, hull form alternatives, signature reduction features, characterize advanced machinery technologies, address optimal required shipboard manning, reduced total ownership cost , and increased capabilities to determine ship size impacts of new technologies. Improve interoperability of Navy and shipbuilder design systems. Continue development of interoperability standards and capability between and among: synthesis/assessment models, cost estimation models, operational effectiveness models, shipbuilder computer aided design (CAD) models, and Navy-developed analysis tools by participation in collaborative efforts such as the Navy Industry Digital Data Exchange Standards Committee (NIDDESC) and other shipbuilding technology efforts. Support NAVSEA Professor of Ship Production research grant.

B. Other Program Funding Summary: Not applicable.
(U) Related RDT&E

(U) PE 0603512N (Carrier Systems Development)
(U) PE 0603513N (Shipboard Systems Component Development)
(U) PE 0604300N (SC21 Total Ship Systems Engineering)
(U) PE 0603564N (Ship Preliminary Design and Feasibility Studies)
(U) PE 0604567N (Ship Contract Design/Live Fire T&E)

C. Acquisition Strategy:
This is a non acquisition program that develops, demonstrates, evaluates, and validates early stage 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 these concept designs and assessments.

EXHIBIT R-2a, RDT&E Project Justification			DATE: **June 2001**
APPROPRIATION/BUDGET ACTIVITY **RDT&E,N/4**	PROGRAM ELEMENT NAME AND NUMBER SHIP CONCEPT ADVANCED DESIGN, PE 0603563N	PROJECT NAME AND NUMBER DESIGN TOOLS, PLANS & CONCEPTS / S2196	

D. Schedule Profile

	FY 2000	FY 2001	FY 2002
Program Milestones	(Not applicable - Non-Acquisition Program)		
Engineering Milestones (All are 4th Quarter unless otherwise indicated)	Complete Medical Capability Afloat Study		
	Complete LHA (large deck amphibious assault) Dev. Options Study including ship concept studies 1Q		
	Define interface specifications for analysis programs to CAD systems & ship synthesis models	Complete ship synthesis model tool user interface upgrade 1Q	Ship synthesis model tool interface to major operational assessment tool
	Fracture & grillage tests of shipyard fabrication specimens complete	Publish Load Factor Resistance Design Method Application and Basis	Merge capabilities of alternative ship synthesis model tools
	Safety indices for naval ship structures components (unstiffened and stiffened plates)		
	Develop initial life cycle cost estimating capabilities		
	PODAC Cost Model Version 6		
Testing Milestones	(Not applicable - Non-Acquisition Program)		
Contract Milestones	(Not applicable - Non-Acquisition Program)		

Exhibit R-3 Cost Analysis (page 1) | DATE: **June 2001**

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NAME AND NUMBER
RDT&E,N/4	SHIP CONCEPT ADVANCED DESIGN, PE 0603563N	DESIGN TOOLS, PLANS, AND CONCEPTS, S2196

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	FY 02 Cost	FY 02 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development											0.000	
Ancillary Hardware Development											0.000	
Systems Engineering,	C/CPFF	CSC Adv Marine (CSC- AM) Arlington, VA	6.794	0.269	Note (1)					Cont.	Cont.	N/A
Concept Development, Engineering Development, Demonstration & Evaluation	C/CPFF	SPAR Assoc, Annapolis, MD	1.450	0.550	Note (2)					Cont.	Cont.	N/A
		Bird-Johnson, Walpole, MA	0.000	1.126	Dec. 2000					1.126	1.126	1.126
	various	Other Contractors	43.566	0.100	various	0.000	various	0.000	various	N/A	N/A	N/A
	WR	NAVSEA, Carderock Div, West Bethesda, MD	23.665	3.683	N/A	0.151	N/A	1.889	N/A	N/A	N/A	N/A
	WR & RC	Other Govt. Activities	7.912	0.510	N/A	0.010	N/A	0.060	N/A	N/A	N/A	N/A
Licenses											0.000	
Tooling											0.000	
GFE											0.000	
Award Fees											0.000	
Subtotal Product Development			83.387	6.238		0.161		1.949		Cont.	Cont.	

Remarks: Note (1): Existing Contract awarded April 1995. Modifications award 1st quarter of FY.
Note (2): Existing Contract awarded March 1998. Modifications award 1st quarter of FY. This contract also includes Avondale Industries, New Orleans, LA; Bath Irons Works, Bath, ME; Ingalls Shipbuilding, Pascagoula, MS; NASSCO, San Diego, CA; Designers & Planners, Arlington, VA; and The University of Michigan Transportation Research Institute, Ann Arbor,MI

Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		N/A	N/A	

Remarks:

Exhibit R-3 Cost Analysis (page 2)										DATE: **June 2001**		
APPROPRIATION/BUDGET ACTIVITY **RDT&E,N/4**			PROGRAM ELEMENT SHIP CONCEPT ADVANCED DESIGN, PE 0603563N			PROJECT NAME AND NUMBER DESIGN TOOLS, PLANS, AND CONCEPTS, S2196						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	FY 02 Cost	FY 02 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation											0.000	
Operational Test & Evaluation											0.000	
Tooling											0.000	
GFE											0.000	
Subtotal T&E			0.000	0.000	N/A	0.000	N/A	0.000	N/A	N/A	N/A	
Remarks:												
Contractor Engineering Support											0.000	
Government Engineering Support											0.000	
Program Management Support											0.000	
Travel				0.000		0.000		0.000			N/A	
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			0.000	0.000	N/A	0.000	N/A	0.000	N/A	N/A	N/A	
Remarks:												
Total Cost			83.387	6.238		0.161		1.949		Cont.	Cont.	
Remarks:												