ATTACHMENT J-3

NOAA SWATH
Coastal Mapping Vessel (CMV)

FEASIBILITY DESIGN PRESENTATION FORMAT

July 15, 2003

United States Department of Commerce
National Oceanic and Atmospheric Administration

Feasibility Design Study Presentation

The Contractor shall provide a presentation describing his feasibility design and associated cost estimate along with an assessment of cost drivers associated with the design requirements.

The presentation shall address:

- Ship size and configuration
- Design margins
- Hull form and appendages
- Ship motions
- Speed / power and endurance
- Weights and loads
- Stability
- Major systems (Propulsion / Electric Plant)
- Mission systems integration
- Noise and vibration
- SOR compliance and Mission Suitability Features
- Conclusions

The minimum required content of each section of the presentation is as described below. Additional sections and appendices may be added if desired. Metric units of measurement shall be used.

The Feasibility Study presentation shall be prepared in a format compatible with Microsoft PowerPoint and shall be a maximum of 75 pages. Separate appendices in suitable Microsoft Office compatible format may be provided for speed power calculations, weight estimates, arrangement sketches, stability calculations and fuel endurance calculations.

1. Ship size and configuration

Provide general arrangement sketches, corresponding to the feasibility design phase as indicated in SNAME T&R Bulletin 7-3. Rationale and discussion of tradeoffs, where appropriate, shall be provided for key features of the general arrangement, including the locations and configurations of the following: Bridge, Charting Laboratory, multibeam echo sounding system, boat stowage and handling areas, machinery spaces, aft working deck arrangement, central control station (if separate from the bridge), and ACS. Available net area shall be identified for each major space and shown on a separate table. The table shall list each compartment, it's location and available net area. The bulkhead deck shall be identified. A Table of Principal Ship Characteristics shall be presented in accordance with Table 1.

Table 1 - Principal Ship Characteristics	
Length, OA (m)	
Length, DWL (m)	
Beam, max. (M)	
Beam, on DWL (m)	
Depth, to Main Deck Amidships (m)	
Draft, mean, Full Load (FL) at delivery (m)	
Draft, navigational, Full Load (FL) at delivery (m)	
Draft, navigational, Full Load (FL) with Service Life Allowance (m)	
Displacement, Light Ship (Mt)	
Deadweight (Loads) (Mt)	
Displacement, Full Load (FL) at delivery (Mt)	
Propulsion power, kW/rpm @ 100% MCR	
Propeller Type	
Propeller Diameter (m), Number of Blades	
Speed (knots): Free Route 80% MCR (Sustained)	
Endurance: Stores (days) Fuel (Mt) (specify governing cruise)	
Electric Plant (no./kW) (specify generator type)	
Aft Working Deck Area (sq m)	
Charting Laboratory (sq m)	

2. Design margins

Preliminary design and construction margins and service life allowances reflected in the design shall be summarized in accordance with Tables 2 and 3.

TABLE 2. DESIGN AND CONSTRUCTION MARGINS		
Margin Category	Minimum Required	Margin Allocated (percent)
Weight Design & Building Contract Modification GFM Modification Total	 Note 1 Note 2 Note 2 Note 1	
KG Design & Building Contract Modification GFM Modification Total	 Note 1 Note 2 Note 2 Note 1	
Hull Resistance, Calm Water	Note 1	
Unassigned Deck Area	Note 1	
Other (if any, specify)	Note 1	
Notes: 1. Contractor to determine 2. In accordance with the SOR.		

TABLE 3. SERVICE LIFE ALLOWANCES		
Allowance Category	Minimum Required	Allocated
Weight (% FL)	(in accordance with the SOR)	
KG Rise (FL)	(in accordance with the SOR)	
Electric Load (except deck machinery propulsion and steering)	(in accordance with the SOR)	

3. Hull form and appendages

A lines plan, including stations, waterlines, and buttocks shall be provided. Hull form characteristics shall be presented in accordance with Table 4. Key features of the hull form and rationale for their selection shall be presented. Sketches depicting the shapes of the rudders, canards, and stabilizers shall be provided.

TABLE 4. PRINCIPAL HULL FORM CHARACTERISTICS	
Length, OA (m)	
Length, WL (m)	
Beam, maximum (m)	
Beam, at DWL (m)	
Draft to DWL, Amidships (m)	
Displacement, molded to DWL (mt)	
Max. height/width of lower hull (m)	
Max. strut width (m)	
Wet Deck clearance above DWL, amidships (m)	
Wet Deck clearance above DWL, at FP (m)	
Wetted Surface to DWL (m^2)	
Waterplane Area (m^2)	
Demihull C_B Demihull C_X, at Section of Maximum Area Demihull C_P Strut C_W	
LCB, % LWL Aft of Amidships LCF, % LWL Aft of Amidships	

4. Ship motions

Discuss the sea conditions for operations and the selection of design characteristics to maximize ship motions performance for those conditions.

5. Speed / power and endurance

Design Speed - Calculations shall be presented which clearly demonstrate that the specified Design speed is met. The speed-power calculations shall be clearly labeled and shall identify all data sources and assumptions. Hull resistance, assumed margin on predicted hull resistance, appendage resistance, hull/propeller interaction coefficients, open water propeller efficiency, mechanical losses between the prime mover and the propeller, and still air drag shall be addressed. The results of the calculations shall be discussed and key results stated, including, the predicted achievable speeds at (1) 100% MCR, (2) 80% MCR (Design speed). In addition, free route speed - power curves shall be included. The required power level for towing at design speed shall be determined. The curves shall show required propulsion power in kW and propeller rpm vs. speed in knots for the ship. The curves shall cover the range from zero to the maximum achievable speed.

Propulsors - The type of propulsors selected shall be identified. Describe and summarize all parametric calculations used to determine diameter, design RPM, pitch, blade area ratio, and number of blades.

6. Weights and loads

The design weight estimate shall be summarized in this section in accordance with Table 5. The load summary shall identify the heaviest load condition. VCG's shall be located in accordance with the SOR. Changes may be made to the ESWBS groups listed in the Loads Summary of Table 5 to suit the design specifics. Include a discussion of the method(s) used to prepare the weight estimate, e.g. parametrically derived from a parent ship. Identify any parent ships used for the estimate.

TABLE 5A - WEIGHT SUMMARY – LIGHT SHIP SUMMARY					
		VERTICAL		LONGITUDINAL	
	WEIGHT (mt)	VCG (m)	MOMENT (m-mt)	LCG (m)	MOMENT (m-mt)
1 HULL STRUCTURE 2 PROPULSION PLANT 3 ELECTRIC PLAND 4 IC AND ELECTRONIC SYSTEMS 5 AUXILIARY SYSTEMS 6 OUTFIT AND FURNISHINGS 7 SMALL ARMS AND PYROTECHNICS					
TOTAL LIGHT SHIP (W/O MARGINS)					
LIGHT SHIP MARGINS					
LIGHT SHIP W/MARGINS					

TABLE 5B - WEIGHT SUMMARY – LOADS SUMMARY					
F11, F13 OFFICERS AND CREW F21 SMALL ARMS AMMUNITION F29 MISSION SYSTEMS STORES AND LOADS F31 PROVISIONS & PERSONNEL STORES F32 GENERAL STORES F41 DIESEL FUEL F46 LUBRICATION OIL F51 SEA WATER F52 FRESH WATER F54 HYDRAULIC FLUID F55 COLLECTION AND HOLDING TANKS					
TOTAL LOADS					

TABLE 5C - WEIGHT SUMMARY – FULL LOAD AND BURNED OUT CONDITION SUMMARY

LIGHT SHIP W/MARGINS					
TOTAL LOADS					
FULL LOAD					
SERVICE LIFE ALLOWANCE					
FULL LOAD WITH SERVICE LIFE ALLOWANCE					
BURNED OUT FUEL LOAD					

7. Stability

This section shall include the ship's Curves of Form and a summary of the capacities and centers of gravity of all built-in tanks in accordance with Table 6. Include subtotals for all tanks of each particular type (for e.g., fuel, seawater ballast, etc.). Include also a summary of draft, trim, and GMT and GML in accordance with Table 7. Provide the limiting displacement for reserve buoyancy, and the following intact conditions:

a. Full load condition.
b. Full load condition with burnable fuel totally consumed and ten percent consumables remaining.
c. Full load condition, with 50 percent fuel burned and 55 percent consumables onboard.

Each of the above conditions shall be met with and without the Service Life Allowance. In addition, for each of the above conditions, list the tanks and the amount of seawater ballast carried.

The allowable KG curves vs. displacement curves shall be plotted. Curves shall be shown which correspond to the governing (limiting) intact and damage stability criteria. Each curve shall be clearly labeled for the intact/damaged condition and criteria governing. Four points shall be plotted (corresponding to the ship's actual full load and burned out load conditions, at delivery and with service life allowance) with the intact and damage allowable KG curves.

Both the intact and damage stability analyses shall be clearly discussed in the report, including all assumptions. The manner in which phenomena such as free surface effects and boat launching are treated shall be clearly explained and calculated or assumed values stated. For example, the effects of launching the survey boat (list, trim, etc.) on ship displacement, VCG, and LCG shall be stated. The most critical stability criteria for both the intact and damage cases shall be clearly identified and described. For the worst damage case, the damage location and extent shall be stated. If any ship operating restrictions must be imposed to meet the criteria, they shall also be described.

TABLE 6. TANKAGE SUMMARY					
TANK IDENTIFICATION	MOLDED VOLUME (m^3)	USABLE CAPACITY (mt)	VCG (m)	LCG (m)	MAXIMUM FREE SURFACE (m-mt)
NOTES: VERTICAL CENTERS FROM KEEL AMIDSHIP LONGITUDINAL CENTERS FROM FORWARD PERPENDICULAR					

TABLE 7. DRAFT, TRIM, GM_T, AND GM_L SUMMARY							
LOAD CONDITION	DISPLACEMENT (mt)	MEAN DRAFT AMID-SHIPS (m)	TRIM (m) (+ = aft)	NAVIG. DRAFT (m)	FREE SURFACE CORR. (m)	GMT CORR. (m)	GML COR R(m)
FULL LOAD (at Delivery)							
FULL LOAD (with Service Life Allowance							
FULL LOAD WITH BURNABLE FUEL CONSUMED AND 10% CONSUMABLES (at Delivery)							
FULL LOAD WITH BURNABLE FUEL CONSUMED AND 10% CONSUMABLES (with Service Life Allowance)							
FULL LOAD WITH 50% FUEL BURNED AND 55% CONSUMABLES (at Delivery)							
FULL LOAD WITH 50% FUEL BURNED AND 55% CONSUMABLES (with Service Life Allowance)							

8. Structure

Describe the overall structural configuration and provide rationale for it. Hull structure shall include identification of the hull structural material(s), framing system, scantling size, and strength deck. Provide rationale for the selected material(s) and framing system. Address structural integration of the superstructure with the cross-structure and the haunch and lower hulls. Describe the process to be followed to determine the long-term load exceedance distributions (fatigue). Identify wet deck height and rationale for height selection. Present a midship section drawing, to scale, showing the structural configuration and scantlings. Include appropriate notes and principal characteristics data on the drawing. Address status of ABS involvement in structural design approval.

9. Major systems (Propulsion / Electric Plant)

The ship's main machinery plants, including propulsion, auxiliary propulsion (if provided) electric power and auxiliary systems, shall be described. Provide rationale for the selected plant type, configuration, rating, and shaft rpm at full power for main and auxiliary propulsion (if provided). Describe the features incorporated in main propulsion for low speed operation if auxiliary propulsion unit is not provided. Provide rationale for the selected full power shaft rpm. Provide sketches of the propulsion and electrical generating machinery spaces, showing major items of installed equipment. Include the location of the Centralized Control Station. Provide a shafting arrangement profile, from the prime mover to propeller. Include preliminary calculations used to size the shafts. Present the endurance fuel calculations for each cruise type and identify the governing cruise and the required ship fuel capacity. Identify and provide background on selection of the Single Source Vendor (SSV) for the Integrated Diesel Electric Propulsion System, if provided.

10. Mission systems integration

The following spaces and systems shall be described: Aft Working deck arrangements; Service Area arrangements; Charting Laboratory Location and Arrangement; Multibeam Configuration; Survey Launch Location; Mission Sidescan and CTD winches; Dive locker; A-Frame rigging. Identify major items of equipment, speeds, capacities and ratings. Address how and from where winches, cranes, etc. will be controlled during critical operations as well as communications and visibility between the personnel performing the operations. Include sketches to supplement the text, which show the proposed arrangements of the mission systems and the equipment listed above. The rigging sketches shall depict arrangements, system equipment, and rigging leads.

Describe the features and equipment provided for the mission electronics systems. Identify the locations of all transducers.

11. Noise and vibration

Identify the noise sources considered and explain how noise requirements were reflected in the development of the vessel design. Provide an assessment of the impact of the vessel generated noise on sonar performance. Identify the noise control measures adopted as a result

of this preliminary assessment. Quantify allowances made for noise control in the weight estimate.

12. SOR compliance and Mission Suitability Features

Identify SOR compliance issues and discuss the features of the design and associated trade-offs that were fundamental in maximizing performance of this design with respect to the Mission Suitability features and the NTE construction price.