

## Task Order Plan (TOP)

**Contract Number:** NNM05AB50C  
**TO Title:** Structural Dynamics Test Branch/Modal  
**TO Number:** 36-040001 **Revision:** 17

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**Period of Performance:** 10/02/2010 to 09/30/2011

**MSFC Initiator:** Tim Driskill

(b)(4)

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**Emergency:** No

Revision -17: The purpose of this revision is to change to the period of performance through March 31, 2011. In addition, (b)(4) labor hours and (b)(4) were added to Subelement 01; and (b)(4) hours and (b)(4) were added for labor and (b)(4) was added subcontractor support to Subelement 02 for subcontractor support. The total change for this task order is (b)(4) labor hours and (b)(4)

Task Order revision history:

- Revision 16: The purpose of this revision is to extend this task into Contract Year 6 of the NNM05AB50C ESTS contract. This revision defines and estimates work for the period 2 October 2010 through 31 December 2010. Additionally the Schedule, Performance Plan, and Risk Assessment have been revised to reflect any changes in task activities for the new period of performance.
- Revision 15 The purpose of this revision is to add a new Subelement-02, Empirical Spin-off Development of LOX Damper Technology (WBS Nos. 685676.01.08.01 and 814060.08.11) to this task order. This Subelement added (b)(4) labor hours and (b)(4) in subcontractor costs for at total of (b)(4) Revised Section 3.0.
- Revision 14: The purpose of this revision is to change the period of performance and to close Subelements CB: Modal and Structural Dynamics Test Support for the Flight Integration Test Office (FITO) (WBS 136905.10.30.20.10) and CD: . Liquid Oxygen (LOX) Damper/Thrust Oscillation Test Support (WBS 136905.02.04.08.17). This resulted in a reduction of (b)(4) labor hours and (b)(4) New Subelemnt-01, Modal and Structural Dynamics Test Support (WBS 522632.08.01.01) was added to the task order.
- Revision 13: The purpose of this revision is to extend the period of performance out to 06/30/2010 to continue the work specified in this task order through the third quarter.. As a result, this revised period of performance adds (b)(4) in subcontractor support and (b)(4) labor hours to reflect the support needed to for Subelement CD: Liquid Oxygen (LOX) Damper/Thrust Oscillation Test Support (WBS 136905.02.04.08.17).
- Revision 12: Closed Subelement CC, opened Subelement CD, and extended the period of performance out to 03/31/2010.
- Revision 11 Extended the period of performance into Contract Year 5.

- Revision 10: Moved (b)(4) labor hours from Subelement CB: Modal and Structural Dynamics Test Support for the Flight Integration Test Office (FITO) [WBS 136905.10.30.20.10] to Subelement CC: Ares Crew Launch Vehicle (CLV) Thrust Oscillation Test Support [WBS 136905.01.07.01] to reflect the actual manpower needed to support Subelement CC.
- Revision 09: Moved (b)(4) labor hours from Subelement CB: Modal and Structural Dynamics Test Support for the Flight Integration Test Office (FITO) [WBS 136905.10.30.20.10] to Subelement CC: Ares Crew Launch Vehicle (CLV) Thrust Oscillation Test Support [WBS 136905.01.07.01] to reflect the actual manpower needed to support Subelement CC, and revised the labor rate for the participating subcontractor to reflect the actual labor rate.
- Revision 08: Reduce the labor hours by (b)(4) to reflect the actual manpower needed to support Subelement CB
- Revision 07: Extended the period of performance into Contract Year 4.
- Revision 06: Closed Subelement CA: Ares Crew Launch Vehicle (CLV) Upper Stage Modal and Structural Dynamic Test Support, and opened Subelement CC: Ares Crew Launch Vehicle (CLV) Thrust Oscillation Test Support
- Revision 05: Added (b)(4) to Subelement CB
- Revision 04: Extended the period of performance into Contract Year 3.
- Revision 03: Further reduced labor hours due to delayed staffing and added subcontract labor.
- Revision 02: Reduced planned labor hours due to delayed staffing.
- Revision 01: Moved ODC from the -00 Subelement into the appropriate work specific Subelements.
- Revision 00: Defined and estimated the work for the period 01 January 2007 through 28 September 2007.

## **1.0 Task Order Description & Objectives**

This Task provides engineering support for the Structural Dynamics Test Branch Modal Dynamics Team of the Engineering Directorate Test Laboratory. The support will, at a minimum, provide direction and support for modal and structural dynamic tests of components, structures, assemblies, and systems through evaluations of design specifications, drawings, and hardware, test planning and preparation, testing, analyzing and reporting the test results. Analysis of structural dynamics data obtained from flights and/or experimental laboratory work will also be performed as a part of the Task support.

## **2.0 Technical Approach (Including required input, guidelines & assumptions)**

### **Subelement CA - Ares Crew Launch Vehicle (CLV) Upper Stage Modal and Structural Dynamics Test Support (WBS 136905.08.05.10.02.08)**

The objective of Subelement -CA is to provide test support for Ares Crew Launch Vehicle (CLV) upper stage modal and structural dynamic testing. This Subelement was deleted by Revision 06.

### **Subelement CB - Modal and Structural Dynamics Test Support for the Flight Integration Test Office (FITO) (WBS 136905.10.30.20.10)**

The objective of Subelement -CB is to provide modal and structural dynamics test support for the Flight and Integrated Test Office (FITO). This Subelement was deleted by Revision 14.

### **Subelement CC - Ares Crew Launch Vehicle (CLV) Thrust Oscillation Test Support (WBS 136905.01.07.01)**

The objective for Subelement -CC is to provide scaled tank damping characterization in support of the mitigation of the Thrust Oscillation issue for the Ares Crew Launch Vehicle (CLV). This Subelement was deleted by Revision 12.

### **Subelement CD - Liquid Oxygen (LOX) Damper/Thrust Oscillation Test Support (WBS 136905.02.04.08.17)**

The objective for Subelement -CD is to provide Liquid Oxygen (LOX) damping characterization in support of the Thrust Oscillation issue for the Ares Crew Launch Vehicle (CLV). This Subelement was deleted by Revision 14.

### **Subelement 01 - Modal and Structural Dynamics Test Support (WBS 522632.08.01.01)**

The objective of Subelement -01 is to provide modal and structural dynamics test support for multiple programs to include:

- Shuttle programs; Orbiter, ET, SRB, RSRM, SSME
- ISS Programs
- Flight Directorate programs
- Engineering Directorate programs and customers
- Science Directorate programs
- Heavy Lift Launch Vehicle
- Other external customers supported by MSFC

### **Subelement 02 - Empirical Spin-off Development of LOX Damper Technology (WBS Nos. 685676.01.08.01 and 814060.08.11)**

The objective of Subelement -02 is to provide Empirical Spin-off Development of LOX Damper Technology for potential NASA and commercial applications to include, but not limited to:

- Structural Dynamics testing and analysis,
- Modal testing,
- Fluid Systems testing,
- Accelerometer instrumentation, pressure transducers, signal conditioners, and structural dynamic response data acquisition systems,
- High speed camera operation and data processing,
- Independent technical report generation and presentation of the physics and analytical correlation of empirical data.

## **3.0 Discussion of Skills Required**

Subelements 01 and 02:

Detailed Task flow and schedule will be coordinated with NASA task manager.

The following Technical approach items are common to all Subelements:

1. Provide liaison between the various project offices and the test requestors.
2. Review test requirements and specifications.
3. Review design specifications and drawings.
4. Review and/or develop test implementation plans.
5. Develop test procedures.
6. Review test facility drawings and specifications.
7. Develop and review facility activation and operation procedures.
8. Coordinate technician activities for test setup, hardware installation, and test.
9. Coordinate with personnel in related tasks to resolve technical problems.
10. Perform checkouts, tests, and experiments.
11. Support anomaly resolution, as required.
12. Review test data.
13. Report on test results.

Subelement 02:



# ESTS Contract Task Order Request Performance Plan

Task Order Title: [Structural Dynamics Test Branch/Modal](#)

Task Order Number: [36-040001](#) Revision: 17

Category	Weighting Technical %	End of Period Technical Score
<b>Technical Objectives</b>	65%	X 65% = <b>Justification</b>
Structural Dynamics Test Engineering; Co-ordinates all test related activities to satisfy test requirements. This includes: direction for all technician activities; data acquisition system personnel; develop, implement, and perform test procedures; and document all test related activities in final report form per ISO standards.		
<b>Schedule Objectives (Milestones)</b>	Weighting Schedule % 10% (min 10%)	Schedule Score X 10% = <b>Justification</b>
Support as required to accomplish/satisfy each project/customer schedule requirements.		
<b>Cost (actual vs. negotiated)</b>	Weighting Cost% 25% (min.25%)	Cost Score X 25% = <b>Justification</b>
	Weighting Total % 100.00%	<b>Total Score</b>

## Technical, Schedule, and Cost Grading Scale

Score	Description
9.0-10.0	Exceeded TO Performance Plan objectives resulting in major benefit(s)
8.0-8.9	Exceeded TO Performance Plan objectives resulting in modest benefit(s)
7.0-7.9	Met TO Performance Plan objectives
3.0-6.9	Did not meet all TO Performance Plan objectives resulting in minimal impact or requiring additional agency funds
0.0-2.9	Did not meet TO Performance Plan objectives resulting in substantial impact and/or requiring additional agency funds

## ESTS Contract Task Order Request Performance Plan

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**Comments:**

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**Risk Assessment**

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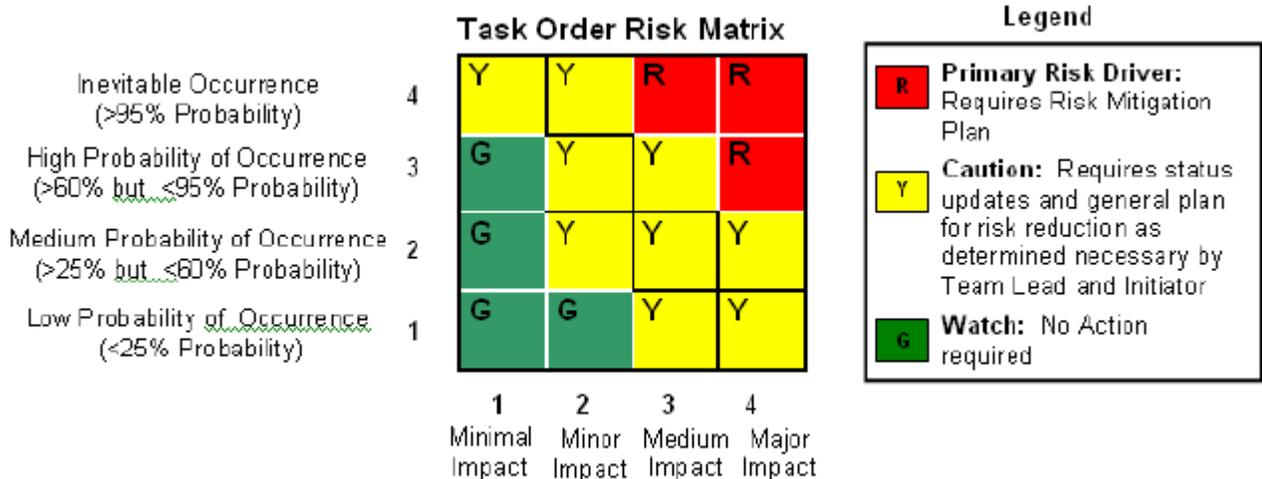
(b)(4)

**Task Order Risk Assessment to Cost, Technical, and Schedule**

List identified risk associated with Task Order performance as related to task cost, technical, and schedule. Classify the risk(s) according to probability of occurrence and impact as defined below and enter the risk into risk matrix.

Risk	Risk Type	Probability (1-4)	Impact (1-4)	Risk Description
Risk C1	Cost	2	3	Possibility the funding will not continue in calendar yr 2011
Risk C2	Cost			
Risk T1	Technical	2	2	Uncertainty of continuation in calendar year 2011
Risk T2	Technical			
Risk S1	Schedule			
Risk S2	Schedule			

\*Note: See page 2 for risk mitigation plan for those risks which are Primary Risk Drivers.



Impact Level	Cost Impact Definition	Technical Impact Definition	Schedule Impact Definition
(1) Minimal Impact	No significant cost impact	No significant technical impact	No significant schedule impact
(2) Minor Impact	Potential to recover cost	Potential to gain required technology without impact	Minor delay in deliverables but no impact to customer
(3) Medium Impact	>0 but <10% subtask cost overrun	Some technical impact but potential to recover	Delay in subtask deliverables but work arounds available and acceptable to customer
(4) Major Impact	>10% subtask cost overrun	Unable to meet technical requirements to perform subtask	Delay in subtask deliverables with impact to customer

## Risk Mitigation Plan

Complete the following chart for those risks identified on page 1 as "Primary Risk Drivers". The following chart will serve as the Risk Mitigation Plan.

Risk No.:		
Risk Description:		
Mitigation Step No.	Planned Completion Date	Mitigation Step Description
		No mitigation required. Accept risks