

University-affiliated Spaceport Technology Development Contract NAS1003006
TASK ORDER

100893

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TO Ref:	Task Order No.	Contract Year	Task Order Revision	Reference Plan Revision	Laboratory/Area	Type:
SPI	00453	7	B	B	None required	Mission Support

Title: **ML Electrical Systems Support for Constellation Ground Systems.**

Director Area	R&D:	Manager Group	Period of Performance:
Systems & Project Engineering	No	Project Engineering	From: 05/03/2007
	Scope Change: Yes		To: 09/30/2010

Note: Target Costs change only if scope changes	CY1 to CY5	CY6	Contract Year 7 (CY7) Cost Targets			CY8	OUTYEARS	TOTAL
	(K\$)	(K\$)	FROM:	DELTA:	TO:	(K\$)	(K\$)	(K\$)
TOTAL ADJUST TARGET LABOR COSTS								
ESTIMATED OTHER DIRECT COSTS								
SUBTOTAL TOTAL ESTIMATED COSTS								
AWARD FEE (on labor only)								
INCENTIVE FEE (on labor only)								
TOTAL COST AND FEE	948.72	4,390.78	\$7,336,922	-\$39,967	\$7,296,955	7,360.78	0.00	19,997.23

FS	PROGRAM	FUND CODE	\$ FROM	\$ DELTA	\$ TO	INITIALS
1	CONSTL	292360.09.20.02.11.01	\$11,656,396.00	\$0.00	\$11,656,396.00	LH 3-27-09
2	CONSTL	321379.09.01.05.01.11	\$486,000.00	\$0.00	\$486,000.00	LH 3-27-09
TOTAL CUMULATIVE FUND LIMIT (NOT TO EXCEED)			\$12,142,396.00	\$0.00	\$12,142,396.00	

NASA TASK ORDER MANAGER/ ORG / PHONE <i>Gary Snyder</i> 3-19-09 DATE SIGNATURE Gary Snyder / NE-E8 / (321)861-4276	CUSTOMER TECH REPRESENTATIVE/ ORG / PHONE <i>Larry Schultz</i> 3/26/09 DATE SIGNATURE Larry Schultz / LX-51 / (321)867-8803
CERTIFICATION OF FUNDING/ ORG / PHONE DATE	CONTRACT TECHNICAL MANAGER/ ORG / PHONE <i>Nancy W. Hoffman</i> 4/2/2009 DATE SIGNATURE Nancy Hoffman / NE-42 / (321)867-4014
CONTRACT OFFICER/ ORG / PHONE <i>Edwin Martinez</i> 5/5/09 DATE SIGNATURE Andrew Dennis / OP-ES / (321)867-4178	ACCEPTANCE ACKNOWLEDGEMENT BY CONTRACTOR/ ORG / PHONE DATE SIGNATURE Martin Cummins / USTDC / (321)867-5408

Edwin Martinez

OPTEX 03/12/2009 1:15:53

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Title: ML Electrical Systems Support for Constellation Ground Systems

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A. PROJECT DESCRIPTION & SCOPE

TO Rev B: Task Order Revision B is generated in response to Task Plan Revision B.

The purpose of this Revision is to: 1) Add scope to support the prototyping efforts associated with Task 2.0; 2) Add scope for Hypergols Subsystems support and product development associated with new Task 1.16; 3) Remove conferences; 4) Add training to support Task 1.0 and; 5) Adjust the labor target values to reflect actual effort for the months of October 2008 through February 2009.

TO Rev A: Task Order Revision A is generated in response to Task Plan Revision A.

The purpose of this Revision is to further adjust CY6/FY08 target values due to less than anticipated labor support through fiscal year end and an ODC decrease adjustment due to actual ODC being less than estimated due to unfilled orders (UFO) that were either obligated and/or committed during CY6/FY08 but had not been costed. Task Order Revision A will capture the obligated and/or committed UFO ODC and also add ODC to support the prototyping effort associated with Task 2.0.

This Revision also changes the NASA Task Order Manager from Hugo Delgado to Gary Snyder. (TO Rev A) A. Diaz for H. Delgado 10/27/08

Basic: The purpose of this Revision is to define project scope continued from CY6/FY08 defined in TO 6SPI00453, Revision A. Unless specifically addressed below, the scope of work defined in 6SPI00453, Revision A remains unchanged.

CY6/FY08 Activity

Requirement development activities continued throughout CY6/FY08 and evolved as the subsystem and element projects matured. Subsystems proceeded to 30% and 60% design reviews to the Mobile Launcher (ML) Preliminary Design Review (PDR). S & MA support was removed from this Task Order.

CY7/FY09 Activity

Requirement development activities will continue into CY7/FY09 and evolve as the subsystem and element projects mature. Subsystems will proceed to 60, 90 and 100% design reviews in CY7/FY09. During CY7/FY09, some subsystems will progress to prototype fabrication and testing after completing its design review cycle.

This TO defines the scope of work requested by NASA to provide technical and engineering support for CxP Ground Processing electrical subsystems, specifically the design of ML electrical subsystems and electrical support for the ML fluid subsystems. These activities will be a cooperative effort between NASA Electrical Design Engineering and USTDC Electrical Design Engineering organizations to support the development of the ML electrical subsystems and electrical support for the ML fluid subsystems. Under the direction of the Lead Design Engineers (LDEs), USTDC shall provide technical expertise and engineering support for the definition and development of the design concepts for electrical subsystems and electrical support for the fluid subsystems on a ML for the Crew Launch Vehicle (CLV)/Crew Exploration Vehicle (CEV). Under the direction of the LDEs, USTDC shall support the design for ML electrical subsystems and electrical support for the ML fluid subsystems and shall provide support for documentation that will be required for the ML design review submittals. Design teams have been formed and the contractor shall support the design reviews and meetings as required by the LDEs.

The electrical design support shall be provided for the following electrical and fluid subsystems: Ground

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Special Power (GSP), Hazardous Gas Leak Detection Subsystem (HGLDS), Kennedy Ground Control Subsystem (KGCS), ML Physical Data Interface (MPDI) to include Subsystem Cable Infrastructure, Range Safety Checkout Subsystem (RSCS), Radio Frequency & Telemetry Station (RFTS) {formally identified as Communication & Tracking Station (C & TS) [~~formally identified as RF Monitoring Subsystem (RFMS)~~] } (TO Rev B) , Sensors Data Acquisition Subsystem (SDAS), First Stage Thermal Control Subsystem (FS TCS), Weather Subsystem (WX), Launch Release Subsystem (LRS), Cryogenics [consisting of Liquid Oxygen (LO2), Liquid Hydrogen (LH2) and Cold Gas Helium (CGHe)], Environmental Control Subsystem (ECS), Hydraulics, Pneumatics [consisting of Gaseous Nitrogen (GN2), Gaseous Oxygen (GO2), and Gaseous Helium (GHe) and Breathing Air], Hypergols Subsystems (TO Rev B) and Transducers for the ML.

Required products to support the ML design include baseline subsystem requirements, concept of operations, products/technology availability market assessment, procurement plan, and Electrical Ground Subsystems weight and space analysis and drawings. The following additional products shall also be required for CDR: preliminary versions of Operations and Maintenance Requirements Specification (OMRS) document, design concept and architecture, Interface Requirement Documents (IRD), Interface Control Documents (ICD), component or system qualification plans, verification matrix, verification and validation (V & V) and test plans, implementation plan, cost estimate, schedule and milestones, risk assessment and mitigation plan, trade study reports, engineering drawings (per CxP guidelines), prototyping efforts, proof-of-concept development, general arrangement drawings, system descriptions, design analyses, block diagrams, system specifications, end-to-end System Electrical Schematics (SES), System Electromechanical Control Diagrams (EMCD), Cable Interconnect Diagram (CID), equipment list(s), Advanced Order Parts Lists (AOPL), Logistics Support Plan, Preliminary Hazard Analysis (PHA), Critical Items List (CIL) and Preliminary Hazardous List (PHL).

ML requirements are defined by CxP 70000 *Constellation Architecture Requirements Document (CARD)*, CxP 70023 *Design Specification for Natural Environments*, CxP 70028 *Ground Systems to CEV Interface Requirements Document*, CxP 70052 *Ground Systems to CLV IRD*, CxP 72034 *System Requirement Document (SRD)*, CxP 70044 *Natural Environments Definition for Design (NEDD)*, and GOP 404001 *ML Element Requirement Document*. All designs shall be in compliance with KDP-P-2713, *Technical Review Process* and GP-435, *Engineering Drawing Practices Volume I of II Aerospace and Ground Support Equipment*.

B. TASKS

1.0 The contractor shall support the development of electrical design products for Ground Subsystems during the design phase, 60/90/100% design reviews, and ML design. The electrical and fluid subsystems that will be supported are listed in the following subtasks 1.01 through 1.15:

1.01 Ground Special Power (GSP)

1.02 Hazardous Gas Leak Detection Subsystem (HGLDS)

1.03 Kennedy Ground Control Subsystem/ Emergency Safing Subsystem (KGCS/ EMSF)

1.04 ML Physical Data Interface/System Cable Infrastructure (MPDI)

1.05 Range Safety Checkout Subsystem (RSCS)

1.06 ~~Communication and Tracking Station (C & TS)~~ Radio Frequency & Telemetry Station

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Subsystem (RFTS) (TO Rev B)

1.07 Sensors Data Acquisition Subsystem (SDAS)

1.08 First Stage Thermal Control Subsystem (FS TCS)

1.09 Weather Subsystem (WX)

1.1 Launch Release Subsystem (LRS)

1.11 Cryogenics Subsystems

1.12 Environmental Control Subsystem (ECS)

1.13 Hydraulic Subsystems

1.14 Pneumatics Subsystem

1.15 Transducers

1.16 Hypergols Subsystems (TO Rev B)

2.0 Proof-of-Concept and Systems Prototyping and Qualification

2.1 The contractor shall support NASA NE-E with the set up, fabrication, installation, and testing of proof-of-concept, prototype, and qualification hardware and equipment in development laboratories.

2.2 The contractor shall provide support for the development of additional requirements during the proof-of-concept and qualification activities.

3.0 Overall Ground Electrical Subsystem Coordination Function for ML

3.1 The contractor shall provide overall ground electrical subsystem project coordination functions for the ML.

4.0 Project Engineering (PE) Support

4.1 The contractor shall provide project engineering support to conduct progress reviews to ensure that technical, schedule, and cost objectives are being attained.

5.0 Subsystem Integration Support

5.1 The contractor shall provide subsystem integration support for the electrical subsystems and the electrical portions of the ML fluid subsystems development and design.

6.0 Engineering Support Services

6.1 The contractor shall provide engineering support services for document and specifications releases.

C. MILESTONES/DELIVERABLES

1. - Support for the Ground Subsystems schedules. ~~(09/30/09)~~ (TO Rev B)
Start Date : 10/01/2008 End Date : 09/30/2010

2. - Support for Electrical Ground Subsystems Level V requirements. ~~(09/30/09)~~ (TO Rev B)

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Start Date : 10/01/2008 End Date : 09/30/2010

3. - Support for Subsystems 60, 90 and 100% Design Review package submittals. ~~(09/30/09)~~ (TO Rev B)

Start Date : 10/01/2008 End Date : 09/30/2010

4. - Support for the setup and installation of proof-of-concept and prototyping hardware and equipment in development laboratories. ~~(09/30/09)~~ (TO Rev B)

Start Date : 10/01/2008 End Date : 09/30/2010

5. - Support for the overall coordination function for the ML communication subsystems and project management. ~~(09/30/09)~~ (TO Rev B)

Start Date : 10/01/2008 End Date : 09/30/2010

6. - Electrical support for the overall coordination function for the electrical and fluid subsystems integration. ~~(09/30/09)~~ (TO Rev B)

Start Date : 10/01/2008 End Date : 09/30/2010

7. - Deliver an acoustic test report for electronic equipment enclosures.

Due Date : 11/28/2008

Completed : 11/26/2008

D. STANDARDS OF PERFORMANCE (METRICS)

1. - Task Order metrics will be collected in accordance with the USTDC Internal Surveillance Plan.

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TO No. **00453** TO Rev. **B** Plan Rev. **B** Year **7** Title **ML Electrical Systems Support for Constellation Ground Systems**

TO Status:	IN REVISION	PM:	Gary Snyder	NE-E8	USTDC Director:	Dennis Weaver	ASRC-19
Verified Date:		Customer:	Larry Schultz	LX-D1	USTDC Manager:	Paul Gamble	ASRC-23
Program	CONSTL				Lead	Bennett Ross	ASRC-23

A. PROJECT DESCRIPTION & SCOPE

TO Rev B: Task Order Revision B is generated in response to Task Plan Revision B.

The purpose of this Revision is to: 1) Add scope to support the prototyping efforts associated with Task 2.0; 2) Add scope for Hypergols Subsystems support and product development associated with new Task 1.16; 3) Remove conferences; 4) Add training to support Task 1.0 and; 5) Adjust the labor target values to reflect actual effort for the months of October 2008 through February 2009.

TO Rev A: Task Order Revision A is generated in response to Task Plan Revision A.

The purpose of this Revision is to further adjust CY6/FY08 target values due to less than anticipated labor support through fiscal year end and an ODC decrease adjustment due to actual ODC being less than estimated due to unfilled orders (UFO) that were either obligated and/or committed during CY6/FY08 but had not been costed. Task Order Revision A will capture the obligated and/or committed UFO ODC and also add ODC to support the prototyping effort associated with Task 2.0.

This Revision also changes the NASA Task Order Manager from Hugo Delgado to Gary Snyder. (TO Rev A) A. Diaz for H. Delgado 10/27/08

Basic: The purpose of this Revision is to define project scope continued from CY6/FY08 defined in TO 6SPI00453, Revision A. Unless specifically addressed below, the scope of work defined in 6SPI00453, Revision A remains unchanged.

CY6/FY08 Activity

Requirement development activities continued throughout CY6/FY08 and evolved as the subsystem and element projects matured. Subsystems proceeded to 30% and 60% design reviews to the Mobile Launcher (ML) Preliminary Design Review (PDR). S & MA support was removed from this Task Order.

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USTDC Technical Lead <i>Bennett Ross</i> SIGNATURE Bennett Ross DATE 3/13/09	USTDC S&MA <i>Susan M Davis</i> SIGNATURE For Jarl Gustafson Susan M. Davis DATE 3/13/09
USTDC Manager <i>Paul Gamble</i> SIGNATURE Paul Gamble DATE 3/13/09	NASA Approvals
USTDC Director <i>Dennis Weaver</i> SIGNATURE Dennis Weaver DATE 3/13/09	Task Order Manager / Org. <i>Gary Snyder</i> SIGNATURE Gary Snyder / NE-E8 DATE 3-19-09
USTDC PCB <i>Pedro Medelius</i> SIGNATURE Pedro Medelius DATE 3/13/09	Contract Technical Manager / Org. <i>Nancy Hoffman</i> SIGNATURE Nancy Hoffman / NE-12 DATE 3/12/2009

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Electrical Design Engineering and USTDC Electrical Design Engineering organizations to support the development of the ML electrical subsystems and electrical support for the ML fluid subsystems. Under the direction of the Lead Design Engineers (LDEs), USTDC shall provide technical expertise and engineering support for the definition and development of the design concepts for electrical subsystems and electrical support for the fluid subsystems on a ML for the Crew Launch Vehicle (CLV)/Crew Exploration Vehicle (CEV). Under the direction of the LDEs, USTDC shall support the design for ML electrical subsystems and electrical support for the ML fluid subsystems and shall provide support for documentation that will be required for the ML design review submittals. Design teams have been formed and the contractor shall support the design reviews and meetings as required by the LDEs.

The electrical design support shall be provided for the following electrical and fluid subsystems: Ground Special Power (GSP), Hazardous Gas Leak Detection Subsystem (HGLDS), Kennedy Ground Control Subsystem (KGCS), ML Physical Data Interface (MPDI) to include Subsystem Cable Infrastructure, Range Safety Checkout Subsystem (RSCS), Radio Frequency & Telemetry Station (RFTS) {formally identified as Communication & Tracking Station (C & TS) [formally identified as RF Monitoring Subsystem (RFMS)] } (TO Rev B) , Sensors Data Acquisition Subsystem (SDAS), First Stage Thermal Control Subsystem (FS TCS), Weather Subsystem (WX), Launch Release Subsystem (LRS), Cryogenics [consisting of Liquid Oxygen (LO2), Liquid Hydrogen (LH2) and Cold Gas Helium (CGHe)], Environmental Control Subsystem (ECS), Hydraulics, Pneumatics [consisting of Gaseous Nitrogen (GN2), Gaseous Oxygen (GO2), and Gaseous Helium (GHe) and Breathing Air], Hypergols Subsystems (TO Rev B) and Transducers for the ML.

Required products to support the ML design include baseline subsystem requirements, concept of operations, products/technology availability market assessment, procurement plan, and Electrical Ground Subsystems weight and space analysis and drawings. The following additional products shall also be required for CDR: preliminary versions of Operations and Maintenance Requirements Specification (OMRS) document, design concept and architecture, Interface Requirement Documents (IRD), Interface Control Documents (ICD), component or system qualification plans, verification matrix, verification and validation (V & V) and test plans, implementation plan, cost estimate, schedule and milestones, risk assessment and mitigation plan, trade study reports, engineering drawings (per CxP guidelines), prototyping efforts, proof-of-concept development, general arrangement drawings, system descriptions, design analyses, block diagrams, system specifications, end-to-end System Electrical Schematics (SES), System Electromechanical Control Diagrams (EMCD), Cable Interconnect Diagram (CID), equipment list(s), Advanced Order Parts Lists (AOPL), Logistics Support Plan, Preliminary Hazard Analysis (PHA), Critical Items List (CIL) and Preliminary Hazardous List (PHL).

ML requirements are defined by CxP 70000 *Constellation Architecture Requirements Document (CARD)*, CxP 70023 *Design Specification for Natural Environments* , CxP 70028 *Ground Systems to CEV Interface Requirements Document* , CxP 70052 *Ground Systems to CLV IRD* , CxP 72034 *System Requirement Document (SRD)*, CxP 70044 *Natural Environments Definition for Design (NEDD)*, and GOP 404001 *ML Element Requirement Document* . All designs shall be in compliance with KDP-P-2713, *Technical Review Process* and GP-435, *Engineering Drawing Practices Volume I of II Aerospace and Ground Support Equipment* =

B. MILESTONES/DELIVERABLES

- 1. - Support for the Ground Subsystems schedules. ~~(09/30/09)~~ (TO Rev B)
 Start Date : 10/01/2008 End Date : 09/30/2010

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2. - Support for Electrical Ground Subsystems Level V requirements. ~~(09/30/09)~~ (TO Rev B)
 Start Date : 10/01/2008 End Date : 09/30/2010
3. - Support for Subsystems 60, 90 and 100% Design Review package submittals. ~~(09/30/09)~~ (TO Rev B)
 Start Date : 10/01/2008 End Date : 09/30/2010
4. - Support for the setup and installation of proof-of-concept and prototyping hardware and equipment in development laboratories. ~~(09/30/09)~~ (TO Rev B)
 Start Date : 10/01/2008 End Date : 09/30/2010
5. - Support for the overall coordination function for the ML communication subsystems and project management. ~~(09/30/09)~~ (TO Rev B)
 Start Date : 10/01/2008 End Date : 09/30/2010
6. - Electrical support for the overall coordination function for the electrical and fluid subsystems integration. ~~(09/30/09)~~ (TO Rev B)
 Start Date : 10/01/2008 End Date : 09/30/2010
7. - Deliver an acoustic test report for electronic equipment enclosures.
 Due Date : 11/28/2008
 Completed : 11/26/2008

C. TECHNICAL APPROACH

TASK 1.0 - The contractor shall support the development of electrical design products for Ground Subsystems during the design phase, 60/90/100% design reviews, and ML design. The electrical and fluid subsystems that will be supported are listed in the following subtasks 1.01 through ~~1.15~~ 1.16 (TP Rev B) :

TASK 1.01 - GSP (WBS 1.5.1)

TASK 1.02 - HGLDS (WBS 1.5.2)

TASK 1.03 - KGCS/EMSF (WBS 1.5.3)

TASK 1.04 - MPDI/System Cable Infrastructure (WBS 1.5.4)

TASK 1.05 - RSCS (WBS 1.5.5)

TASK 1.06 - ~~C & TS~~ RFTS (TP Rev B) (WBS 1.5.6)

TASK 1.07 - SDAS (WBS 1.5.7)

TASK 1.08 - FS TCS (WBS 1.5.8)

TASK 1.09 - WX (WBS 1.5.9)

TASK 1.10 - LRS (WBS 1.5.10)

TASK 1.11 - Cryogenics Subsystems (WBS 1.6.1)

TASK 1.12 - ECS (WBS 1.6.2)

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TASK 1.13 - Hydraulic Subsystem (WBS 1.6.3)

TASK 1.14 - Pneumatics Subsystems (WBS 1.6.4)

TASK 1.15 - Transducers (WBS 1.7)

TASK 1.16 - Hypergols Subsystems (WBS 1.6.5) (TP Rev B)

For TASKS 1.01 - ~~1.15~~ 1.16 (TP Rev B) , the same technical approach will be followed as described below.

Subsystems Requirements

The USTDC Electrical Systems Design Engineers will provide support for the further development of subsystem requirements including interface requirements defined as Element-to-Element, Element-to-Ground, and Ground-to-Ground Systems. USTDC will continue to participate in thorough reviews of Level IV ERD and IRD documentation as they evolve to develop the Level V electrical requirements. The following documents will also be used as ancillary information: CxP 70000, CxP 70023, CxP 70028, CxP 70044, CxP 70052, CxP 72006, CxP 72034, and GOP 404001. The results of these reviews will be Level V requirements that will be documented in Cradle. Additionally, any issues discovered with the Level IV requirements will be documented and communicated to Level IV System Integration. USTDC Electrical Systems will provide support to develop electrical requirements for each ML electrical and fluid subsystem. These requirements will be developed by reviewing Shuttle requirements, CxP requirements, ML GOP 404001 project requirements, and by other subsystem levied requirements. These requirements will be communicated with the electrical design group by conducting technical meetings where requirements will be reviewed and coordinated. Participants will include Electrical, Launch Control System (LCS) Communications, Fluids and Mechanical LDEs. These technical meetings will also include the review of electrical control schematics, electrical interfacing commodities, electrical schematics and the cable interconnect diagrams.

Subsystem Schedules

USTDC Electrical Systems will provide support to develop and maintain subsystems schedules. The schedules will contain elements, projects and subsystems dependencies. In addition, the schedules will be updated to reflect the subsystems design progress and plan.

Design Support

USTDC Electrical Systems will provide support for the development of design concepts and design analysis required for electrical related ground processing systems, subsystems and individual elements. The designs will be supported by performing engineering design calculations, developing electro-mechanical subsystem schematics, electrical subsystem schematics, general equipment arrangement drawings, component and equipment sizing, block diagrams, drawing trees, network system calculation, development of concepts of operations (CONOPS) and costs and risks. The concepts will be developed with frequent technical exchanges with the appropriate LDE and down selected to a preferred subsystem solution. USTDC Electrical Systems will provide support for the maturation of the preferred subsystem solution to a design level. The design will be developed through frequent technical exchanges within the appropriate disciplines. USTDC will support developing and updating of new and existing specifications and standards that are used for subsystem design. All drawings/models will be developed in compliance with CxP guidelines.

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<p>USTDC will visit vendor sites and attend conferences training (TP Rev B) to obtain current industry standard for developing connectors, wiring, and power requirements for standardizing hardware installation. USTDC will participate in training classes pertaining to ML electrical subsystems and the electrical portion of the ML fluid subsystems. (TP Rev B) USTDC will also attend and provide technical support to system and project related TIMs for the development and consolidation of requirements based on industry standards from the vendor site visits and other design reviews.</p> <p>USTDC will support the development of detailed drawings and documentation associated with the installation of Electrical Ground Support Equipment (EGSE) in the Mobile Launcher Tower (MLT) and in the Mobile Launcher Base (MLB). USTDC will also support the development of instructions and specifications necessary for the protection of electrical cables and GSE prior to, during, and after their physical installation. In addition, USTDC will support the development of two-dimensional drawings of the EGSE racks, enclosures and hardware, in support of space allocation modeling being provided by others. Additionally, USTDC will support the resolution of cable routing and "space claim" interferences associated with planned GSE rack, enclosure and cable installations. Furthermore, USTDC will provide design support for vibration isolation, thermal protection, EMI protection and acoustic protection of the EGSE racks, enclosures and hardware. (TP Rev B)</p> <p><u>Hardware Procurement Support</u></p> <p>USTDC Electrical Systems will provide support to develop each ML electrical subsystem and electrical portion of the ML fluid subsystems parts and equipment lists as required. The electrical subsystem schematics and design information will be captured and utilized to develop the AOPL, instrumentation and control list, and long-lead design specifications. Items expected to take longer than 6 months to procure will be identified as long-lead. A review of the 79K specifications will be conducted to aid in the identification of additional long-lead items. USTDC Electrical Systems and Project Engineer (PE) will support the generation of ROM cost estimates in accordance with KSC-SPEC-G-0003, <i>GSE Cost Estimating Specification, Operations Costs and Acquisition Plans</i>. The cost estimator will obtain the necessary design information to estimate the project in the detail required for the design phases. Electrical Systems will provide support with the appropriate material design information and a design estimate for the critical design phase of the CxP project.</p> <p><u>Software Support</u></p> <p>USTDC Electrical Systems will provide support to develop each ML electrical subsystem and electrical portion of the ML fluid subsystem software requirements document. Design development and prototyping of subsystems control software will determine allocation of control in interfacing KGCS with LCS. This work will contribute to the overall software architecture for KGCS and control of each GSE subsystem. This will also include support for the creation of the LCS Software Development Plan (SDP). This plan will be developed by generating a list of components that will contain firmware / software. The information contained in the SDP will be used to support the development of the software requirements document. This list will be coordinated with the controls design group by conducting periodic technical meetings. These meetings will be led by electrical and controls LDEs.</p> <p><u>Hardware Readiness Support</u></p> <p>USTDC Electrical Systems will provide support for the development of subsystem logistics support plans and spares analysis. Electrical Systems will support logistics by providing component lists and vendor design information to aid in the development of maintainability analysis and spares. Additionally,</p>		

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Electrical Systems will provide information to support a logistics plan which includes recommended spares, soft goods, calibration and maintenance information. This plan will be coordinated with the logistics planners by conducting periodic technical meetings. These meetings will be led by electrical LDEs.

S & MA Support

USTDC Electrical Systems personnel will provide support for the development of hazard analysis, reliability analysis, safety assessments and FEMA/CIL requirements in accordance with KNPR 8720.1, *KSC Reliability, Maintainability and Quality Assurance procedural requirements*. The S & MA work will be performed under another TO. Electrical Systems will provide subsystem schematics, models, subsystem description and CONOPS information to aid in the S & MA analysis. Electrical Systems will coordinate with S & MA personnel by conducting periodic technical meetings. These meetings will be led by electrical LDEs and safety representatives.

Verification and Validation (V & V) Support

USTDC Electrical Systems will provide support for the development of subsystem V & V plans, component level certification plans and requirements traceability matrices. Electrical Systems will provide subsystem schematics, models and subsystem description information to aid in the System Engineering (SE) plan development. Electrical Systems will provide subsystem design information to meet requirements traceability matrix. Electrical Systems will coordinate with SE personnel by conducting periodic technical meetings. These meetings will be led by electrical LDEs.

Material and Processes (M & P) Design Support

USTDC Electrical Systems will provide support for M & P reviews. Electrical Systems will support these reviews by providing component M & P details. These details will be captured from component vendor parts and materials lists and compared with KTI-5209, *Material Usage Code* and KNPR 8072.1, *KSC M & P Control Procedures and Guidelines*.

Design Review Preparation

USTDC Electrical Systems and the PE, SE, Mechanical Systems (MS) and Fluid Systems (FS) organization will provide support for the preparation of internal design reviews and the final design packages submittal as defined in KDP-P-2713, *Technical Review Process* and NPR 7123.1, *NASA Systems Engineering Processes and Requirements*. These preparations will be supported by printing and distributing drawing packages, collecting review comments, maintaining action item lists, and supporting Review Item Dispositions (RIDs). Additionally, presentation materials, such as PowerPoint presentations, will be prepared. These presentations will be peer reviewed by inter-disciplinary teams. These meetings will be led by NASA electrical and other disciplinary LDEs.

Fabrication and Testing

USTDC will provide support for the fabrication of the first article for each electrical subsystem and electrical portion of the ML fluid subsystem. USTDC will provide support for testing each electrical subsystem and electrical portion of the ML fluid subsystem first article.

TASK 2.0 - Proof-of-Concept and Subsystems Prototyping and Qualification (WBS 1.8)

TASK 2.1 - The contractor shall support NASA NE-E with the set up, fabrication, installation, and testing of proof-of-concept, prototype, and qualification of hardware and equipment in development laboratories. (WBS 1.8.1)

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USTDC and NASA electrical personnel will cooperatively set up, fabricate, assemble, and test proof-of-concept hardware in the KSC Engineering Development Laboratories (EDL). Prototyping and qualification activities are necessary to solidify requirements and validate architecture feasibility. Where necessary, and as determined throughout requirement and architecture development activities, physical design and testing of components will mature decision paths for future hardware design and implementation plans. To meet hardware prototype and qualification testing requirements, numerous electrical components will be acquired via NASA and USTDC (TP Rev B) procurements. Assembly support may require both mechanical and electrical technical assistance for mounting, wiring, and cabling of acquired hardware.

TASK 2.2 - The contractor shall provide support for development of additional requirements during proof-of-concept and qualification activities. (WBS 1.8.2)

USTDC will support the development of additional subsystems requirements that resulted from the proof-of-concept, prototype and qualification hardware and equipment testing. New requirements will be coordinated with the appropriate subsystem lead designer to ensure any design change that may be required has been evaluated to the appropriate engineering levels.

TASK 3.0 - Overall Ground Electrical Subsystem Coordination Function for ML. (WBS 1.9)

TASK 3.1 - The contractor shall provide overall Ground Electrical Subsystem project coordination functions for the ML. (WBS 1.9)

USTDC electrical systems group will provide a key point of contact for ML activities. The designated resource will provide an interface between the electrical group and NASA and contractor counterparts. This interface will attend element and project meetings, perform and attend technical reviews, and track ML-related issues.

TASK 4.0 - Project Engineering Support (WBS 1.2)

TASK 4.1 - The contractor shall provide project engineering support to conduct progress reviews to ensure that technical, schedule, and cost objectives are being attained. (WBS 1.2)

USTDC will provide a project engineer with responsibility and project management authority for a USTDC and subcontractor design activity in support of the ML electrical subsystems and electrical portion of the ML fluid subsystems. USTDC will work closely with the NASA customer to develop and implement the project engineering processes most appropriate for this project. USTDC project management will conduct progress reviews to ensure that technical, schedule and cost objectives are being attained. These items will also be reported to the TOM on a monthly basis via the Task Order Status Report (TOSR). Addition of resources or workload leveling will be coordinated by project engineering with the USTDC senior management team to prevent schedule underperformance.

TASK 5.0 - Subsystem Integration Support (WBS 1.10)

TASK 5.1 - The contractor shall provide subsystem integration support for electrical subsystems and electrical portions of the ML fluid subsystems development and design. (WBS 1.10)

USTDC will provide integration support for the development of electrical subsystems and electrical portions of the ML fluid subsystems. This will include requirements development, integration, flow-down, and traceability; Verification / Validation requirements development; and support for program reviews.

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USTDC will provide support to process development for defining customer needs, developing operational requirements and functional flow analyses at the overall system level and/or at the interfacing vehicle level. This will include supporting design team meetings, and using design products to develop the above requirements, including functional flow block diagrams, element requirements documents, and requirements traceability matrices. (WBS 1.10.1)

USTDC will support process development for the validation and verification of end item requirements for facilities, systems and GSE, including support to the project/element and subsystem level design teams for developing Validation & Verification Plans. These plans will be created in accordance with Constellation Program documents CxP 70008 *Constellation Master Integration and Verification Plan* (MIVP), CxP 72035, *Master Test and Verification Plan*, and KDP-P-1536, *Design Certification Review* (DCR) Process. (WBS 1.10.2)

USTDC will provide horizontal subsystems integration support for Program and Program-related design reviews (e. g. , SDRs, SRRs, PDRs, CDRs, and TIMs). This includes performing document and drawing-reviews, RIDs/comments preparation, and participating in board activities to include RIDs/comments closeout activities. USTDC will provide comments and alternate solutions to design issues related to the above mentioned reviews. (WBS 1.10.3)

All configuration management (CM) activities including drawing releases, design tools support (e. g. , AutoCAD), utilizing Windchill, Vault, and Cradle are supported through a separate Task Order.

TASK 6.0 - Engineering Support Services (WBS 1.4)

TASK 6.1 - The contractor shall provide engineering support services for documents and specifications releases. (WBS 1.4)

USTDC will provide engineering support services to perform editorial reviews and to edit graphics and illustrations for electrical subsystems and electrical portions of the ML fluid subsystems documents and specifications. USTDC will support the preparation of formal and informal documents as required. Informal documents may be reviewed by USTDC to ensure technical accuracy, formatting, technical style and compliance with the customer's requests. All formal documentation will be reviewed through technical editors to comply with KSC-DF-107.

D. BASIS OF ESTIMATE

The labor estimate for this Task Order was developed based on the experience gained in the performance of this Task Order during CY5/FY07 and CY6/FY08. The effort required during CY7/FY09 was extrapolated based on the performance during CY6/FY08 and by performing a detailed estimate for each of the electrical subsystems and electrical portions of the ML fluid subsystems by following the NASA design processes (NPR 7123.1 and KDP-P-2713). The design effort for each subsystem was estimated by USTDC. These experts have years of direct experience with each of the electrical subsystems and electrical portions of the ML fluid subsystems and have worked similar type projects and design implementations within the Shuttle Program and other programs.

These experts assisted in the development of a detailed schedule describing the amount of effort to complete this TO.

These two estimates were found to be in agreement.

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The labor classifications were chosen to provide the range of skills and experience that are the minimum necessary for the successful completion of the planned work effort. Some of these resources have specific experience in the systems, technologies, and concepts covered in the TO. Others are being added to augment the more senior and experienced resources, and will perform lower level tasks under close supervision/direction.

Reviews were conducted in January/February and May/June of 2008 with the NASA NE-E representatives to coordinate the cost, estimated labor, and scope for each task.

(Begin TP Rev B)

The estimate for the increased labor hours for this revision is based on added scope for Task 1.16 - Hypergols (this subsystem was not an original requirement and has since been added). The labor estimate for this task is based on experience performing similar tasks in TO 509. ML Installation support has been estimated at eight WYEs and has been delineated in the technical approach.

For the remaining subsystems, some scope that was planned for the first quarter has been shifted to occur throughout the remainder of the fiscal year.

Labor classifications for the added subsystem are based on the range of skills and experience necessary to successfully complete the planned work effort.

Partnering meetings were conducted in January/February 2009 with the NASA NE-E representatives to coordinate the scope, estimated labor, and cost for each task.

(End TP Rev B)

(Begin TP Rev A)

ODC (TOTAL : _____) (TP Rev B)
Trips are necessary for requirement development, hardware design, TIMs, vendor site visits, ~~conferences~~, (TP Rev B) and training. Estimates are based on current airfare websites, vehicle rental websites, ~~conferences~~ vendor (TP Rev B) websites, and Government per diem rates.

CY7/FY09 _____) (TP Rev B)

CY8/FY10 _____). 79K) (TP Rev B)

CY7/FY09 (TP Rev B)

The following ODCs were UFOs that either obligated and/or committed during CY6/FY08 but have not been costed and are expected to be costed during the first quarter of CY7/FY09. The estimate for the following equipment, materials, and hardware was derived from existing purchase orders or purchase requests. Travel expenses are based on existing travel requests.

- Travel for two personnel to go to Annandale, NJ for electronic equipment enclosure testing.
Airfare - Rental car - lodging - M & IE - misc (Taxes, phones, parking, tolls, gas) - The trip costed in October 2008.

- Two Hoffman Electronic Equipment Enclosures: One Enclosure 75x28x36 Seismic / EMC / Ventilation, Part No. 653XU - each; One Enclosure A72H7212LP3PT with EMC, Part No. 101JG -

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each; Per vendor quote.

\$88.765K - Acoustic/Noise Susceptibility Testing of enclosures at NU Laboratories

\$5.139K - Acoustic dampening material for the Hoffman Electronic Equipment Enclosures from Handy Tech Group

The following ODCs were added for prototyping efforts. These estimates were based on vendor quotes:

- for 8 HR-5 Metering Valves, 1/4" VCRs, Angles, Cv 0.0490, BunaN, 15 Turns & counter
- for 5 Turbo Pump Repair ATH 30+
- for 32 1/4" F-VCR to 1/4"AN
- for 100 Terminal Block, AWG: 30-12 (P/N 1414064)
- for 20 End Covers
- for 100 Terminal Block, AWG: 30-12 (P/N 3002225)
- for 20 Terminal Block & Strip, Covers (P/N 1923034)
- for 20 Terminal Block & Strip, Covers (P/N 3003020)
- for 10 Fixed Bridge w/ Crimp Rolls
- for 10 Bridges
- for 100 UK 5 N Gray IEC Screw Clamp TB, 30-10AWG
- for 10 DIN Rail, Steel, Silver, 7.5mm, 35mm, 2m
- for 50 DIN Rail End Stops
- for 5 Paired Cable, 100 foot coil
- for 1 2-conductor shielded cable
- for 100 Chasis Connectors
- for 10 Circuit Breakers, DIN Rail Mount, 10 Amp
- for 10 Circuit Breakers, DIN Rail Mount, 5 Amp
- for 10 Circuit Breakers, DIN Rail Mount, 2 Amp
- for 10 Circuit Breakers, DIN Rail Mount, 1 Amp
- for 100 Diode Embedded Phoenix Terminal Block Modules
- for 10 Circuit Breaker, DIN Rail Mount, 1 Amp
- for 16 DIN Rail 15V, 1 Amp P/S
- for 6 CONTROLLOGIX 10 SLOT CHASSIS
- for 6 AC Chassis Power Supply
- for 2 Turbo Pump ATH 31+
- for 2 ACT 201 Controllers
- for 2 0.5m Cable for ACT 201 - Right Angle
- for 7 Mass Flow Controller, 5 sLpm, 1/4" VCR
- for 13 3-Way valve/SS/Teflon/7/16-20 SAE F straight thread ports
- for 2 100 FOOT roll of .031" wall PTFE tubing
- for 20 Relief Valves
- for a Rectangular Clamp-on CT
- for a Toroid Clamp-on CT
- for 10 DC Contactor/Coil: 28V Contact: 300A
- for 6 DC Contactor/Coil: 28V Contact: 100A
- for 6 DC Contactor/Coil: 28V Contact: 50A
- for 2 3ph contactor, 440VAC/50A contact, 28DC coil

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- for 3 Fuse /400A
 - for 3 Fuse /100A
 - for 3 Fuse /50A
 - for 12 Circuit Breaker/ (100A)
 - for 11 Diode/300A
 - for 3 Diode/ 150A
 - for 3 Diode/ 50A
 - for 5 Shunt/ (100A)
 - for 3 Shunt/ (300A)
 - for 1 Shunt/ (25A)
 - for 2 Shunt/ (50A)
 - for 25 Mosfet/ (220A)
 - for 6 Transducer/(150Vdc range)
 - for 45 PTFE Teflon Rod
 - for 12 PTFE Teflon Bar
 - for 4 PTFE Teflon Sheets 1" x 12" x 24"
 - for 3 PTFE Teflon Sheets 1/4" x 12" x 24"
 - for 25 Resistors
 - for 25 Mounting Brackets
 - for 32 MIL Spec Connector/Comm
 - for 26 MIL Spec Connector/ Power
 - for 42 DC Power Connectors
 - for 12 Copper Bar/ .125" x 2" x 96"
 - for 4 Copper Bar/ .062" x 1" x 96"
 - for 2 Copper Bar/ .1875" x 1" x 96"
 - for 38 Terminal Blocks
 - for DC Power Conductors/ 8AWG
 - for DC Power Conductors/ 1/0AWG
 - for DC Power Conductor Wire THHN-4-BLK-19STR-CU-500R
 - for DC Power Conductor Wire THHN-3-BLK-19STR-CU-500R
 - for DC Power Conductor Wire THHN-6-BLK-19STR-CU-500R
 - for DC Power Conductor Wire THHN-10-BLK-19STR-CU-500R
 - for Instrumentation Cable
 - for 1 DC Power Conductor/ 22AWG
 - for 35 Enclosures
 - for 4 ISOLATED ANALOG INPUT-CURRENT/VOLTAGE 6 PTS
 - for 2 Processor with 8 MB of Memory
 - for 4 10-30 VDC DIAGNOSTIC INPUT 16PTS Isolated
 - for 2 10-30 VDC ISOLATED OUTPUT 16PTS
 - for 4 18-32V DC POWER SUPPLY
 - for 4 17 slot chassis
 - for 1 Power Monitor Unit
 - for 1 Power Transfer Relay
 - for PMP Training course
- Labview development system, (based on internet vendor price list) The development system

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will not be installed on an ODIN computer. The Instrumentation System Lab has a waiver for IT purchases, waiver Tracking/Log # 08-0721-02.

The following estimates are based on previous history:

for 3 PC Boards
 for various electronic components

(End TP Rev A)

(Begin TP Rev B)

~~= For two personnel to travel to Nashville, TN for three days in November of 2008 for the Rockwell Automation Fair. Airfare: , Lodging: , M & IE: , Car Rental: , Miscellaneous (tolls, parking, etc.): . Estimates based on Government per diem rates and vendor rates.~~

~~= For two personnel to travel to Alpharetta, GA for three days in December of 2008 for the Power Supply Design Workshop. Registration Fee: , Airfare: , Lodging: , M & IE: , Car Rental: . Miscellaneous (tolls, parking, etc.): . Estimates based on Government per diem rates and vendor rates.~~

(End TP Rev B)

- (\$1. 391 x 6 trips) For one person to travel to Houston, TX for three days 6 times throughout 2009 for Lightning TIMs. Airfare: Lodging: M & IE: Car Rental: Miscellaneous (tolls, parking, etc.): . Estimates based on Government per diem rates and vendor rates.

~~= For two personnel to travel to Rosemont, IL for three days in June of 2009 for the Sensors Expo Conference. Airfare: Lodging: , M & IE: Car Rental: , Miscellaneous (tolls, parking, etc.): . Estimates based on Government per diem rates and vendor rates. (TP Rev B)~~

x 2 trips) For two personnel to travel to Denver, CO for four days twice during 2009 for Technical Interchange Meetings (TIM) to discuss the vehicle power architecture and interfaces for the CEV, CLV, US, and CLV FS. Airfare: Lodging: , M & IE: Car Rental: Miscellaneous (tolls, parking, etc.): . Estimates based on Government per diem rates and vendor rates.

x 2 trips) For two personnel to travel to Houston, TX for four days twice during 2009 for Technical Interchange Meetings (TIM) to discuss the vehicle power architecture and interfaces for the CEV, CLV, US, and CLV FS. Airfare: , Lodging: M & IE: , Car Rental: Miscellaneous (tolls, parking, etc.): Estimates based on Government per diem rates and vendor rates.

(Begin TP Rev B)

~~= For two personnel to travel to San Jose, CA for six days in April of 2009 for the Embedded System Conference. Conference: , Airfare: , Lodging: , M & IE: , Car Rental: , Miscellaneous (tolls, parking, trains, etc.): . Estimates~~

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~~based on Government per diem rates and vendor rates.~~

~~- = For three personnel to travel to Pittsburgh, PA for seven days in March of 2009 for the PittCON Conference & Expo. Conference. Airfare: Lodging: M & IE: Car Rental: Miscellaneous (tolls, parking, trains, etc.): Estimates based on Government per diem rates and vendor rates.~~

~~- = For three personnel to travel to Chicago, IL for seven days in June of 2009 for the IMTS Manufacturing Conference & Expo. Conference. Airfare: Lodging: M & IE: Car Rental: Miscellaneous (tolls, parking, trains, etc.): Estimates based on Government per diem rates and vendor rates.~~

x 5 persons plus 2 Rental cars - Training for five personnel in Buffalo, NY for five days in May, 2009 for the "Successful Measurement of Dynamic Force, Pressure, & Acceleration" course. Course Fee - Airfare - Lodging - M & IE - Misc (Taxes, phones, parking, tolls, gas) - All estimates based on Government per diem rates and vendor quotes.

- Training for ten personnel for one week in May, 2009 for the "Advanced RSLogix5000" course. Course Fee - per person.

- Travel for three personnel to go to Las Vegas, NV for seven days in May, 2009 for training on system hardware purchased. Airfare - Rental car - Lodging - M & IE - Misc (Taxes, phones, parking, tolls, gas) - All estimates based on Government per diem rates and vendor quotes.

- Travel for four personnel to go to Dallas, TX for five days in April, 2009 for Real-Time Workshop Embedded Coder for Production Code Generation training. Course Fee - x 4 persons), Airfare - Rental car - Lodging - M & IE - Misc (Taxes, phones, parking, tolls, gas) - All estimates based on Government per diem rates and vendor quotes.

CY8/FY10

x 6 trips) Travel for one individual to go to Houston, TX for three days six times during 2010 for Lightning TIMs. Airfare - Rental car - Lodging - M & IE - misc (Taxes, phones, parking, tolls, gas) - All estimates based on Government per diem rates and vendor quotes with a escalation rate.

x 2 trips) Travel for two personnel to go to Denver, CO for four days twice during 2010 for Technical Interchange Meetings to discuss the vehicle power architecture and interfaces for the US, FS, and CEV. Airfare - Rental car - Lodging - M & IE - Misc (Taxes, phones, parking, tolls, gas) - All estimates based on Government per diem rates and vendor quotes with a escalation.

x 2 trips) Travel for two personnel to go to Houston, TX for four days twice during 2010 for Technical Interchange Meetings to discuss the vehicle power architecture and interfaces for the US, FS, and CEV. Airfare - Rental car - Lodging - M & IE - Misc (Taxes, phones, parking, tolls, gas) - All estimates based on Government per diem rates and vendor quotes with a escalation.

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E. STANDARDS OF PERFORMANCE (METRICS)

1. - Task Order metrics will be collected in accordance with the USTDC Internal Surveillance Plan.

F. RISK ASSESSMENT

The risk assessment has been revised to reflect full staffing on this TO. In the event that a resource is lost, the risk will require reassessment and the probability of the risk occurring will increase. (TP Rev B)

1. Schedule ~~RAC(6)(Green)(3/2/Mid-term)~~ RAC(1)(Green)(1/1/Near-term)(TP Rev B)

Given the highly technical nature of the work involved on this project, there is a possibility that qualified resources may not be readily available and could result in schedule delays.

Resources of this nature are in high demand in this industry and may, therefore, take some time for the USTDC to acquire.

Risk Response: Mitigate

Mitigation Strategy: The risk will be mitigated in two ways. First, the risk will be mitigated by USTDC project management conducting progress reviews to assess technical, cost and schedule performance and coordinating real-time mitigation strategies with the USTDC senior management team. Second, the risk will be mitigated, if required, through the use of subcontractor resources.

G. OTHER PERTINENT INFORMATION

S & MA Statement: No USTDC S & MA support is anticipated on this project.

University Affiliation: No University Affiliation has been initially planned; as the Task Order progresses, the opportunity for University Affiliation will be re-evaluated.

Success Story: A Success Story will be drafted, if appropriate, at the end of this Task Order.

New Technology Reports: No New Technology Reports are expected for this Mission Support TO.

Export Control Compliance: All documents prepared and/or received under this TO will be reviewed for Export Control requirements. Documents not properly marked will be processed using the appropriate administrative and management controls.

OCI Statement: No opportunity for OCI was identified during the planning of this TO.

The OCI assessment has been reviewed and remains valid. (TP Rev B)

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**USTDC TASK ORDER PLAN (J5)
SUMMARY**



Task Order # **00453** Rev: **B** Title: **ML Electrical Systems Support for Constellation Ground Systems**
 Contract Yr. **7** Plan Rev: **B**

Current Contract Year

	CY1-5	CY6	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	CY8	CY9	From	Delta	Grand Totals	
ASRC Labor																					
Sierra Lobo Labor																					
UCF Labor																					
Labor Sub-Total																					
Total Labor Hours																					
Sub-Con. G&A Adj																					
M&A Adj																					
ODC G&A Adj																					
Adj. Labor Total																					
Consultants																					
ODC																					
Adj. ODC Total																					
Subtotal Est. Cost																					
Award Fee																					
Incentive Fee																					
Total Cost & Fee																					0 12,676,420 7,320,808 19,997,228

Approval For Task Order Number: 00453 B
 USTDC Business Office

Handwritten Signature
 3.13.09

Cummins, Martin

WYE	CY1-5	CY6	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	CY8	CY9	From	Delta	Totals

Productive Man-Hours	7
Chemical Engineer II	
Director	
Electrical Engineer I	
Electrical Engineer II	
Electrical Engineer III	
Electrical Engineer IV	
Electrical Engineer V	
Electrical Technician II	
Electrical Technician III	
Engineer I	
Engineer II	
Engineer III	
Engineer IV	
Engineer V	
Engineering Aide I	
Engineering Aide III	
Engineering Designer	
Engineering Designer I	
Engineering Designer II	
Engineering Designer III	
Engineering Designer IV	
Graphic Design Specialist II	
Graphic Design Specialist IV	
Illustrator II	
Manager	
Mechanical Technician III	
Physicist II	
Pneumatic Systems Mechanic	
Principal Investigator	
Programmer III	
Project Administrator I	
Project Administrator II	
Project Administrator III	
Project Manager	
Project Manager III	
Project Manager IV	
Software Engineer V	
Subject Matter Expert	
Technical Editor	

Technical Editor III
Technical Writer
Telecommunications Engineer IV
Total WYE:

11

Shao J. Guy
Cummins, Martin
3.13.09

USTDC Business Office
TO: 00453 CY7 B

Subject Matter Expert
Technical Editor
Technical Editor III
Technical Writer
Telecommunications Engine
Total Hr

USTDC Business Office
TO: 00453 CY7 B

Steven J. Guy
3.13.09
Cummins, Martin

Labor Costs	CY7 Rate	CY1-5	CY6	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	CY8	CY9	From	Delta	Totals	
Chemical Engineer II																						
Director																						
Electrical Engineer I																						
Electrical Engineer II																						
Electrical Engineer III																						
Electrical Engineer IV																						
Electrical Engineer V																						
Electrical Technician II																						
Electrical Technician III																						
Engineer I																						
Engineer II																						
Engineer III																						
Engineer IV																						
Engineer V																						
Engineering Aide I																						
Engineering Aide III																						
Engineering Designer																						
Engineering Designer I																						
Engineering Designer II																						
Engineering Designer III																						
Engineering Designer IV																						
Graphic Design Specialist II																						
Graphic Design Specialist IV																						
Illustrator II																						
Manager																						
Mechanical Technician III																						
Physicist II																						
Pneumatic Systems Mechanic																						
Principal Investigator																						
Programmer III																						
Project Administrator I																						
Project Administrator II																						
Project Administrator III																						
Project Manager																						
Project Manager III																						
Project Manager IV																						
Software Engineer V																						
Subject Matter Expert																						
Technical Editor																						
Technical Editor III																						
Technical Writer																						
Telecommunications Engineer IV																						
ASRC Labor																						

ODC

Consultants

ODC Sub-Total

USTDC Business Office
TO: 00453 CY7 B

[Handwritten Signature]
Cummins, Martin
3.13.09

Task Order#: 00453 CY: 7 Rev: B Plan Rev: B																					
USTDC Task Order Plan Detail (Sierra Lobo)																					
Productive Man-Hours																					
WYE	CY1-5	CY6	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	CY8	CY9	From	Delta	Totals	
Engineer IV																					
Engineering Aide V																					
Total WYE:																					
Labor Hours	CY1-5	CY6	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	CY8	CY9	From	Delta	Totals	
Engineer IV																					
Engineering Aide V																					
Total Hr																					
Labor Costs	CY1-5	CY6	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	CY8	CY9	From	Delta	Totals	
Engineer IV																					
Engineering Aide V																					
Sierra Lobo Lab																					
Projected ODC	CY1-5	CY6	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	CY8	CY9	From	Delta	Totals	
ODC																					
Consultants																					
ODC Sub-Total																					

Sierra Lobo
 Cummins, Martin

Task Order#: 00453 CY: 7 Rev: B Plan Rev: B **USTDC Task Order Plan Detail (UCF)**

WYE	CY1-5	CY6	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	CY8	CY9	From	Delta	Totals	
Research Associate[KSC]																					
Total WYE:																					
Labor Hours																					
Research Associate[KSC]																					
Total Hr																					

Labor Costs	CY7 Rate	CY1-5	CY6	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	CY8	CY9	From	Delta	Totals
Research Associate[KSC]																					
UCF Labor																					

Projected ODC	CY1-5	CY6	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	CY8	CY9	From	Delta	Totals	
ODC																					
Consultants																					
ODC Sub-Total																					

Steve J. Guy
 Steve J. Guy
 Cummins, Martin

USTDC Business Office
 TO: 00453 CY7 B
 Print Date: 3/13/2009 4:59 pm

TASK ORDER PLAN CHECKLIST

Task Order No. 7SPI00453 TO Rev. B TP Rev. B Validated By (PA): Cassandra Bodner

Technology Outreach: Was USTDC involved in securing funding? Yes() No()
If yes, notify Tech Outreach

PLAN TEXT	N/A	SCHEDULE	N/A
<u>Contact Information</u>		<u>Gantt Chart</u>	
Names and Mailstops <input checked="" type="checkbox"/>		Tasks <input checked="" type="checkbox"/>	
		Milestones <input checked="" type="checkbox"/> <input type="checkbox"/>	
<u>Risks Identified(*Required)</u>		Deliverables <input checked="" type="checkbox"/> <input type="checkbox"/>	
Cost* <input checked="" type="checkbox"/>		Resources <input checked="" type="checkbox"/>	
Schedule* <input checked="" type="checkbox"/>			
Technical* <input checked="" type="checkbox"/>		<u>Resource Requirements</u>	
Safety* <input checked="" type="checkbox"/> <input type="checkbox"/>		<u>Engineering Support</u>	
Other		Technical Writing <input checked="" type="checkbox"/> <input type="checkbox"/>	
Security <input type="checkbox"/> <input checked="" type="checkbox"/>		Editing <input checked="" type="checkbox"/> <input type="checkbox"/>	
Export Control <input type="checkbox"/> <input checked="" type="checkbox"/>		Word Processing <input type="checkbox"/> <input checked="" type="checkbox"/>	
Health <input type="checkbox"/> <input checked="" type="checkbox"/>		Graphics/Illustrations <input type="checkbox"/> <input checked="" type="checkbox"/>	
Innovations <input type="checkbox"/> <input checked="" type="checkbox"/>		Drafting <input type="checkbox"/> <input checked="" type="checkbox"/>	
New Process <input type="checkbox"/> <input checked="" type="checkbox"/>		Web Page Design <input type="checkbox"/> <input checked="" type="checkbox"/>	
Environment <input type="checkbox"/> <input checked="" type="checkbox"/>		Web-Based Database Dev. <input type="checkbox"/> <input checked="" type="checkbox"/>	
		Project Photography <input type="checkbox"/> <input checked="" type="checkbox"/>	
<u>Quality Statement</u>	<input checked="" type="checkbox"/>	Video/Audio <input type="checkbox"/> <input checked="" type="checkbox"/>	
		3D Animation/Modeling <input type="checkbox"/> <input checked="" type="checkbox"/>	
<u>Other Pertinent Information</u>		CD-ROM <input type="checkbox"/> <input checked="" type="checkbox"/>	
<u>ODCs</u>		<u>Technical Services</u>	
Travel <input checked="" type="checkbox"/> <input type="checkbox"/>		Welding <input type="checkbox"/> <input checked="" type="checkbox"/>	
Training <input checked="" type="checkbox"/> <input type="checkbox"/>		Machine Shop <input type="checkbox"/> <input checked="" type="checkbox"/>	
Material <input checked="" type="checkbox"/> <input type="checkbox"/>		Cable Shop <input type="checkbox"/> <input checked="" type="checkbox"/>	
Equipment <input checked="" type="checkbox"/> <input type="checkbox"/>		Pneumatic <input type="checkbox"/> <input checked="" type="checkbox"/>	
Procurement <input checked="" type="checkbox"/> <input type="checkbox"/>		Instrum./Data Acquisition <input type="checkbox"/> <input checked="" type="checkbox"/>	
Consultants <input type="checkbox"/> <input checked="" type="checkbox"/>		Safety Engineering <input type="checkbox"/> <input checked="" type="checkbox"/>	
Services <input type="checkbox"/> <input checked="" type="checkbox"/>		Quality Inspection <input type="checkbox"/> <input checked="" type="checkbox"/>	
Identify Large Procurements <input checked="" type="checkbox"/> <input type="checkbox"/>		Reliability Engineering <input type="checkbox"/> <input checked="" type="checkbox"/>	
University Affiliation <input type="checkbox"/> <input checked="" type="checkbox"/>		Environmental Engineering <input type="checkbox"/> <input checked="" type="checkbox"/>	
New Technology Report <input type="checkbox"/> <input checked="" type="checkbox"/>		Project Administrator <input type="checkbox"/> <input checked="" type="checkbox"/>	
Success Story <input type="checkbox"/> <input checked="" type="checkbox"/>		Supervisor <input checked="" type="checkbox"/> <input type="checkbox"/>	
Tech. Dev. & App'l Report <input type="checkbox"/> <input checked="" type="checkbox"/>		Matrixed Personnel <input type="checkbox"/> <input checked="" type="checkbox"/>	
Commercialization Potential <input type="checkbox"/> <input checked="" type="checkbox"/>		IT Security Plan (Sys. Adm.) <input type="checkbox"/> <input checked="" type="checkbox"/>	
Innovations Data Base <input type="checkbox"/> <input checked="" type="checkbox"/>			
		<u>PLAN PACKAGE</u>	
<u>COST SHEET</u>		Checklist <input checked="" type="checkbox"/>	
<u>Subcontractor Concurrence</u>		Plan <input checked="" type="checkbox"/>	
Swales <input type="checkbox"/> <input checked="" type="checkbox"/>		Cost Sheet <input checked="" type="checkbox"/>	
Sierra Lobo <input type="checkbox"/> <input checked="" type="checkbox"/>		Schedule <input checked="" type="checkbox"/>	
UCF/SRTI <input type="checkbox"/> <input checked="" type="checkbox"/>		NASA TOM Tech.Eval Sheet <input checked="" type="checkbox"/>	
Overtime Planned <input type="checkbox"/> <input checked="" type="checkbox"/>			

03/12/06 1:08

TASK ORDER 00463 CY7 Rev B

Direct Labor	<u>CY5</u>			<u>CY6</u>			<u>CY7</u>			<u>CY8 Baseline</u>			<u>TOTAL</u>
	RATE	HRS	COST	RATE	HRS	COST	RATE	HRS	COST	RATE	HRS	COST	
Chemical Engineer II													
Director													
Electrical Engineer I													
Electrical Engineer II													
Electrical Engineer III													
Electrical Engineer IV													
Electrical Engineer V													
Electrical Technician II													
Electrical Technician III													
Engineer I													
Engineer II													
Engineer III													
Engineer IV													
Engineer V													
Engineering Aide I													
Engineering Aide III													
Engineering Designer													
Engineering Designer I													
Engineering Designer II													
Engineering Designer III													
Engineering Designer IV													
Graphic Design Specialist II													
Graphic Design Specialist IV													
Illustrator II													
Manager													
Mechanical Technician III													
Physicist II													
Pneudraulic Systems Mechanic													
Principal Investigator													
Programmer III													
Project Administrator I													
Project Administrator II													
Project Administrator III													
Project Manager													
Project Manager III													
Project Manager IV													
Software Engineer V													
Subject Matter Expert													
Technical Editor													
Technical Editor III													
Technical Writer													
Telecommunications Engineer IV													
Total ASRC Labor													
Sierra Lobo													
Engineer IV													
Engineering Aide V													
UCF													
Research Associate (KSC)													
Total Subcontract Labor													
TOTAL LABOR													
M&A													
Total Labor													
Other Direct Costs													
Subtotal													
Subcontract G&A													
ODC G&A													
Subtotal G&A													
Total Estimated Cost													
Adjusted Target Cost (less ODC)													
Award Fee													
Incentive Fee													
Total Est Cost & Fee			\$949,718			\$4,380,780			\$7,296,958			\$7,380,776	\$19,987,229

Figures may differ from task order summary due to rounding.

Attachment A

STAND ALONE PRICE NEGOTIATION MEMORANDUM (PNM)

Task Order 00453 Rev B CY7: Mobile Launcher (ML)
ELECTRICAL SYSTEMS SUPPORT FOR CONSTELLATION
GROUND SYSTEMS

NAS10-03006, University-Affiliated Spaceport & Technology
Development Contract (USTDC)

(FAR 15.406-3 and NFS 1815.406-3)

I. INTRODUCTION

- A. Contractor: ASRC Aerospace Corporation
6301 Ivy Lane, Suite 300
Greenbelt, MD 20770
- B. Contract Number: NAS10-03006
- C. Action: ASRC submitted Task Order (TO) 00453 Rev B, ML Electrical Systems Support for Constellation Ground Systems. This TO rephrase/re-plan is to add scope for Hypergols Subsystem support and will result in Task Order 00453 Rev B CY07. The period of performance for the TO is from task order approval through September 30, 2010.
- D. Task Order 00453 Rev B (1) add scope to support the prototyping efforts associated with Task 2.0; (2) add scope for Hypergols Subsystems support and product development associated with new Task 1.16; (3) remove conferences, (4) add training to support Task 1.0 and; (5) adjust the labor target values to reflect action effort for the months of October 2008 through February 2009.
- E. Chronology:
- a. January 30, 2009 Partnering Process Commenced
 - b. April 02, 2009 Task Order Plan Completed
 - c. April 02, 2009 Task Order/Task Order Plan and Technical Evaluation Received
 - d. April 02, 2009 Price-Negotiation document begun
 - e. April 16, 2009 Negotiations completed

- F. This procurement action was not subject to the requirements of FAR Part 6, Competition Requirements, and therefore was not competed as it will be a contract action within the scope and under the terms of an existing contract.
- G. The contractor for this effort is ASRC Aerospace Corporation (ASRC). All of the CY7 effort under TO 00453 will be accomplished by ASRC employees.
- H. The contract was awarded, using competitive procedures, to ASRC on February 10, 2003.

Synopsis of this effort was not released to the Federal Business Opportunities (FedBizOpps) (the Government-wide Point-of-Entry) portal because the effort is made under the terms of an existing contract that was previously synopsisized in sufficient detail to comply with the requirements of 5.207 with respect to the current proposed contract action in accordance with FAR 5.202.

Review and posting to the Consolidated Contracting Initiative (CCI) Home Page was not made since a solicitation was not required.

EEO compliance for the basic contract was obtained and copy included in Pre-Award file (FAR/NFS 22.805).

ASRC's Accounting system has been determined to be adequate for the accumulation, reporting and billing of costs under government contracts. (Reference DCAA Audit Report No. 6311-2005D17740010, dated March 30, 2005.) The Billing system has also been determined to be adequate for billing costs accumulated under government contracts. (Reference DCAA Audit Report No. 6311-2005D17740011, dated April 6, 2005.) A Purchasing system review was performed by NASA/KSC and determined ASRC's purchasing policies and practices to be adequate for protecting the Government's interest. (Reference Contractor Purchasing System Review, dated August 27, 2008.)

- I. Negotiations commenced on April 02, 2009 and were completed on April 16, 2009. The following NASA personnel participated:

NASA/KSC
Joyce McDowell
Contracting Officer

ASRC
Martin Cummins
ASRC Business Office Manager

Nancy Hoffman
NASA COTR

Bennett Ross
ASRC Technical Lead

Gary Snyder
NASA Task Order Manager

Paul Gamble
ASRC Task Order Manager

II. TYPE OF CONTRACT CONTEMPLATED

Contract NAS10-03006, is a cost-plus-award-fee/incentive fee (CPAF/IF) contract with an Indefinite Delivery/Indefinite Quantity feature. This task order is a continuation of core support currently available under the basic scope of the task order. All terms and conditions of the basic contract will remain in full force and effect.

III. PROPOSAL

The Task Order/Task Order Plan (TO/TOP) represents ASRC's proposal for this effort, and documents the partnered agreement between the parties for the associated costs for the effort. Therefore, the basis of estimate for cost is exact to the basis of estimate of the partnered agreement. The supporting documentation includes the rate, labor hours, and Other Direct Costs verification sheets that confirm that ASRC's pricing is in accordance with contract attachment J-5, Task Order Pricing Rate Schedule.

IV. TECHNICAL VALIDATION

The NASA Task Order Manager (TOM) and the NASA Contract Technical Manager (CTM) representative have been present in the meetings associated with the TO/TOP process. As a result of the partnering approach in developing the requirements and resources for these tasks, the NASA team was able to resolve all issues that arose during the partnering of the requirement. **(See the attached partnering meeting notes).**

The NASA TOM and the NASA CTM have reviewed and evaluated the requirements and schedule, and determined them to be acceptable. The estimate for this task order was developed with ASRC and NASA experts in project management, cost estimating, resource management and IT management. The labor classifications were chosen to provide the range of skills and experience that are necessary for the successful completion of the planned work. The TOM and CTM signatures on the documentation are a result of fact-finding that took place during the partnering of that document, and represent the technical validation of the requirement. In addition, the NASA Resource Manager's signature signifies that adequate funding is available for the effort.

Certificate of Cost and Pricing Data submitted by the contractor were relied upon in their entirety for this negotiation.

VI. COST ANALYSIS

		<u>ASRC</u>	<u>NASA/KSC</u>
CY7 COST ANALYSIS	Labor Cost		
	ODC's		
	Award Fee (6%)		
	Total Cost & Fee		
CY8 COST ANALYSIS	Labor Cost		
	ODC's		
	Award Fee (6%)		
	Total Cost & Fee		

*See Attachment A for breakdown.

A. Evaluation:

Field pricing support was not requested for this action, as information available to the Contracting Officer (CO) was sufficient to establish price reasonableness.

The pre-negotiation positions were based on the outcome of the resource partnering, TOM Technical Evaluation dated April 01, 2009, the rate data obtained under contract attachment J5 and submitted to the CO, and past experience with work performed under similar TO/TOP's. Proposal rates submitted match the established Pricing Rate Schedule, which provided the foundation of the pre-negotiation position for all applicable costs. Fully burdened labor rates contained in J5 are pre-agreed to by the parties, mechanically applied pursuant to the process defined in the contract, and not subject to negotiation.

ASRC proposed an award fee/incentive fee of 6 percent, comprised of 6.0 percent award fee 0 percent incentive fee, for this CY7/CY8 effort. The fee is deemed fair and reasonable for this type of effort as it is identical to the fee rates pre-agreed to by the parties as shown under contract section B.2 Contract Value, Award Fee, and Incentive Fee. The base for fee on TO's is limited only to labor costs and excludes other direct costs.

ASRC proposed a decrease in total cost and fee for CY7 in the amount of _____ from _____ to a revised total of _____ for a rephrase/replan in Task Order and to add scope for Hypergols Subsystem support.

The total target labor cost of the work associated with the subject task order is _____ for CY7/CY8. The labor classifications were chosen to provide the range of skills and experience that are the minimum necessary

for the successful completion of the panned work effort, additionally, the rates proposed by ASRC are in compliance with contract clause B.6, Task Order Pricing. The NASA TOM has reviewed ASRC's proposed task order plan and found the labor hours and skill mix appropriate and reasonable to facilitate successful completion of the task order, as evidenced by the attached Technical Evaluation dated April 01, 2009.

ASRC proposed _____ in Other Direct Costs (ODC) in support of this task order for CY7/CY8. The ODC costs are for trips necessary for requirement development, hardware design, TIMS, vendor site visits, and training in support of this TO. The estimates are based on current airfare websites, vehicle rental websites, vendor websites, and Government per diem rates. The NASA TOM has reviewed the proposed ODC's and has found them to be acceptable and reasonable as evidenced by the attached technical evaluation.

VII. NEGOTIATION APPROVALS

On the basis of the preceding, authority to incorporate the cost associated with TO 00453 CY7/CY8 under the USTDC, Contract NAS10-03006, is recommended. As stated, the Government's objective position is that of the partnered resources and cost as noted.

VIII. RECOMMENDATION

Based on the above, it is the opinion of the undersigned that the total agreed to total cost and fee of _____ is fair and reasonable.

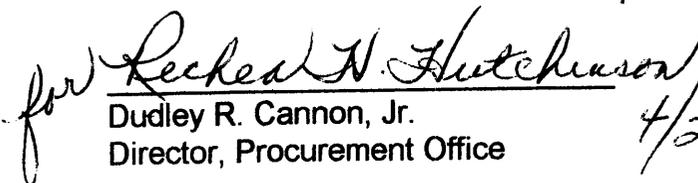
Concurrence:


Joyce McDowell
Contracting Officer

Date: 4/21/09


Edwin Martinez
Lead, Engineering & Project
Support Office
Date: 4/22/09.

Approval:

for 
Dudley R. Cannon, Jr.
Director, Procurement Office 4/28/09

Enclosures:

Attachment A, Cost Element Summary

Task Order Plan

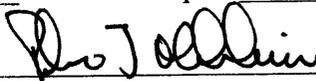
Technical Evaluation with attached partnering notes

Certificate of Current Cost or Pricing

Certificate of Current Cost or Pricing Data

This is to certify that, to the best of my knowledge and belief, the cost or pricing data (as defined in section 2.101 of the Federal Acquisition Regulation (FAR) and required under FAR subsection 15.403-4) submitted, either actually or by specific identification in writing, to the Contracting Officer or to the Contracting Officer's representative in support of Task Order 453 Rev B ML Electrical Systems Support for Constellation Ground Systems are accurate, complete, and current as of March 13, 2009. This certification includes the cost or pricing data supporting any advance agreements and forward pricing rate agreements between the offeror and the Government that are part of the proposal.

Firm ASRC Aerospace

Signature 

Name Pedro J. Medelius

Title Deputy Program Manager

Date of execution March 13, 2009

NAS10-03006: USTDC TECHNICAL EVALUATION FORM

(Use of this form is mandatory for all Task Order changes)

WHEN A BASIS OF DETERMINATION BLOCK IS CHECKED, FILL INS ARE REQUIRED.

PROJECT TITLE ML Electrical Systems Support for Cx Ground System	Task Order No.: 453	
Technical Evaluator's Statement: I have reviewed the referenced Task Order Plan to confirm the Contractor's understanding of the scope of work and to ascertain the reasonableness of the kinds and quantities of resources proposed to accomplish that work. My findings and the rationale for them are provided below.	Revision: <u>B</u>	Task Order Plan Revision: <u>B</u>

1. JOINT DEVELOPMENT OF TECHNICAL REQUIREMENTS

Prior to meeting with the contractor to develop the detailed technical requirements of this task, the NASA Task Order Manager (TOM) estimated the total cost of the work to be: \$ 7.36M
On Jan 09 And Feb 09 NASA and the contractor met to jointly developed the technical requirements of this task order plan.

Discussion with the contractor during the technical requirement definition meeting(s) and application of the rates required by the basic contract, resulted in a total estimated cost of: \$7.32M

Difference (if any) between the original Government estimate and the results of the technical requirement definition meeting is due the following general factors:

Addition of CY-8 Target Plan to the Task Order (\$7.3 M). Authority not requested.

Rephase / Replan Task Order and to add scope for Hypergols Subsystem support (-40K).

2. ADEQUACY OF THE CONTRACTOR'S UNDERSTANDING OF THE STATEMENT OF WORK (SOW):

STATEMENT OF WORK:

The contractor's description of the work to be performed, methods of accomplishment, schedules and/or plan of execution **(x) are () are not** consistent with the intent of the Task Order and reflect a reasonable basis to proceed.

3. ADEQUACY OF LABOR RESOURCE REQUIREMENTS:

ASSESSMENT OF LABOR HOURS:

The kinds, quantities and distribution of labor hours proposed (including those of subcontractors, university affiliates, and/or the use of overtime, if proposed) **(x) are () are not** considered appropriate and reasonable to accomplish the scope of work. The basis for this determination is:

Previous experience with task order number 453 from CY6 and CY 7. The hours and skill mix are consistent with the actuals experienced on this successfully completed task.

Previous experience with the work performed on contract number _____. The work successfully performed on this past contract was similar in nature and scope to the work being considered on this task.

NAS10-03006: USTDC TECHNICAL EVALUATION FORM

(Use of this form is mandatory for all Task Order changes)

WHEN A BASIS OF DETERMINATION BLOCK IS CHECKED, FILL INS ARE REQUIRED.

- Engineering judgment gained from ___ years working on similar projects.
- Government engineering breakdown/analysis of all elements. (Attached)
- Comparison with independent Government estimate. (Attached. Include an explanation of Inconsistencies between the Government Estimate and the final Task Order Plan)
- Other basis:

4. ASSESSMENT OF OTHER DIRECT COSTS (ODC):

a. MATERIAL and OTHER SUBCONTRACT COST:

The kinds and quantities of materials, equipment, and/or other subcontracts (including consultants, temporary services, etc.) are () are not () N/A considered appropriate and reasonable to accomplish the scope of work. The basis for this determination is:

- Previous experience with task order number 453 from CY6. The hours and skill mix are consistent with the actuals experienced on this successfully completed task.
- Previous experience with the work performed on contract number _____. The work successfully performed on this past contract was similar in nature and scope the work being considered on this task.
- Engineering judgment gained from 6 years working on similar projects.
- Government engineering breakdown/analysis of all elements. (Attached)
- Comparison with independent Government estimate. (Attached. Include an explanation of Inconsistencies between the Government Estimate and the final Task Order Plan)
- Other basis:

b. TRAVEL:

The contractor's proposed use of travel is () is not () N/A regarding the number and nature of trips and travelers, destinations and duration of stays. The basis for this determination is:

- Previous experience with task order number 453 from CY6. The hours and skill mix are consistent with the actuals experienced on this successfully completed task.
- Previous experience with the work performed on contract number _____. The work successfully performed on this past contract was similar in nature and scope the work being considered on this task.
- Engineering judgment gained from ___ years working on similar projects.
- Government engineering breakdown/analysis of all elements. (Attached)
- Comparison with independent Government estimate. (Attached. Include an explanation of Inconsistencies between the Government Estimate and the final Task Order Plan)
- Other basis:

NAS10-03006: USTDC TECHNICAL EVALUATION FORM

(Use of this form is mandatory for all Task Order changes)

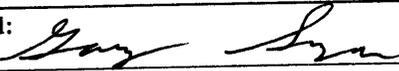
WHEN A BASIS OF DETERMINATION BLOCK IS CHECKED, FILL INS ARE REQUIRED.

5. ANY OTHER COMMENTS (SCHEDULES, ETC):

N/A

NASA Task Order Manager: Gary Snyder

Signed:



Date: 4-1-09