

University-affiliated Spaceport Technology Development Contract NAS1003006

100806

TASK ORDER

Page 1 of 5

TO Ref:	Task Order No.	Contract Year	Task Order Revision	Reference Plan Revision	Laboratory/Area	Type:
SPI	00423	7	RFP	C	None required	Mission Support

Title: **Pad B Electrical System Formulation Support for Exploration Ground Systems**

Director Area	R&D:	Manager Group	Period of Performance:
Systems & Project Engineering	No	Project Engineering	From: 01/26/2007
	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	455.93	2,422.40	\$2,701,690	\$0	\$2,701,690	2,438.71	0.00	8,018.73

FS	PROGRAM	FUND CODE	\$ FROM	\$ DELTA	\$ TO	INITIALS
1	CONSTL	321379.09.01.05.01.11	\$383,645.00	\$0.00	\$383,645.00	
2	CONSTL	292380.09.20.03.11	\$4,744,954.00	\$0.00	\$4,744,954.00	
3	CONSTL	292360.09.20.03.24.01	\$292,592.00	\$0.00	\$292,592.00	
TOTAL CUMULATIVE FUND LIMIT (NOT TO EXCEED)			\$5,401,191.00	\$0.00	\$5,401,191.00	

NASA TASK ORDER MANAGER/ ORG / PHONE	DATE	CUSTOMER TECH REP (OPTIONAL) / ORG / PHONE	DATE
<i>Paul Mackey</i> Paul Mackey / NE-E8 / (321)867-8882	5/13/09	<i>Jose Perez Morales</i> Jose Perez Morales / LX-D1 / (321)867-1453	5/13/09
CERTIFICATION OF FUNDING/ ORG / PHONE	DATE	CONTRACT TECHNICAL MANAGER/ ORG / PHONE	DATE
<i>Joyce McDowell</i> Joyce McDowell / OP-ES / (321)867-3437	5/15/09	<i>Ned Voska</i> Ned Voska / NE-42 / (321)867-4878	5/14/09
CONTRACT OFFICER/ ORG / PHONE	DATE	ACCEPTANCE ACKNOWLEDGEMENT BY CONTRACTOR/ ORG / PHONE	DATE
<i>Joyce McDowell</i> Joyce McDowell / OP-ES / (321)867-3437	5/15/09	<i>Martin Cummins</i> Martin Cummins / USTDC / (321)867-5408	

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1. DOCUMENT NO(S) TO Ref: SPI TO No.: 00423 TO Rev: RFP Plan Rev: C	Kennedy Space Center Document Continuation Sheet	2. Page 2 of 5
4. DOCUMENT: Title: Pad B Electrical System Formulation Support for Exploration Ground Systems		3. OFFICE: 5. DATE:

A. PROJECT DESCRIPTION & SCOPE

RFP C: The purpose of this RFP is to add scope to support integration and associated CAD work for the Launch Complex 39B (LC-39B) installation design task order.

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

The purpose of this Revision is: 1) Add scope to support Weather Subsystem meteorological field deployable prototyping efforts associated with Task 1.06. 2) Add scope to support Weather Subsystem lightning prototyping efforts associated with Task 1.06. 3) Remove conferences and 4) Add training to support Task 1.0.

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.

This Revision also changes the NASA Task Order Manager from Hugo Delgado to Paul Mackey. (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 6SPI00423, Revision C. Unless specifically addressed below, the scope of work defined in 6SPI00423, Revision C 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 Pad B Preliminary Design Review (PDR). S & MA support was removed from this Task Order (TO). Labor target values have been adjusted to reflect actual effort for CY6/FY08. The EMI test report milestone is being shifted into early CY7/FY09 due to the late arrival of the NASA procured electronic equipment needed to complete testing.

CY7/FY09 - CY8/FY10 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 and the Pad B Critical Design Review (CDR) in CY7/FY09 and CY8/FY10. During CY8/FY10, each subsystem 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 Pad B electrical subsystems and electrical support for the Pad B fluid subsystems. These activities will be a cooperative effort between NASA Electrical Design Engineering and USTDC Electrical Design Engineering organizations. 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 Pad B for the Crew Launch Vehicle (CLV)/Crew Exploration Vehicle (CEV). USTDC shall also support the design for Pad B electrical subsystems and electrical support for the Pad B fluid subsystems and shall provide support for documentation that will be required for the Pad B design review submittals. Design teams have been formed and the contractor shall support the design

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1. DOCUMENT NO(S)
TO Ref: SPI
TO No.: 00423
TO Rev: RFP
Plan Rev: C

Kennedy Space Center
Document Continuation Sheet

2. Page 3 of 5

3. OFFICE:

4. DOCUMENT:
Title: Pad B Electrical System Formulation Support for Exploration Ground Systems

5. DATE:

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, Sensor Data Acquisition Subsystem (SDAS), Weather Subsystem (WX), Water Deluge / Sound Suppression System (SSS), Cryogenics [consisting of Liquid Oxygen (LO2), Liquid Hydrogen (LH2) and Cold Gas Helium (CGHe)], Environmental Control Subsystem (ECS), Pneumatics [consisting of Gaseous Nitrogen (GN2), Gaseous Oxygen (GO2), and Gaseous Helium (GHe) and Breathing Air], and Transducers for the Pad B.

Required products to support the Pad B design include baseline subsystem requirements, schedule, concept of operations, products/technology availability market assessment, procurement plan, and Electrical Ground Subsystems weight and space analysis and drawings. The following additional products will 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).

Pad B 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 405001 *Launch Pad Element Requirement Document*. All designs shall be in compliance with KDP-P-2713 *Technical Review Process*, GP-435 *Engineering Drawing Practices Volume I of II Aerospace and Ground Support Equipment*, and CxP 72006 *Ground Systems Requirements Documents*.

This effort will provide the foundation for electrical subsystem hardware design, fabrication, testing, qualification/validation, and implementation.

B. TASKS

1.0 The contractor shall support the development of electrical design products for Ground Subsystems during the design phase, 60%, 90%, and 100% design reviews, and Pad B design. The electrical and fluid subsystems that will be supported are listed in the following subtasks 1.01 through 1.11.

- 1.01 Ground Special Power (GSP)
- 1.02 Hazardous Gas Leak Detection Subsystem (HGLDS)
- 1.03 Kennedy Ground Control Subsystem (KGCS/EMSF)
- 1.04 ML Physical Data Interface (MPDI)
- 1.05 Sensors Data Acquisition Subsystem (SDAS)

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1. DOCUMENT NO(S) TO Ref: SPI TO No.: 00423 TO Rev: RFP Plan Rev: C	Kennedy Space Center Document Continuation Sheet	2. Page 4 of 5
4. DOCUMENT: Title: Pad B Electrical System Formulation Support for Exploration Ground Systems		3. OFFICE: 5. DATE:

- 1.06 Weather Subsystem (WX)
- 1.07 Water Deluge/Sound Suppression Subsystems (SSS)
- 1.08 Cryogenics Subsystems
- 1.09 Environmental Control Subsystem (ECS)
- 1.1 Pneumatics Subsystem
- 1.11 Transducers
- 2.0 Proof-of-Concept and Subsystem Prototyping and Qualification
- 2.1 The contractor shall support NASA NE-E with the setup, 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 The contractor shall provide overall ground electrical subsystem project coordination functions for Pad B.
- 4.0 The contractor shall provide project engineering support to conduct progress reviews to ensure that technical, schedule, and cost objectives are being attained.
- 5.0 The contractor shall provide subsystem integration support for the electrical subsystems and the electrical portions of the Pad B fluid subsystems development and design.
- 6.0 The contractor shall provide engineering support services for documents and specifications releases.

C. MILESTONES/DELIVERABLES

- 1. - Support for the ground subsystems schedules.
Start Date : 10/01/2008 End Date : 09/30/2010
- 2. - Support for electrical ground subsystems requirements.
Start Date : 10/01/2008 End Date : 09/30/2010
- 3. - Support for subsystems' 60%, 90% and 100% design review package submittals.
Start Date : 10/01/2008 End Date : 06/28/2010
- 4. - Support for Pad B PDR package submittal.
Start Date : 10/01/2008 End Date : 11/17/2008
- 5. - Support for the setup and installation of proof-of-concept and prototyping hardware and equipment in development laboratories.
Start Date : 10/01/2008 End Date : 09/30/2010
- 6. - Support for the overall coordination function for the Pad B communication subsystems and project engineering.
Start Date : 10/01/2008 End Date : 09/30/2010
- 7. - Electrical support for the overall coordination function for the electrical and fluid subsystems

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1. DOCUMENT NO(S) TO Ref: SPI TO No.: 00423 TO Rev: RFP Plan Rev: C	Kennedy Space Center Document Continuation Sheet	2. Page 5 of 5
4. DOCUMENT: Title: Pad B Electrical System Formulation Support for Exploration Ground Systems		3. OFFICE: 5. DATE:

integration.

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

8. - Deliver an EMI 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.