

5.0 Ground Systems Readiness and Supportability

The contractor shall plan, operate, maintain, and sustain assigned ground systems as listed in Appendices 5A, 5B, 11, 12, 13, 14, 15 and 16. The contractor's interfaces with the government and other KSC contractors for each assigned facility system are listed in Appendix 12. The contractor shall ensure that changes on the contractor's side of the interface do not cause an overall system outage or damage on the other side of the interface. The contractor shall ensure ground systems readiness to support processing milestones.

The contractor shall schedule and perform ISS, Shuttle, Constellation and ELV ground systems and equipment maintenance, modifications, and new development projects to avoid impact to spacecraft/payload processing activities. For assigned facilities or facility areas, the contractor shall coordinate and integrate payload customer and other government contractor activities so as to avoid any impact to on-going processing activities. Further detail is specified in 5.1 through 5.7 below.

The contractor shall provide NASA documentation review, planning, analyses, trade studies, requirements definition (limited to ground systems identified in appendices above), design monitoring, design, procurement, fabrication, implementation, surveillance, activation and validation testing, certification, and required hardware/system turnover documentation during acceptance, modifications and development of new ground systems.

The contractor shall support the meetings listed in Table 5-1.

Table 5–1 Ground Systems Review Support Matrix

Meeting / Review	Frequency	Contractor Responsibility	Remarks
GSE Performance-to-plan	Weekly	S, A, P, I, D, M	Alternate weekly meeting between detailed status meetings and action item reviews. See DR-31 for data requirements.
Facility Performance-to-plan	Weekly	S, A, P, I, D, M	Alternate weekly meeting between detailed status meetings and action item reviews. See DR-31 for data requirements.
Checkout systems performance-to-plan	Biweekly	S, A, P, I, D, M	See DR-31 for data requirements.
Checkout systems testing schedule coordination	Weekly	S, A, P, I, D, M	Testing schedule coordination with affected parties.
NASA RCM working group	Annually	P, I	May be offsite.
KSC Energy Management Working Group	Monthly	P, I	Contractor to share data and metrics with other KSC organizations and contractors.
NASA Ground Systems conferences	Every six months	P, I	May be offsite.
Ground Systems Review Team	Biweekly	S, A, P, I, D, M	See DR-41 for data requirements.
ESR and Facility Projects	Monthly	S, A, P, I, D, M	See DR-41 for data requirements.
CoF Design	As needed	P, I	Applicable to CoF projects affecting contractor assigned facilities and equipment. Minimum of four reviews per project.
CoF Construction	Weekly	P, I	Applicable to CoF projects under construction affecting contractor assigned facilities and equipment. One meeting per week per project with the construction organization.
CoF Review	Monthly	P, I	Only during implementation of CoF projects affecting contractor assigned facilities and equipment.

S= Schedule Conference Room

A= Develop and Distribute Agenda and Schedule

P= Develop and Distribute Presentation Material

I= Present Agenda Items

D= Distribute, Track, and Report Action Items through Closure

M= Generate and Distribute Meeting Minutes

5.1 Facility Operations and Readiness

The contractor shall ensure that all assigned facilities, systems and equipment, including backup equipment, are operationally ready for scheduled payload customer and contractor payload processing activities. The contractor shall schedule facility access and facility system services to support payload processing and avoid impact to payload processing activities.

The contractor shall provide facility services per the facility Standard Interface Document (SID), to satisfy approved payload customer requirements. The contractor shall provide special facility services, when required, as defined by approved processing requirements.

The contractor shall provide payload storage to accommodate launch delay/dwell as defined by approved requirements.

The contractor shall obtain government approval for the following tasks:

- New facility projects and modifications over \$50,000
- Facility system and equipment out-of-family problem and anomaly resolutions.

The contractor shall provide safety and obsolescence upgrades to the Payload Hazardous Servicing Facility (PHSF), Radioisotope Thermal Generator Facility (RTG-F), Warehouse

Facility #1, and Warehouse Facility #2. The modification projects include, but are not limited to, the installation of crane safety rails, installation of Heating, Ventilation, and Air Conditioning (HVAC) Andover controllers, and replacement of HVAC systems, chillers and hot water piping.

The contractor shall provide interior office renovation of M6-698 (Warehouse #2) to include demolition and removal of HVAC, fire suppression, electrical, plumbing and communication equipment. Additionally, the contractor shall construct a mezzanine above the office space that will include new construction of architectural, structural, mechanical, and electrical systems.

The contractor shall perform a detailed assessment and implementation for the clean out of the O&C Building high bay. Phase I of the project shall include, but not be limited to, the following tasks: development of a project plan to cleanout the O&C high bay legacy infrastructure and secure support service systems; a structural and architectural hardware removal package with an environmental evaluation plan to remove the test stands, rails, and Apollo Telescope Mount (ATM) cleanroom; safing of test stands 2, 3, 4, and footprint 1; removal of test stands 2, 3 and 4; reactivation of the O&C west door; removal of infrastructure from the footprint 1 area; and safing of systems at the ATM and rails.

The contractor shall provide Architecture and Engineering (A&E) design services for approved facility and facility system modification projects associated with the activation of the O&C facility in support of the Constellation Program and Crew Exploration Vehicle (CEV) contractor in FY 2007 through FY 2009. Design services shall include, but not be limited to, the following tasks: trade studies and preliminary designs, design engineering, design integration, design support, design reviews, construction administration, commissioning support, and support of activation and validation. The contractor shall incorporate approved design changes as of January 2008 into final design packages. The contractor shall provide technical expertise in architectural and engineering (A&E) design during construction, activation and validation of the Operations and Checkout (O&C) Industrial Operations Zone (IOZ). The contractor shall: provide the necessary design expertise to support requests for changes in design, clarification of design content, field changes, and implementation of approved change requests as directed by NASA; employ a streamline response to requests for support or design changes; and manage and report the use of the technical support.

The contractor shall provide a Preliminary Engineering Report (PER) and trade study for the O&C building Visitor Viewing Gallery (VVG) project.

The contractor shall provide a Constellation (Cx) Program Consolidated Logistics Depot Study including an "as-is" capability assessment of the SSPF, depot requirements analysis, and development of high-level depot layout options.

The contractor shall perform O&C facility power modifications to provide power receptacles in approved O&C parking lot locations for Information Technology (IT) Tele-science Laboratory vehicles and equipment.

The contractor shall provide Architecture and Engineering (A&E) design services for design modifications to enable the performance of ISS Life Science payload requirements in the SSPF beginning with the STS-131/19A mission. The design changes to the SSPF shall provide for six science labs, three hardware labs, two central services labs, and one cold stowage lab for Life Science processing while retaining seven existing hardware labs, two rack labs, and the Payload Rack Checkout Unit (PRCU) room.

5.1.1 Customer Support Documents

The contractor shall prepare and update the following documents for all assigned payload processing facilities:

Modification 321

- Facility Handbook (DR-25)
- SID (DR-25)

5.1.2 Hazardous Facility Operations

The contractor shall prepare and process any waivers and proposed changes to a facility's hazardous quantity/distance site plan requirements with the government.

For SSPF and O&C operations which require ammonia, gaseous oxygen or alcohol, the contractor shall comply with the Interim Safety Requirements for Certain Hazardous Commodities in the SSPF and O&C, dated May 12, 2000.

5.1.3 Facility Space Management

The contractor shall manage assigned facility space including, but not limited to, office space, office layouts and modifications, personnel moves, storage, hardware processing areas, and laboratories. The contractor shall manage SSPF and O&C processing areas used for Space Station and Shuttle Payload processing through the multi-flow assessment process (Ref. Section 2.1.3.3). The contractor shall provide design and drawing support to office areas in the O&C, Engineering and Operations (E&O), and Hanger AE facilities. The contractor shall manage office space and perform modifications to facilities being utilized by the KSC Constellation project Office (LX) personnel.

The contractor shall provide off-site (Boeing Building 100) office space, relocate contractor personnel from the SSPF to Boeing Building 100 in FY 2008, and return contractor personnel to the SSPF in FY 2011.

The west end of the O&C Building has been designated as a Truss Processing Area (TPA) and has been assigned to the ISS Development Contractor until the truss outfitting and acceptance testing is completed (currently scheduled to be complete in FY03).

The contractor shall maintain and update a utilization schedule for the SSPF and O&C off-line laboratories.

The contractor shall administer government and payload customer office areas as assigned and required by the government.

The contractor shall categorize space per KHB 1200.1, Facilities and Real Property Management Handbook. The contractor shall provide office utilization data to the J-BOSC maintained KSC Space Management System for use in analyzing KSC-wide space utilization.

The contractor shall update and maintain:

- A facility space information system to manage the breakdown of assigned space by category and facility. The contractor shall make this system accessible to the government.
- Annual space utilization reports (DR-29)
- Office space graphical layouts for all assigned office areas
- Office layouts and planning for the government and assigned payload customer areas located in the contractor's assigned facilities
- Contractor and assigned payload customer area administrative phone and facsimile machine layouts
- Space utilization drawings for all assigned facilities

The contractor shall assess new space requirements against the contractor's and payload customer's assigned space capabilities. Requirements that cannot be satisfied with existing assigned space shall be presented to the government for assistance in finding the most appropriate resolution.

The contractor shall tear down and buildup system furniture required for office modifications and personnel moves in government, payload customer and contractor office areas. For assigned facility systems and equipment, the contractor shall perform modifications required to reestablish system functionality. The contractor shall coordinate facility layouts and fire alarm systems modifications with J-BOSC.

The J-BOSC will be responsible for all floor to ceiling wall relocations or new construction. The J-BOSC will reconfigure life safety and security systems including but not limited to fire alarm, sprinklers, and electronic security systems.

5.1.4 Facility Outage Coordination

The contractor shall coordinate and perform utility and system outages for the assigned facility systems. The contractor shall coordinate outages with the government, KSC contractors and any affected payload customers. The contractor shall maintain and update the 60-Hertz Circuit Coordination and Documentation System for the planning and evaluation of electrical utility outages.

The contractor shall provide an automated Utility Outage Processing System to coordinate, process, and schedule utility outages within 6 months of contract start. This system shall be interoperable with the J-BOSC and SFOC Integrated Utility Outage Processing System (IUOPS).

5.1.5 Facility Management

The contractor shall develop, implement, and update an overall Facility Management Plan (DR-30). The contractor shall manage facility operations and utilization to optimize both costs and operational readiness.

The contractor shall maintain and update real property records per KHB 1200.1, KSC Facility Space Management Handbook.

The contractor shall provide a facility manager at each processing facility whenever there are active payload processing or major facility modifications. The contractor may assign more than one processing facility to an individual facility manager with government concurrence.

The contractor shall coordinate and obtain support from the contractor's internal organization, government organizations, or other KSC contractors. The contractor shall track all Support Requests, both internal and those forwarded to other contractors, for work at the contractor assigned facilities and for payload customer-required changes.

5.1.6 Daily Facility Reporting

The contractor shall provide electronic (e-mail or web-based) daily facility performance reporting for all operational facilities to the government (DR-31).

5.1.7 Facility Crane Operations

The contractor shall provide a capability for dual overhead cab-operated crane operations a minimum of five days per week, single shift operation.

The contractor shall update and maintain emergency procedures for contingency actions such as power loss, brake failure, or other emergencies.

The contractor shall provide training to allow payload customers to operate facility lifting devices including pendant cranes, forklifts and man lifts. The payload customer will not operate the cab-operated cranes in the SSPF and the O&C building, or the CRF crane.

5.1.8 Facility Cleanliness and Environmental Conditions

The contractor shall maintain specified levels of cleanliness in clean work areas per KCI-HB-5340.1, Payload Facility Contamination Control Implementation Plan (DR-32). The contractor shall monitor and maintain cleanliness levels at all times except when taking a facility off-line with government approval.

The contractor shall monitor and measure the PPF environment per K-STSM-14.2.1, KSC Payload Facility Contamination Control Requirements Plan. The contractor shall notify the government and affected payload customers of any out of specification condition per the call tree within four hours.

The contractor shall provide special cleanliness equipment and procedures when specified by approved requirements.

5.1.9 Facility and Equipment Cleaning

The contractor shall clean or ensure that the payload customer cleans all equipment brought into the processing area to a level of "visibly clean" or better prior to entry per JSC SN-C-0005, Contamination Control Requirements.

The contractor shall maintain and operate the cleaning capability outside of the CRF for large shipping containers and other equipment prior to entry to a clean room facility. The contractor shall clean payload customer shipping containers and equipment with payload customer

permission including, but not limited to, large item cleaning at the CRF or outside of the receiving facility; cleaning of equipment or shipping containers in an airlock, inspection area and receiving area; and routine cleaning in the processing area.

5.1.10 Facility Access Control

The contractor shall manage personnel, equipment, and material access to all of the active processing bays located within the contractor's assigned facilities. The contractor shall use and monitor the Access Control Intrusion Detection System (ACIDS) for entry to and exit from the large processing areas of the PPFs. The ACIDS system is operated, maintained, and sustained by the J-BOSC and provided by the government.

The contractor shall provide the appropriate employee information to the J-BOSC operated Visitor Records Center for the issuance of employee and visitor area access badging by J-BOSC.

The contractor shall coordinate with J-BOSC the opening and closing of all alarmed doors that are monitored by the Electronic Security System provided by the government.

5.1.11 Facility Communications Circuits

SFOC/CSOC* will provide voice, video, and data communication services, including video distribution systems services (except for flight), transmission services, cable system services, communication services, computer network services, OIS-D, radio services, paging and area warning, point-to-point telephone, conference room sound reinforcement, extension of Nascom Network voice/data, voice and video recording, secure communication at KSC and the sustaining engineering services for the Photo Optical Control System (POCS) and the Timing and Countdown joint services contracts at KSC and CCAFS.

*SFOC-provided service will transition to CSOC on 10/1/2002.

5.1.11.1 Customer Circuit Connection

The contractor shall provide intra-system cabling and communications services. The contractor shall coordinate and schedule communication services with SFOC/CSOC for assigned test areas, stands, computer rooms and control/user rooms. The contractor shall connect and schedule usage of contractor and payload customer circuit connections to the SFOC/CSOC or Outsource Desktop Initiative for NASA (ODIN) interface. The contractor shall provide connection cabling from the contractor and payload customer's equipment to the SFOC/CSOC or ODIN interface.

The contractor shall coordinate, schedule and initialize government and payload customer videoconferences in the SSPF as required.

5.1.11.2 Telephone Circuit Connection

The contractor shall coordinate assigned payload customer, test stand and control/user room area administrative phone and facsimile machine additions and changes with the government and the ODIN contractor.

The contractor shall provide dial-up modems and auto dialers for payload customer use per approved requirements.

5.1.11.3 (Reserved)

5.1.11.4 Launch Complex 39 and Launch Control Center Communications Circuits

At Launch Complex (LC) 39, the contractor shall connect and schedule usage of contractor and payload customer circuit connections to the SFOC/CSOC interface or other KSC contractor's interface. The contractor shall coordinate and patch T-0 circuits and other payload customer circuits in the MLP and in room 220 and room 221 of the Pad Terminal Connection Room (PTCR) per approved requirements.

The contractor shall coordinate with SFOC/CSOC and verify end-to-end communications circuits between the pad and the Launch Control Center and the LC 39 area and Industrial Area control/user rooms.

5.1.12 Complex Control System Interfaces

The contractor shall operate, maintain, and sustain assigned facility 60 Hz. power sensors and wiring up to the Complex Control System (CCS) SFOC interface per Appendix 12. The SFOC will provide a complex control system for the monitoring of Industrial Area power systems. J-BOSC will monitor the complex control system from the Launch Control Center.

The contractor shall provide a call tree to the CCS console at the Launch Control Center for J-BOSC notification in the event that CCS is reporting a problem with a contractor's assigned facility. The contractor shall establish contingency plans to react to a CCS reported problem and shall notify the government and payload customer.

The CCS is in the process of being upgraded by NASA. Once these upgrades are complete the system will officially be known as the Kennedy Complex Control System (KCCS).

The contractor shall coordinate and support outages as required to complete the upgrade to the KCCS.

5.1.13 Facility Operational Modes

The contractor shall optimize payload processing facilities utilization by taking facilities or portions thereof (e.g. selected systems, altitude chamber) to a standby or modified mothball mode.

The contractor shall analyze payload processing facility utilization during inactive periods to evaluate standby or modified mothball mode risk, and the economic and operational feasibility to place a facility in standby or modified mothball mode. The contractor shall present the analysis, including tailored modifications to mothball mode, to the government for approval no later than 14 days in advance of the intent to place a facility or portion thereof into a standby or modified mothball condition. The contractor shall develop, update and implement a Facility Standby Report (DR-33) that presents the status of PPF utilization and any proposed standby or modified mothball planning.

The contractor shall define the standby or modified mothball conditions and proposed deviations to temperature and humidity from the required specifications for government approval.

The contractor shall prepare the facility for payload processing 14 days prior to the Operational Readiness Date (ORD) or unless otherwise defined per requirements.

The contractor shall transition the VPF to a modified mothball mode and the SAEF2 to a abandon mode as described in NPR 8800.15A and agreed to deviations. The transition is to be accomplished in conjunction with the other activities associated with the termination of the Payload Carriers Program (PCP).

In support of the Constellation Program and for the period from October 1, 2006 through September 30, 2007, the VPF shall be maintained in a modified mothball ("life support") mode as described in NPR 880015A and agreed to deviations.

The contractor shall reduce performance of O&M activities associated with the VPF and transition the VPF to an abandonment mode, effective October 1, 2007, as described in NPR 8800.15A and agreed to deviations.

The contractor shall prepare, inspect, perform MAWP calculations and provide a written report of the feasibility of recertifying the VPF GHe tank.

The contractor shall reduce performance of O&M activities associated with the MPPF and transition the MPPF to a modified mothball ("life support") mode, effective October 1, 2008, as described in NPR 8800.15A and agreed to deviations.

5.1.14 Frequency Coordination

The contractor shall coordinate and obtain authorization for all new contractor and new payload customer equipment's radio frequency transmissions from the KSC Frequency Control Officer Spectrum Manager per the requirements of KHB 2570.1, KSC Radio Frequency Spectrum Management Handbook. The contractor shall ensure that all newly purchased equipment is issued a Radio Frequency Authorization (RFA) by the KSC Frequency Control Officer Spectrum Manager. The contractor shall ensure that any contractor assigned equipment replacement item is within the spectrum bandwidth previously approved for contractor or payload customer use by the KSC Frequency Control Officer Spectrum Manager.

Crane radios are provided by the SFOC/CSOC. Cellular telephones, two-way pagers, "cordless" telephones, and wireless computer keyboards/mice have been authorized as a class of stations. Users do not have to request individual RFAs.

The contractor shall ensure that all transmitting devices, including cellular phones are restricted from being located near flight hardware or ground support equipment per the distance requirements of KNPR 8715.3, KSC Safety Practices Procedural Requirements.

5.1.15 Facility and Equipment Readiness Reporting

The contractor shall prepare a Facility and Equipment Readiness Report (DR-34).

The contractor shall present the facility and equipment readiness for all payloads, a minimum of one week prior to payload support equipment arrival, at the government led GOR and other readiness reviews.

5.1.16 Battery Servicing

The contractor shall provide any required services for payload and payload customer battery charging as documented in the LSSP. The contractor shall provide servicing of batteries including, but not limited to, lead acid, potassium hydroxide, silver zinc, nickel cadmium and nickel hydrogen batteries. The contractor shall arrange for the use of the SFOC Battery Shop

when SFOC has the equipment and expertise required for a unique type of battery, such as nickel hydrogen batteries.

5.1.17 Facility Energy Consumption

The contractor shall assist KSC in achieving federally mandated energy conservation goals.

The contractor shall collect, analyze, and prepare utility consumption data and reports (DR-35).

The contractor shall manage, implement, and maintain processes to reduce energy consumption including, but not limited to:

- Office lighting controls and procedures
- Heating, Ventilation and Air Conditioning (HVAC) controls and procedures

5.1.18 Facility Heating, Ventilation and Air Conditioning Systems

The contractor shall report chilled water usage for each facility (DR-35). The contractor shall meet all of the energy guidelines of Section 5.1.17.

The contractor shall develop, update and implement a HVAC Heat Load Shed Plan (DR-30) for all assigned processing facilities.

The contractor shall bring the SSPF back-up systems, in coordination with J-BOSC, on line within 4 hours in the event of a problem with hot or chilled water delivery.

The contractor shall maintain the SSPF standby main high bay air-handling unit in a state of readiness.

5.1.19 Andover Control Systems

The contractor shall test and validate all Andover software changes and ladder logic prior to loading the software onto an operational set. The contractor shall exchange HVAC and facility environmental data with the J-BOSC via an Andover data exchange interface. The contractor shall back-up and archive all Andover software.

The contractor shall provide the government and payload customer access to the Andover environmental monitoring system graphic layouts of assigned operational facilities.

The contractor shall provide a data printout, graphic data, and report to the government within 48 hours following any anomaly or out of specification condition for any facility system monitored by Andover. The data presented to the government shall indicate the start time, duration, and magnitude of the problem.

5.1.20 SSPF Ammonia Processing

The contractor shall configure, operate, maintain, and sustain the SSPF systems to perform ammonia servicing and testing.

5.1.21 O&C Altitude Chamber Operations

The contractor shall maintain the west altitude chamber in the standby mode until needed. The contractor shall perform a demonstration/validation of the altitude chamber when it is reactivated from the standby mode at least 30 days prior to the next scheduled use date. The contractor shall ensure that the east altitude chamber can be safely used for storage.

5.1.22 Facility or Fixed Equipment Location Siting

The contractor shall comply with NPG 8820.2, Facilities Project Implementation Handbook. The contractor shall prepare drawings locating the placement of new facilities or fixed equipment. The government will approve all physical location siting plans for any new facility foundations or

concrete slabs. The contractor shall submit the siting plans no later than the 30% design review.

5.1.23 Hurricane Recovery Effort

The contractor shall support the Hurricane Frances and Hurricane Jeanne recovery effort at KSC to return facilities and equipment back to pre-hurricane condition based on assessment from the Damage Assessment and Recovery Team (DART). The contractor shall participate on the KSC Recovery Team (KRT); assess CAPPS KSC facilities and equipment; develop and prioritize the CAPPS Hurricane Recovery Master List of projects; and execute facility repairs, personnel relocations and equipment maintenance and replacement.

5.2 Ground Support Equipment Operations and Readiness

The contractor shall ensure that all assigned support equipment is operationally ready for scheduled payload customer and contractor payload processing activities. The contractor shall schedule support equipment services to support payload processing and avoid impact to payload processing activities.

The contractor shall develop, update and implement a Support Equipment Standby Plan (DR-33). The contractor shall notify the government at least 14 days prior to placing the equipment in the standby mode.

5.2.1 Payload Canister and Transporters

The contractor shall operate, maintain and sustain payload canisters and transporters at KSC/CCAFS per approved requirements.

The contractor shall develop concepts of mechanical modifications to the payload transporter in support of the Constellation Program.

5.2.2 (Reserved)

5.2.3 Access and Handling Equipment

If the handling operation is new or is using new equipment that is critical to the operation, the contractor shall analyze and determine the most suitable handling devices. The analysis shall include, but not be limited to the handling device, the weight and center of gravity of the item to be handled, and a determination of whether a hydraset is required.

5.2.4 Late Orbiter Access and Post Orbiter Landing Support Equipment

The contractor shall operate, maintain and sustain all assigned support equipment used for late payload access to the Orbiter prior to launch.

The contractor shall operate, maintain and sustain all assigned support equipment used to service payloads following the Shuttle landing at the KSC Shuttle Landing Site, the Dryden Flight Research Center (DFRC) and the White Sands Test Facility.

The contractor shall operate, maintain and sustain assigned Conditioned Cargo Transport Equipment (CCTE) at both KSC and DFRC. The contractor shall plan and implement relocation of the DFRC based CCTE to the assigned SLS as required. The contractor shall coordinate and implement CCTE operations and interfaces in accordance with contractor-to-contractor agreements.

5.2.5 Simulators and Avionics Support Equipment

The contractor shall coordinate with the AEP to obtain required Flight Equivalent Units (FEUs) to support approved testing requirements.

The contractor shall maintain the ITCS servicing unit, and space to ground test set, such that the equipment can be relocated to a test stand to support payload testing.

5.2.6 Life Support

The contractor shall perform periodic inspections of life support equipment furnished by J-BOSC. The contractor shall recharge cryogenic backpacks before return to J-BOSC.

5.3 Checkout Systems

The contractor shall use, operate, maintain and sustain the Checkout Systems as described in Table 5-2.

Table 5-2 Checkout System Responsibilities*

System	Function	Contractor	Government	Comments
TCMS ^{1,2}	Verify ISS 1553 busses and RS-422 and IEEE-488 GSE busses.	U, O, M, E	U	Incorporate Partial Payload Checkout Unit (PPCU) capabilities within three years.
Payload Rack Checkout Unit (PRCU)	Verify ISS racks before integration for flight	O ⁺ , M ⁺	U, O, M, E	Interface with MSFC sustaining engineering required.

U = USE this system

O = OPERATE this system

M = MAINTAIN this system

E = Sustaining ENGINEERING for this system and perform any required development work.

+ = Technician support only

* See Appendix 14 for detailed listing of hardware and responsibilities

1 The contractor shall reduce the support for the TCMS to the level required to provide test support for Node 2, Node 3 and the remaining passive Multi-Purpose Logistics Module flights, effective February 2007. TCMS sustaining support shall be reduced after final release, verification and installation of TCMS software version 8.0.

2 The contractor shall deliver a Test Control and Monitor System (TCMS) Data Archival and Retrieval System (ARS) for the Constellation Launch Control System (LCS). Boeing is to deliver a fully operational system including installation instructions, development of the LCS/ARS data communications interface on a customer-supplied platform and training support.

5.3.1 User Test Products

The contractor shall develop test application software, data bank definitions, and all other test products required to use and operate required checkout systems.

5.3.2 Shuttle Processing Test Products

The contractor shall develop and provide to SFOC test application software, data bank definitions, and all other test products required for the contractor to use the shuttle processing checkout system when required to process payloads through the launch process.

5.3.3 EHS/PDSS Integrated Change-out (EPIC)

The contractor shall design and implement changes to the Payload Test and Checkout System (PTCS) and the Test, Control and Monitor System (TCMS) to remotely interface and functionally operate with two systems at the Marshall Space Flight Center (MSFC)—Enhanced Huntsville Operations Support Center System (EHS) and Payload Data Services System (PDSS) in support of experiment and payload processing activities.

5.3.4 Integrated Spacecraft Emulation Environment (ISEE)

The contractor shall maintain operator competency and proficiency for the Command and Data Handling (C&DH) and Electrical Power System (EPS) components of the Integrated Spacecraft Emulation Environment (ISEE).

5.4 Ground Systems Maintenance

The contractor shall implement a maintenance program incorporating RCM in accordance with NPG 8831.2C, Facilities Maintenance Handbook for assigned ground systems. The level of maintenance provided shall ensure the reliability, cost effectiveness, serviceability, and longevity of the assigned systems and equipment. For items maintained by the contractor and sustained by another organization, the contractor shall coordinate, integrate and implement assigned upgrades and modifications.

The contractor shall maintain all applicable software and firmware for the assigned systems, facilities, and equipment.

The contractor shall develop, update and implement a Maintenance Plan (DR-36).

The contractor shall provide Backlog of Maintenance and Repair (BMAR) data to the government annually at the end of each fiscal year per the requirements of NPG 8831.2C (DR-36).

The contractor shall retain the previous five years of historical ground systems maintenance and repair data for trending purposes. *The government will provide, at contract start, a copy of the historical facility maintenance and repair data, in comma-delimited format, for the period of 1997-2001.*

5.4.1 Maintenance Work Control and Scheduling

The contractor shall perform all operations and maintenance tasks in accordance with work authorization documents developed by the contractor and based on approved requirements. The contractor shall use, update, and implement a computerized maintenance management system (Reference Section 6.1.3) to schedule and track maintenance of assigned systems and equipment. The system shall have the capability to:

- Provide historical and statistical data
- Provide current visibility of all maintenance tasks
- Schedule, track and report
 - Preventive and predictive maintenance
 - Facility inspection and assessment
 - Utilities management

5.4.2 Facility Condition Assessments

The contractor shall prepare Facility Condition Assessments for all assigned facilities and facility systems (DR-37).

5.4.3 Ground Support Equipment and Checkout System Assessments

The contractor shall prepare Ground Support Equipment and Checkout System Condition Assessments for all designated support equipment and checkout systems (DR-38).

5.4.4 Warranty Maintenance

The contractor shall maintain warranty or guarantee records for assigned ground systems for any warranty or guarantee period. The contractor shall investigate the failure of any covered equipment or material, report findings to the government, and take no action that would void a warranty without prior approval from the government representative. The contractor shall obtain warranty documents on all warranted equipment and materials installed by the contractor.

5.4.5 Corrosion Control

The contractor shall provide corrosion control for all equipment identified in Appendix 12. The contractor shall control corrosion of equipment through rust prevention and rust correction activities. Rust prevention activities shall include, but are not limited to, the application of protective coating. Rust correction activities shall include, but are not limited to: scraping and treatment of corroded area with an application of protective coating, removal and replacement of corroded area and application of protective coating.

Corrosion evaluations and corrective actions shall be incorporated into Facility Condition Assessments, as required by paragraph 5.4.2.

5.4.6 Factory Equipment

The contractor shall operate and maintain the ISS factory equipment listed in Appendix 5C.

5.5 Ground Systems Sustaining Engineering

The contractor shall perform sustaining engineering for all ground systems including software and firmware identified in Appendices 5A, 5B, 11, 12, 13, 14, 15 and 16 to meet the original design intent (i.e. form, fit and function).

The contractor shall provide engineering services and task level support to upgrade systems and equipment performance and to improve safety, reliability, maintainability, functionality and cost effectiveness.

5.5.2 Modification and New Requirements Processes

The contractor shall perform modifications to configured facility, ground and checkout systems, and support equipment per the requirements of KHB 1200.1, Facilities and Real Property Management Handbook.

The contractor shall track work forwarded to other KSC contractors if the ESR affects a payload customer, assigned facility or equipment item.

The contractor shall obtain approval from the government for all ESRs with an estimated cost exceeding \$50,000 prior to implementation.

5.5.3 Support Equipment Tracking Databases

The contractor shall input and update the status of any new, standby, or excess items of ground support equipment into the TR1287, KSC Support Equipment List By Title Number. The contractor shall provide an annual listing (DR-40) of all GSE being used or in standby mode in each facility.

5.5.4 Systems Engineering

The contractor shall provide systems engineering, field engineering and design integration for all assigned ground systems to the demarcation point with systems and equipment under the responsibility of other KSC contractors. The contractor maintained and updated technical data shall include those documents, which identify each part and its precise configuration at any level of assembly required to support KSC activity. The contractor shall ensure that no change on the contractor's side of the interface causes an overall system outage or damage on the other side of the interface.

The contractor shall review applicable ICDs and, when required, update the GSE configuration to maintain compatibility with flight hardware interfaces.

The contractor shall conduct and schedule functional design reviews for all appropriate levels of changes.

5.5.5 Engineering and Drawings Standards

The contractor shall provide engineering, drawings and other documents in accordance with KSC-DE-512-SM, Facility, System, and Equipment General Design Requirements. The contractor shall release documentation in accordance with KDP-KSC-P-1537, Document Release Authorization (DRA) Process. The contractor shall maintain existing drawings per the existing format.

5.5.6 Ground Systems Design

The contractor shall provide design services for all assigned ground systems. The contractor shall define requirements with the payload customer for any new design changes. System and configuration changes that affect the functional capability of system or hardware and software architecture require formal design reviews. The design review process shall be in accordance with KDP-KSC-P-1535, Design Review Process.

The contractor shall design ISS support equipment in accordance with SSP 50004, ISS Program Ground Support Equipment Design Requirements. The contractor shall design and certify support equipment that interfaces with Shuttle flight hardware or ground systems in accordance with SW-E-002, Space Shuttle GSE General Design Requirements.

The contractor shall obtain government approval for new GSE development with an estimated cost exceeding \$50,000.

5.5.6.1 Preliminary Design

The contractor shall coordinate with affected organizations to develop and convert operational requirements into preliminary design concepts including, but not limited to ROM cost estimates. The contractor shall prepare an interim or preliminary design package when changes affect critical components or changes affect more than 10% of a system or equipment item. The contractor shall provide technical data in the preliminary design review package including, but not limited to, schematics, block diagrams, preliminary reliability and hazard analyses, list of long lead items and other engineering data.

The contractor shall conduct a formal Preliminary Design Review (PDR) for GSE that interfaces with flight hardware and software unless the appropriate control board imposes other requirements or waives the need for such design reviews. Required design reviews shall be documented in the technical assessment. The contractor shall invite representatives from the design centers responsible for the interfacing flight hardware. Following the preliminary design review, the contractor, with government concurrence, may proceed with long lead time item procurement of parts required to meet an implementation need date for new or modified facilities and equipment.

5.5.6.2 Final Design

The contractor shall prepare the final or CDR package including, but not limited to, working drawings, procurement specifications, software criteria (if applicable), installation approach, cost estimates, parts lists, schedules, activation and validation plan, and reliability, supportability and safety analyses.

In the final review or CDR, the contractor shall address the maintenance concept for the system or equipment item. The contractor shall address the following areas, including but not limited to:

- Accessibility for maintenance and operation
- Built-in test equipment
- Self-test capabilities
- Mean time between failures
- Mean time to repair
- Maximum repair time
- Inspection frequency and maintenance hours

When design changes create criticality Category 1, 1S, or 2 single failure points or hazardous conditions, the contractor shall conduct a formal CDR, which includes a representative from NASA Safety. The contractor shall update the systems safety assessment (Reference Section 3.1.2

The contractor shall conduct a formal Critical Design Review (CDR) for GSE that interfaces with flight hardware and software unless the appropriate control board imposes other requirements

or waives the need for such design reviews. Required design reviews shall be documented in the technical assessment. The contractor shall invite representatives from the design centers responsible for the interfacing flight hardware. Before any GSE that interfaces with flight hardware can be used, the contractor shall complete a formal presentation of readiness at a government led Design Certification Review (DCR) unless the appropriate control board imposes other requirements or waives the need for such review. DCR requirement or proposal to waive it shall be documented in the technical assessment.

5.5.6.3 Human Factors Design Engineering

The contractor shall review designs to assess the need to perform a human factors analysis prior to initial design release. The contractor shall perform a human factors analysis prior to changes to critical controls and displays.

5.5.6.4 Modification Packages and Instruction

The contractor shall develop modification packages and instructions to implement design changes, which include the development of Engineering Instructions (EI) packages, preparation of material lists, and detailed installation instructions. The contractor shall formally release the modification package using the DRA process. The contractor shall prepare and ensure completion of a punch list of open items.

5.5.6.5 Modification, Activation and Validation

The contractor shall activate and validate all modifications or new capabilities at the end of installation and prior to hardware and system turnover operations. The contractor shall coordinate with the user organization during final activation and validation.

The contractor shall provide the services required to certify ground systems, including support equipment provided as government furnished equipment, for contractor use in its operating environment.

5.6 Engineering Studies and Analysis

The contractor shall evaluate program requirements and flight hardware designs for impacts to KSC facilities and equipment. The contractor shall perform engineering analyses and assess ground system impacts to safety, reliability, operability, scheduling, documentation and logistics. The contractor shall include in the assessments an implementation strategy, proposed coordination with other contractors, effects of proposed design on other contractors' systems and operations, cost estimate, installation and testing requirements, environmental analyses, required documentation per existing federal and state regulations, and any necessary trade studies.

5.7 Facility Construction Projects

The contractor shall implement Non-CoF construction projects. The contractor shall provide requirements, technical and cost data for the design and construction of facility projects per NPG 8820.2, Construction and Labor Provisions, and in NASA Policy Guideline.

The contractor shall provide facility projects cost proposals including, but not be limited to construction management, construction (for assigned projects), construction surveillance, program required documentation, activation, facility as-builts and hardware and system turnovers.

The contractor shall provide a monthly report addressing each construction project cost schedule and performance (DR-41).

The contractor shall provide a recovery plan within two weeks of any over budget or schedule milestone slip for assigned projects. The recovery plan shall address the proposed mitigation offered. For non-CoF facility projects, any reduction in scope shall take into consideration the approved NASA Form 1509 content and scope of work. The contractor shall revise the NASA Form 1509 as required for government approval.

The contractor shall develop and submit a Non-CoF Facility Projects Five-Year Plan (DR-42) and a CoF Five-Year Plan (DR-43).

The government will provide blocks of unique Project Control Numbers (PCNs) to the contractor. The contractor shall only assign a government PCN for facility projects exceeding \$50,000. The contractor shall use PCNs for each facility project in all documentation and databases.

5.7.1 Non Construction of Facilities Projects

The contractor shall submit NASA Form 1509 and a facility requirements list for government approval prior to start of design of Non-CoF facility projects exceeding \$50,000. The facility requirements list shall establish the system requirements for the proposed project in enough detail to correlate with the contractor's estimate.

The contractor shall provide project activity breakdown to the government in sufficient detail to allow for an independent evaluation of all tasks including but not limited to design, construction management, construction, activation, documentation and turnover.

5.7.2 Construction of Facilities Program

The contractor shall develop, update and submit to the government the CoF budget documentation and Project Identification Sheets as required to meet the annual government budget development schedules. The government will notify the contractor of those projects included in the approved CoF budget.

During project design and construction, the contractor shall review project packages and provide engineering and scheduling consultation to the implementing organization.

5.7.3 Facility Activation and Validation

The contractor shall activate and validate all modifications or new capabilities at the end of installation and prior to hardware and system turnover operations. The contractor shall coordinate with the user organization during final activation and validation.

The contractor shall complete punch list items, make-work modifications, and interim maintenance during and following construction. The contractor shall perform integrated testing, if required, after the installation of non-collateral equipment and systems.

6.0 Information Technology

The contractor shall provide all data and IT systems to perform the requirements of this contract. This includes, but is not limited to, all associated hardware, system software, applications, test application software, firmware, Commercial Off the Shelf (COTS) software, displays, databases, data storage and measurement definitions.

The contractor shall develop, operate, maintain, and sustain IT systems and applications identified in Appendix 16 and software identified in Appendix 13. These include, but are not limited to:

- Desktop computers and portable computing devices
- Peripherals
- Enterprise computational systems
- Network servers
- CAD/ Computer Aided Engineering (CAE) workstations

The contractor shall develop, update, and implement an IT Plan (DR-45).

6.1 Information Technology Operations

6.1.1 Data Sharing

The contractor shall implement an architecture that enables bi-directional digital data sharing with government representatives within the KSC domain or its successor.

6.1.1.1 Kmail and Global Address List Update

The contractor shall provide daily (Monday through Friday) updates to the KSC X.500 Directory (Kmail) including, but not limited to, all e-mail user and address data. The contractor shall maintain NASA Locator (Facility Center) data current on all active employees.

6.1.1.2 Calendar Compatibility Requirement

The contractor shall provide integration and interoperability between their calendar system and the NASA Calendar System. Automated meeting and resource scheduling and notification between the systems; calendar and resource sharing and viewing between the government and the contractor are examples of the interaction that is required. The current NASA Calendar System is Microsoft Outlook.

6.1.1.3 Desktop Application Interoperability

The contractor shall maintain interoperability between the contractor's desktop application environment and the government's desktop application environment per NASA-STD-2804E, Minimum Interoperability Software Suite. If the contractor implements Public Key Infrastructure, the contractor system shall be interoperable with the NASA Public Key Infrastructure system.

6.1.2 Help Desk

The contractor shall operate a user help desk to support government, IP/P, NASA customers, and payload developers involved with computational and digital communication resources operated by the contractor. The contractor shall coordinate, provide expertise and assist in the isolation and resolution of IT systems data exchange problems with non-CAPPS organizations.

The contractor shall maintain a problem tracking system as part of the Help Desk function. The contractor shall report to the initiator when the problem is closed and maintain data on help desk performance via use of the problem tracking system.

6.1.3 SAGER Control and Monitor System

The contractor shall develop and deliver a web-based control and monitor system (SAGER) for the environmental growth chambers to be located in the Space Experiment Research & Processing Lab (SERPL) facility. The contractor shall work with NASA to develop server/database interface software, support problem resolution for the prototype demonstration dry run, and support the SERPL SAGER testing prior to system activation and delivery.

6.1.4 MAXIMO

The contractor shall use, operate, maintain and sustain the MAXIMO system. Within six (6) months of the start of CAPPS, the contractor shall manage the maintenance of all GSE systems with MAXIMO, provide the MAXIMO interface to the Training, Tracking, and Scheduling System (TTSS) database, provide a MAXIMO capability to perform change tracking, provide a reporting capability from KSC IMS databases, and implement a Utility Outage Processing System (Reference Section 5.1.4).

6.1.5 Digital Networks and Other Communication

The contractor shall operate and maintain all intra-system communication functions within the systems for which it is responsible. Appendix 12 identifies demarcation points and physical interfaces with the KSC communication contractor.

6.1.6 Two and Three Dimensional Models and Simulations

The contractor shall provide, operate, maintain, and sustain a high-fidelity simulation and visualization capability (two dimensional and three dimensional software modeling) to address flight hardware and GSE processing, space utilization, access, and clearance concerns. The contractor shall use the models to evaluate the management of processing area floor space in the multi-flow analysis per Section 2.1.3.3; for the modeling analysis of exceptionally time critical processes such as Launch on Need (LON) mission assessments per paragraph 4.6; for selected hazardous operations; or when requested by the government.

The contractor shall update or provide new models and simulations when complex equipment moves require analysis, a new payload test setup requires evaluation, multiple payloads are sharing a processing area, new or modified facility or equipment changes have occurred, when special studies require a motion analysis, or when requested by the government. A list of existing models and simulations is provided in Appendix 15.

The contractor shall provide computer modeling, analysis, and graphics, including 2D/3D conceptual graphic images and providing 3D models for Constellation ground operations.

6.1.7 Enterprise Computing Systems

Enterprise Computing Systems are listed in Appendix 16. The contractor shall provide Payload Data Management System (PDMS) functionality to authorized organizations and personnel outside CAPPS on a 24-hours per day/7-day per week basis.

The contractor shall update the Electronic Connect/Disconnect Log (ECDL) to include all assigned flight hardware interfaces and flight-to-ground support equipment interfaces within two years of contract start.

6.2 Information Technology Security

The contractor shall comply with NPR 2810.1A, NASA's Security of Information Technology. Existing systems retained by the contractor, shall be brought into compliance. New systems shall be compliant prior to authorization to operate. The contractor shall develop, update and implement an IT Security Plan (DR-46).

The contractor shall partially implement the IT industry internet standards relating to the hardening of systems per NASA Directive for Agency Security Configuration Standards (ASCS). The ASCS benchmark standards shall be implemented on distributed desktops, distributed servers, engineering workstations, Computer Aided Design (CAD) servers, CAPPS Information Management Systems (CIMS) servers, Andover systems, and in the Electro Magnetic Laboratory (EML).

6.2.1 NASA System Administrator Information Technology Security Certification Program

The contractor shall demonstrate that system administrators and personnel with authority to perform system administrator tasks have knowledge consistent with the NASA System Administrator Security Certification. This certification consists of a two-tier assessment which verifies that systems administrators are able to:

- A. Demonstrate knowledge in system administration for the operating systems for which they have responsibility.
- B. Demonstrate knowledge in the understanding and application of Network and Internet Security.

The contractor shall make a reasonable effort to enable all system administrators to pass the applicable, NASA-designated Operating System test and Network and Internet Security test. This level of proficiency of system administrators shall be demonstrated every three years consistent with the NASA System Administrator Security Certification. The contractor is not required to maintain any new level of proficiency with their system administrators in the years between the tests.

7.0 Logistics

The contractor shall perform logistics functions in support of shuttle, Constellation, payload carrier, ELV, and ISS payloads consistent with KSC designated responsibilities.

7.1 Logistics Management and Integration

The contractor shall develop, update, and implement a Logistics Support Plan (DR-47).

The contractor shall develop and update logistics documents to include, but not limited to:

- K-SS-12.09, KSC Operational Logistics Plan
- K-SS-12.10, Logistics Capabilities Manual
- K-SS-12.11, Oversized Element Transportation On-Site KSC Logistics Plan
- K-SS-12.12, Maintenance Support Baseline (MSB)
- K-SS-12.12.1, Depot & Orbital Replacement Unit/Shop Replaceable Unit (ORU/SRU) Certification Plan
- K-SS-12.13, Logistics Management Responsibility Transfer (LMRT)
- K-SS-12.14, International Space Station Asset Tracking Plan
- K-SS-12.15, ISS KSC Logistics Fleet Resource Management (FRM) Implementation Plan
- K-SS-12.16, ISS and Space Shuttle Payloads Certification of Flight Readiness (CoFR) Logistics Plan
- K-SS-12.17, NASA KSC ISS/Payloads Receiving and Shipping Guideline
- K-SS-12.18, NASA KSC ISS Maintenance Support Equipment (MSE) Management Plan

The contractor shall participate in a weekly KSC ISS and Payload Logistics Working Group. The contractor shall participate by providing logistics project status and reports, metrics, and mission support posture.

The contractor shall provide a technical and cost assessment for LMRT requests of hardware to KSC.

7.2 Logistics Operations

7.2.1 Depot Capability

The contractor shall provide a depot capability that supports payload processing activities.

The contractor shall repair and maintain hardware and equipment listed in Appendices 2, 5A, 5B, 5C, 11, 12, 14, 16, 17 and 18. The contractor shall provide depot capabilities to flight hardware sustaining engineering organizations upon request.

The contractor shall utilize government approved and certified repair centers per SSP 50276, ISS Depot Facility and Certification Plan, for flight hardware maintenance and repair.

The contractor shall provide the capability to perform and implement depot support functions to include, but not be limited to:

- Structural, mechanical, and cable fabrication
- Fiber optics test and repair
- Proof loading
- Hydrostatic testing
- M&P services
 - Chemical sampling and analysis
 - Process engineering
 - Material engineering
 - NDE
 - Material testing
 - Contamination/cleanliness control

The contractor shall plan, implement, and manage a repetitive maintenance program for all hardware and equipment that require calibration. The contractor shall perform calibration for the items identified in Appendix 18 to support payload processing activities and payload customer requirements. The contractor shall utilize the government furnished service for calibration available through the J-BOSC contract for all other assigned hardware and equipment calibrations.

7.2.2 Material Management

The contractor shall provide a material management capability in support of payload processing activities.

This effort includes the following:

- Material Service Centers (MSC)
- Tool loan
- Bench stock
- Garment issue
- Instrument library
- Warehousing and storage
- Receiving
- Distribution and Issue
- Kitting
- Transportation and shipping
- Packing and crating
- Inventory management
- Property administration
- Procurement
- Subcontract management
- Customs coordination

7.2.2.1 Warehousing

The contractor shall utilize KSC/CCAFS assigned facilities to satisfy storage requirements prior to utilizing off-site facilities.

The contractor shall store all flight ORUs, Line Replaceable Units (LRUs), and SRUs on-site.

The contractor shall store all flight hardware in the following environmental conditions:

- Humidity greater than 30% but less than 70%
- Temperatures between 68 and 82 degrees Fahrenheit

The contractor shall segregate flight and non-flight hardware with the same master part number. Materials with batch/lot requirements shall be stored in such a manner as to prevent mixing of individual batches and lots.

The contractor shall implement the requirements for packaging and tri-annual inspection of ISS hardware in accordance with SSP 50520 (ISS Logistics and Maintenance Operational Support Concepts and Requirements).

7.2.2.2 Inventory Management

The contractor shall provide an Inventory Management System (IMS) for the tracking and management of equipment, spares, repair parts, supplies, material and shipping containers.

The IMS shall interface with the JSC ISS asset tracking and management system, GOLD.

The contractor shall utilize and affix IMS labels per the requirements identified in the SSP 50007, Space Station Inventory Management System Label Specification.

The contractor shall review NASA, government, and industry alerts such as GIDEP per KHB 5310.1, Reliability, Maintainability, and Quality Assurance Handbook. The contractor shall identify the affected hardware within the contractor's responsibility including off-site vendors and depots, perform an analysis of the problem, provide recommendations and corrective actions to the government, implement corrective actions if required and notify the government of corrective actions taken.

The contractor shall obtain from the SFOC all transducers, pyrotechnic connectors, KC fittings, buttweld fittings (KSC designed), and stainless steel tubing per KSC SPEC-Z-0007. The contractor shall provide usage-forecasting data for these items (DR-48).

The contractor shall obtain required propellants, cryogenics, fluids, gases, bulk chemicals, and commodities as a government provided service. The contractor shall provide usage-forecasting data for these items (DR-49).

7.2.2.3 Government Property

The contractor shall provide a Government Furnished Property (GFP) accountability system. Government furnished property to this contract is identified in Appendix 17.

The contractor shall transfer accountability to NASA Contract NAS15-10000 (ISS Development Contract) for any CAPPS assigned hardware launched and remaining on-orbit as part of the configured core station.

The contractor shall receive, tag, inspect, control, record, store, issue, track, and return government property and IP/P assets designated for test and return, integration, and de-integration while utilized at KSC. The contractor shall report on the location and condition of the assets when requested by the government and asset owner.

The contractor shall identify excess and obsolete assets, and initiate disposal.

The contractor shall plan and execute the disposal of the items that resulted from the termination of the Payload Carriers Program.

The contractor shall plan and execute the disposal of the Cargo Integration Test Equipment (CITE).

7.2.2.4 Fleet Resource Management

The contractor shall perform the Fleet Resource Management (FRM) function for ISS, in accordance with K-SS-12.15, ISS KSC Logistics Fleet Resource Management (FRM) Implementation Plan. The contractor may utilize the government provided FRM Asset Scheduling Tool (FAST).

7.2.2.5 Procurement

The contractor shall screen for availability through the GFP accountability system and the IMS, prior to initiating any equipment procurement.

7.2.2.6 Japan Aerospace Exploration Agency (JAXA) Hardware

The contractor shall plan, prepare, package, and transport JAXA hardware in preparation for shipment to Japan.

7.3 Logistics Engineering

The contractor shall perform logistics engineering functions for new equipment (flight hardware, GSE, and FS&E).

The contractor shall perform logistics engineering functions in support of sustaining engineering for FS&E and GSE as listed in Appendices 5A, 5B, 5C, 11, 12, 14 and 16.

The logistics engineering functions include, but are not limited to:

- Supportability engineering
- Maintenance planning
- Spares management

The contractor shall provide the logistics resources identified through the maintenance planning activity for new hardware and systems by the scheduled ORD.

The contractor shall provide spares and materials to support payload processing activities. The contractor shall procure initial spares identified through the maintenance planning activity for assigned hardware and systems.

7.4 Post Production Support Material Management

The contractor shall support the ISS Program by performing material management functions for ISS hardware and assets (flight ORU, SRU, repair parts, and associated support equipment) listed in Appendix 7. The material management function includes all responsibilities, tasks, and functions related to storage, inventory management, kitting, inventory accuracy, tagging, packaging, handling, and transportation.

The contractor shall participate in monthly ISS Program logistics reviews, via teleconference. The participation includes reporting on capabilities, backlogs, metrics, and budget associated with the Post Production Support (PPS) Material Management function.

8.0 Institutional/Support Services

8.1 Training and Certification

The contractor shall plan and implement a training and certification program for all personnel engaged in the inspection, test, checkout, and operation of assigned flight hardware, GSE, and facilities. The contractor shall provide training in accordance with K-STSM-12.05.04, KSC Ground Operations Technical Training Plan.

The contractor shall verify that all contractor personnel are knowledgeable of the laws, regulations, and the government directives concerning their tasks. The contractor is not responsible for the certification of NASA personnel.

The contractor shall maintain and update the assigned KSC area access training courses in digital format. The contractor shall review the KSC area access training course program annually to identify and develop new training courses, as required, and to ensure the content of existing training courses are accurate and complete.

The contractor shall maintain and update the following area access training courses:

- QF28IKSC, Space Station Processing Facility (SSPF) Familiarization
- QF28OKSC, Operations and Checkout (O&C) Building Familiarization
- QF223KSC, SSPF Ammonia Familiarization
- QF28MKSC, MPPF Familiarization
- QF28PKSC, PHSF Familiarization
- QF28SKSC, SAEF-2 Familiarization
- QF28VKSC, VPF Familiarization

The contractor shall provide the government access to their training schedule. The contractor shall permit attendance by government and payload customer personnel in any scheduled training, on a space-available basis.

The contractor shall enter and update training data into the KSC Training and Certification Record System (TCRS) PM50 for all personnel trained per K-STSM-12.05.04, KSC Ground Operations Technical Training Plan.

The contractor shall perform operational training of life support equipment furnished by J-BOSC. During training exercises, the contractor shall set up and operate the equipment for contractor personnel, government personnel, payload customers and payload developers.

8.2 Electromagnetic Measurement and Analysis Services

The contractor shall perform electromagnetic compatibility testing, frequency control and analysis, and associated electromagnetic measurements to satisfy the requirements of the government and their contractors in residence at the KSC/CCAFS, Patrick Air Force Base (PAFB), and outlying facilities, and to support NASA commitments as referenced in the Joint Operating and Support Agreement (JOSA), 45 SW JOP 15E/NASA-KSC 1323, Joint Operating Procedure Between 45th Space Wing And NASA-KSC For Electromagnetic Measurements and Analysis (EMA).

The contractor shall provide engineering expertise and technical support to electromagnetic laboratory activities in support of the Constellation Program (CxP).

The contractor shall provide operations, maintenance, and sustaining engineering for all systems and equipment associated with the Electromagnetic Laboratory (EML).

8.2.1 Electromagnetic Compatibility

The contractor shall perform testing and analysis of facilities, systems and equipment including:

- EMI testing and analysis
- Electromagnetic signal level investigations
- Power line transient measurements
- RF transmission line characteristics and fault detection

The contractor shall perform electromagnetic compatibility investigations consisting of:

- Susceptibility of equipment to transient environments
- Radiation levels emanating from equipment
- Susceptibility of equipment or systems to radiated fields

The contractor shall measure electromagnetic field intensities, power densities and empirically verify antenna parameters at KSC and the Eastern Range (ER) and other areas per approved requirements. The contractor shall perform tests to ensure compliance with MIL-STD-461 and applicable standards.

The contractor shall operate, maintain and reconfigure as required the Electromagnetic Analysis Mobile Platform (EAMP).

8.2.2 Frequency Control and Analysis

The contractor shall perform Frequency Control and Analysis (FCA) for KSC and the ER.

The contractor shall perform launch site RF surveillance and recording during all KSC and ER launches to ensure local RF sources do not interfere with launch operations.

The contractor shall locate, identify and resolve RFI problems affecting KSC and ELV assets on KSC and the ER.

The contractor shall certify Range Safety transponder parameters for all testing of Command Destruct systems at KSC and the ER.

The contractor shall perform radar beacon transponder parameter measurements for all launch vehicles and beacon equipped aircraft operating on KSC and the ER to insure operating parameters are within required limits prior to launch. The contractor shall provide beacon operation parameters to range radars to ensure accurate vehicle tracking.

The contractor shall perform interference analysis and impact assessments for new emitters operating at KSC and ER.

The contractor shall design, fabricate and test antenna systems including special purpose devices such as transmitters, receivers, control equipment and RF filters.

8.2.3 Re-Radiating Antenna Systems

The contractor shall maintain and operate the Re-Radiating Antenna System (RAS) for KSC and ER.

The contractor shall mount and install antennas, feed-lines and pressurization equipment. The contractor shall perform and document alignment and end-to-end verification of the RAS.

The contractor shall provide customers detailed reports on antenna gain, cable losses, test frequencies, and free space path loss between antennas.

The contractor shall maintain and update the KSC-HB-0004.0, Payload Antenna Repeater System User's Guide. The contractor shall make this guide available to all Space Shuttle and ELV payload customers for payload test planning.

8.2.4 Automated Monitoring System

The contractor shall operate and maintain the Automated Monitoring System (AMS). The contractor shall archive data and distribute to individuals experiencing RF related interference upon request.

The contractor shall provide a monitoring system with direction finding capability that is able to intercept signals that are not continuous and provides data reporting and analysis capability. The system shall be capable of monitoring in close vicinity to payloads in processing facilities and launch facility white rooms, as well as external monitoring at these sites for peak field detection.

8.2.5 Special Projects

The contractor shall provide operations, maintenance, and engineering support to special projects that require the use of equipment and techniques unique to RF and electromagnetic technology as directed by the government.

8.3 Imagery, Graphics, and Reproduction Services

8.3.1 Imagery

The contractor shall provide operational and engineering imagery for tasks required in the performance of KSC payload processing and support for on-orbit operations. Reference Appendix 19 for listing of government furnished imagery equipment.

The contractor shall perform digital imaging for ISS and other Shuttle payloads including:

- Final integration
- Final mates (except for hardware built by the ISS Prime contractor)
- MPLM rack integration and de-integration
- Shuttle integration
- Quality Assurance
- Test and verification (including CEIT)
- Manufacturing
- Non-conformances

The contractor shall store and archive all digital images. PDMS-Digital Imagery Management System (DIMS) is available for CAPPS use as part of the PDMS suite (reference Appendix 16).

8.3.1.1 Imagery Working Group Requirements

The contractor shall provide digital imagery for the following ISS processing activities (excluding International Partner processed hardware) per Imagery Working Group (IWG) Requirements including:

- GFE and payload items
- Flight hardware closeouts
- Final integration

The contractor shall provide and catalog flight hardware imagery to document ISS hardware configuration during assembly, test, integration, closeout and post-flight per Imagery Working Group (IWG) Requirements. The contractor shall provide digital video recording of flight hardware moves, lifts, shuttle integration and post-landing events.

The contractor shall participate in the IWG and prepare Pre-flight Imagery Plans for IWG approval. The contractor shall provide all ISS images to the IWG for input into the DIMS, operated and maintained by JSC.

8.3.2 Graphics and Technical Writing

The contractor shall provide graphics and technical writing in support of processing and training activities for performance of this contract.

8.3.3 Reproduction Services

The contractor shall reproduce documentation as required for payload processing activities per NPG 1490.5, NASA Procedural Guidance for Printing, Duplicating, and Copying Management and S. Pub. 101-9, No. 26, Government Printing and Binding Regulations. The contractor shall acquire, operate and maintain reproduction equipment in contractor documentation centers and report duplicating efforts (DR-50). The contractor shall reproduce classified documents, if required. The contractor shall utilize the services of an approved government printing plant in accordance with the government requirements.

8.4 Janitorial Services

The contractor shall provide clean room janitorial service in contractor operational and technical areas including, but not limited to, processing bays, off-line labs and control rooms. Clean room janitorial services shall include the cleaning of ground support equipment and checkout system racks located in the operational area at a minimum of every six months. The contractor shall maintain clean work areas per K-STSM-14.2.1, KSC Payload Facility Contamination Control Requirements Plan.

8.5 Public Affairs

The contractor shall provide technical and logistical support to NASA Public Affairs Office (PAO) when requested. The contractor shall refer any news media access requests to NASA PAO per the requirements of KMI 1301.3, Media Access.

9.0 Constellation Program

9.1 Support to KSC Constellation Ground Operations

The contractor shall provide project management support, engineering expertise and technical support to KSC Constellation Ground Operations. The work that can be broadly summarized into two categories: 1) Project Integration support and 2) Engineering support for trade studies.

Project Integration support includes, but is not limited to, the following areas: Scheduling, Database Management, Integration of Review Material, Administration, Project Planning Approaches (and documentation for the approach), Risk Management tracking, technical writing, graphics support and computer modeling (2D & 3D).

Engineering support includes, but is not limited to, the following areas: Reviewing technical documents, and assisting the KSC Constellation Ground Operations Project Office in trade studies in various areas (Facilities/GSE, Command & Control, Integrated Testing, Logistics, Transportation, S&MA, and Operations).

The contractor will not assist in requirements definition or write technical requirements of any kind for the Constellation Program.

The contractor shall provide engineering expertise and technical support to KSC Constellation Project Office (LX) Systems Engineering & Integration Division Test and Verification (T&V) activities, to include documentation planning and review, modeling and simulation tool assessments, and integrated test and verification process planning.

The contractor shall provide engineering support to the planning, definition, development, and integration of the Distributed Systems Integration Laboratory (DSIL). The contractor will lead and/or support studies, design reviews, integration forums, and development and implementation planning activities.

The contractor shall provide engineering expertise and technical support to KSC Constellation Project Office (LX) Command, Control, and Communications project, to include documentation planning and review, trade study support, coordination of work group activities, and resolution of identified technical issues and impacts.

9.2 Support to KSC Design Engineering Directorate Spacecraft and Payloads Development Project

The contractor shall provide technical support and existing engineering data for facilities, facility systems and Ground Support Equipment (GSE).

The contractor shall provide existing engineering data for facilities, facility systems and GSE to include, but not be limited to: functionality, performance, engineering drawings, condition assessment reports, operations and maintenance data, modification data, and inventory.

The contractor shall provide technical support by:

- Assisting in technical content validation of NASA internal and externally-generated documents associated with existing facilities and Ground Support Equipment (GSE).

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- Providing engineering data associated with existing facilities and Ground Support Equipment (GSE) to support the government in performing trade studies, reviews (including facility/GSE operations and resource needs) and preliminary design efforts, including but not limited to: modifications to existing facilities/GSE design, test and activation, command and control systems, integrated testing, logistics and maintenance analysis, operations analysis, and S&MA.

Performing computer modeling and analysis and graphics associated with existing facilities and Ground Support Equipment (GSE) - providing 2D/3D conceptual graphics images and 3D models of existing facilities and GSE for early concept trades as well as longer-term operational trades.

The contractor's activities under this task are limited to the provision of data with regard to existing facilities and systems currently occupied and/or utilized under the CAPPS contract.

9.3 Systems Engineering and Integration (SE&I) and Operations and Test Integration (OTI) Support to the Constellation Program

The contractor shall provide engineering expertise and technical support, and project management support to the Constellation Program (CX) Systems Engineering & Integration (SE&I) and Operations and Test Integration (OTI) organizations and shall support NASA as an industry member of NASA lead working groups*.

The contractor shall provide engineering expertise and technical support in the following areas by:

- Assisting in performing trade studies, assessments, and initial design efforts and providing assessments with respect to (but not limited to) integrated analyses, physical architecture, life cycle costs, operability, performance, and related ground processing systems and capabilities.
- Providing engineering expertise to review and recommend design concepts, formulate options for approaches, consider alternative methods, develop test and verification plans and approaches to meet ground operations objectives, and identify areas of potential risk to the program for processing systems and capabilities. Technical areas include (but not limited to):
 - Software & Avionics integrated Build Plan/Architecture Team
 - Integrated loads/structures/mechanisms/power/communications/hazard analyses/guidance navigation and control/Ares 1-X
 - Non-proprietary Integrated Computer Aided Design (CAD) Model and Assembly Drawing Tree development
 - System and subsystem development/Systems Integration Plan
 - Program Technical Integration (PTI) activities
 - Analysis of requirements development processes, tools, products, and plans and
Program Requirements and Interface Management Office (PRIMO) Team support
 - Test and Verification support for Distributed System Integration Lab (DSIL) and Ground Operations Mission Operations (GOMO) System Integration Group (SIG)
 - Flight & Interface Test Support
- Participating in CxP working groups and architecture teams as required

The contractor shall provide project management support in the following areas by:

- Supporting definition of tools and processes for large scale distributed teams. Identify and recommend requirements, tool sets and metrics to facilitate Constellation integration.
- Supporting development of margins management methods and techniques (including TPMs and MOEs).
- Identify and implement Management tracking Tools for tracking interdependencies across Constellation at all applicable NASA centers.
- Performing Risk Management functions
- Providing assistance in performing project management duties for multi-disciplined teams.

With the exception of during participation with NASA lead working groups, the contractor shall not create, furnish, analyze, evaluate, or approve engineering requirements intended for use for future competitive procurements on the Constellation Program under this statement of work.

***NASA Lead Working Groups** – Project Constellation (PC) working groups consist of participants from NASA Technical Integration Leaders, Multiple Industry and NASA PC Elements, NASA Common Components, Systems, and Computer Software Configuration Items(CSCI's), and Industry Center Support Contractors. NASA managed working groups and teams include, but are not limited to, System Integration Groups, requirements working groups, Interface Control Working Groups, Analyses, trades & architecture working groups, Modeling and Simulation (M&S) Working Groups, horizontal integration teams, Test & Verification teams, , Lunar Architecture teams, Data Architecture teams and Operations teams.

9.4 Support to the KSC ISS/Spacecraft Processing Directorate (UB) & Constellation Project Office (LX)

The contractor shall provide project management support, engineering expertise and technical support to KSC ISS/Spacecraft Processing Directorate (UB) Constellation Integration Division (UB-E).

The contractor shall provide project management support in the following areas by:

- Providing integrated Constellation Ops Level IV project schedules, processing schedules, processing flows (with associated links to Level II, III, & IV schedule products)
- Integrating review material for status reviews and providing administrative support to UB project boards and reviews
- Providing assistance in Risk Management activities—including development, analysis, and tracking of Constellation Ground Operations risks relative to CEV processing
- Project planning, approaches, and documentation, including, but not limited to: charters, plans, earned value management, and transition
- Performing Constellation Ground Operations computer modeling, graphics, and analysis for early concept trades and longer-term operational trades
- Providing database management – ensure access to various Configuration Management databases used by the Constellation Projects and KSC Development Projects, coordinate training, and interface with other centers' database POCs.

The contractor shall provide engineering expertise and technical support in the following areas by:

- Assisting in developing and reviewing internally-generated and external documents for technical content
- Assisting in performing trade studies, reviews (including task identification and resource needs) and initial design efforts, including but not limited to: facilities/GSE design, test and activation, command and control systems, integrated testing, logistics and maintenance analysis, operations analysis, and S&MA, hazards analysis, contamination control documentation and planning, and Altair planning
- Assisting in the analyses of ISS hardware for Constellation projects
- Assisting in the performance of KSC Constellation Systems logistics analyses
- Assisting in the development of the Ground Operations Planning Document
- Assisting in the review of Program, Ground Operation Project requirements documentation, and project design reviews
- Assisting in the development of concepts, plans, and designs for Orion, Altair, and Lunar Surface Systems (LSS) off line and on line processing

The contractor shall support the KSC Constellation Project Office (LX) Ground Systems Division (LX-D) by performing feasibility studies, supporting reviews, planning and performing activation and validation, and providing operational considerations to developmental projects. A representative listing of Constellation Ground Operations projects include, but are not limited to:

- Command, Control, and Communications (C&C) Record and Retrieval subsystem

The effort specified in this section 9.4 shall be subject to the restrictions of Appendix 23 only if access to NASA sensitive information is required in the performance of the effort. The contractor shall not assist in requirements definition or write technical requirements.

All data produced and delivered to the Government as part of this effort shall be in accordance with 52.227-14 , RIGHTS IN DATA –GENERAL (JUN 1987). The products produced under this effort will be made available to all interested parties.

9.5 Support to the KSC Constellation Project Office (LX) – Design for Operability

The contractor shall provide engineering expertise and technical support to the KSC Constellation Project Office (LX) with the specific objective of incorporating operability into the designs and processes in order to reduce the Constellation Program Life-Cycle Costs (LCC).

Tasks

1. The Contractor shall attend design meetings/reviews for the purpose of providing operational expertise to flight and ground hardware/software designs and evolving concepts. Comments and adjustments should include any associated Life-Cycle Costs (LCC) impacts. All comments will be submitted to NASA for the use of the Constellation Ground Ops (LX) project for consideration and possible incorporation into the Constellation OEM designs and Ground Ops project planning and development products. The contractor shall also attend technical interchange meetings and Program and Project milestone reviews.
2. The Contractor shall assess the Government's plans to ensure a balance of cost, schedule and risk between Constellation flight hardware/software design and ground infrastructure and resources needed to accomplish the ground operations functions. These operational assessments/studies will produce an "operational view" that describes how the system products serve the operators/end users. The Contractor shall provide recommendations for life-cycle operation and support requirements for the Constellation architecture. These operational assessments shall be used by NASA to determine how best to enhance Constellation design operability, provide operational support, determine under what environmental conditions the system products may be used, and how well they may perform under anticipated conditions. These shall include plans for and assessments of OEM deliverables necessary for cost effective operations, including "fair (normal) wear and tear" specifications, qualification and certification test results and reports, operations and maintenance requirements specifications, and launch commit criteria.
3. The Contractor shall provide technical recommendations in the development of the system offline and integrated testing approach, provide operational technical expertise during the Ground Operations reviews, and provide work force resource loading estimates for the purpose of LCC analyses for ground operations activities involving flight and ground hardware and software.

The contractor shall provide monthly activity reports and trade study reports.

9.5.1 Support to the KSC Constellation Project Office (LX) – Design for Operability - Ares Launch Vehicle Preliminary Design Review (PDR) Support

The contractor shall provide ground processing operations engineering analysis and technical support to the Ares launch vehicle Preliminary Design Reviews.

9.5.2 Support to the KSC Constellation Project Office (LX) – Design for Operability - Integrated Work Control System (IWCS) Study Support

The contractor shall provide engineering analysis and technical support to the Integrated Work Control System (IWCS) Study to include definition of data requirements and data access; identification and evaluation of data certification tools; description of data management processes; and evaluation of data exchange capabilities.

9.5.3 Support to the KSC Constellation Project Office (LX) – Design for Operability - Operational Support Element (OSE) Support

The contractor shall provide engineering and technical support to the Operational Support Element activity to include document reviews, recommendations for planning documentation, insight into potential logistics development and architecture concepts, and providing approach and strategy recommendations to the KSC Constellation Project Office Logistics Division (LX-L).

The effort specified in this section 9.5 shall not be subject to the restrictions of Appendix 23. This effort contains no risk of potential OCI issues due to the government's decision to involve multiple contractors, make all products produced and delivered to the government as part of this effort available to all interested parties well in advance of any affected future acquisitions in an effort to facilitate full and open competition of future Constellation activities.

9.6 Support to KSC Constellation Project Office Logistics Division (LX-L)

The contractor shall provide engineering expertise and technical support to the KSC Constellation Project Office Logistics Division (LX-L) to include documentation planning and review; trade studies; operational support element (OSE) planning, recommendations, and concepts; analysis of warehouse utilization, legacy logistics systems, and logistics support analyses (LSAs).