ATTACHMENT J-1

STATEMENT OF WORK

FOR THE

**CHECKOUT, ASSEMBLY AND PAYLOAD PROCESSING SERVICES (CAPPS)
CONTRACT**

Table of Contents

List of Figures/Tables

Modification 173

<u>**CAPPS STATEMENT OF WORK**</u>

1.0 Contract Overview

The contractor shall perform spacecraft/payload checkout, assembly, integration and processing activities for International Space Station (ISS), Shuttle, Constellation, and Expendable Launch Vehicle (ELV) payloads consistent with Kennedy Space Center (KSC) designated responsibilities.

The contractor shall perform these responsibilities including program management; design, sustaining engineering, operation and maintenance of assigned flight, facilities and ground systems; information technology; logistics; and institutional support in the most cost-effective and efficient manner while supporting the government's top priorities for safety, mission success, and payload customer satisfaction.

The contractor shall perform all the necessary program management including technical and business functions to plan, implement, track, report, and deliver the required products and services described in this Statement of Work (SOW). The contractor shall provide all personnel and other resources, except as otherwise specified in the contract, necessary to accomplish these functions. The contractor shall affect these management functions while maintaining flexibility and responsiveness to changing requirements.

The contractor shall implement a comprehensive safety and mission assurance program that emphasizes safety, health, and environmental stewardship in accordance with the NASA Safety Hierarchy.

The contemplation of the parties to this contract is that the contractor shall have a broad mission in performing payload processing related functions for the government and designees. Therefore, the general scope of the contract covers any payload processing service or related activities arising from the SOW in support of human exploration and development of space and earth and space science exploration.

Modification 215

2.0 Program Management

The contractor shall develop, update and implement a Program Management Plan (DR-1) to provide the programmatic services encompassing operational, business, budgetary, risk, and schedule planning for program related functions.

The contractor shall integrate program and project requirements and policies at all locations required to support this contract.

The contractor's program management approach shall include the establishment of work plans that integrate cost, schedule and technical baselines. The contractor shall implement project controls for managing changes to the integrated cost, schedule and technical work plans.

The contractor shall provide the government unrestricted access to all data generated in the performance of this contract.

The contractor shall ensure that all contractor personnel are trained and certified for assigned tasks prior to performing tasks within functional work areas.

2.1 Program Control

The contractor shall perform program management including:

- Developing and implementing payload processing policy and planning consistent with agency, program and center directives, policies, and operating procedures
- Assessing cost, schedule and technical risk
- Assessing and reporting performance to plan
- Integrating safety, reliability, maintainability, mission assurance and engineering
- Maintaining configuration control of assigned hardware, ground systems, and software
- Identifying and implementing continuous improvements to key processes
- Managing developmental efforts to meet technical, cost, and schedule requirements
- Establishing a process for developing, updating and tracking Memoranda of Understanding (MOUs) and Memoranda of Agreement (MOAs) with other KSC contractors
- Planning, participating and hosting program reviews, workshops, and presentations
- Preparing payload questionnaires, handbooks, and reference libraries for customer education and outreach
- Implementing a customer advocacy program
- Developing and tracking metrics and other data to measure the overall progress and work content of payload processing
- Coordinating lessons learned and implementing resultant findings
- Perform project planning, and documentation of technical approaches, including but not limited to charters, plans, earned value management and transition related to NASA's Constellation program.

Currently, there are standardized plans, practices, procedures, understandings and agreements jointly developed and used by the current contractor, government personnel, payload customers and other KSC contractors. While this is a performance-based contract, there are required critical plans, procedures and practices essential to safety and mission success that must be initially followed while the contractor develops their own plans, procedures and practices. These critical plans, procedures and practices are documented within the Launch Site Support

Plans (LSSP), Standard Practices and Procedures (SPPs), MOUs/MOAs, and Operations and Policy Directives (OPDs). The contractor should analyze the plans, processes and procedures to identify safe alternative methods and improvements, model revised practices and procedures, and propose revisions to these documents. Revisions will reflect the contractor's best judgment and strategy for mission success.

Some MOUs/MOAs refer to contractors no longer working at KSC such as EG&G, Lockheed Space Operations Company (LSOC), and McDonnell Douglas Space Systems Company (MDSSC). Nevertheless, the intent of these MOUs is still being honored by the present Joint-Base Operations Service Contractor (J-BOSC), Space Gateway Support (SGS) and the Space Flight Operations Contractor (SFOC), United Space Alliance (USA). References to EG&G should be interpreted as SGS, LSOC as USA and MDSSC as The Boeing Company Payload Ground Operations Contract. NASA will provide new civil service points of contact for NASA organizations in the referenced documents.

The contractor shall comply with existing LSSPs, SPPs, Standard Repair Procedures (SRPs), OPDs, Safety Variances, Ground Safety Review Panel (GSRP) approved payload ground safety packages, and MOUs/MOAs until completed, modified or cancelled. The contractor shall obtain NASA approval for modifications or cancellations to the above listed documents. MOUs/MOAs between the contractor and other KSC contractors do not require NASA approval. The contractor shall revise all existing SPPs, SRPs, MOUs, and MOAs to reflect their own strategies for mission success and to correct KSC contractor and government organizations within one year of contract start. The contractor shall develop, update and implement newly required plans, processes and procedures.

2.1.1 Risk Management

The contractor shall develop, update and implement a Risk Management Plan (DR-2). The contractor shall develop and implement a management approach for identification, analysis, planning, tracking, controlling, documenting and communicating risks associated with:

- Human space flight safety issues
- Mission success criteria
- Problem resolution
- Developmental projects
- Budget limits
- Launch window and vehicle/carrier availability
- Security or environmental concerns
- "Fail ops/fail safe" requirements
- Technology readiness
- Oversight requirements
- Amount and type of testing
- Constellation Ground Operations

The contractor shall provide risk assessments (DR-3) for each identified risk requiring government attention.

2.1.2 Customer Advocacy

The government will make formal commitments and agreements with KSC's external customers. External customers of KSC include International Partner/Participant (IP/P), NASA

contractors, commercial entities, payload developers, other NASA centers and government agencies.

The contractor shall provide customer management support to the government for ISS and shuttle payload customers. The support includes, but is not limited to, conducting internal KSC planning meetings, assisting customers in defining launch site requirements, documenting launch site requirements, developing the LSSPs, maintaining documentation libraries for design package reviews, and providing project management, logistics and technical support to Ground Operations Working Groups (GOWGs)/Technical Interchange Meetings (TIMs). The contractor shall assess payload customer requirements internal to KSC and provide capability assessments to the government.

The contractor shall participate in the NASA customer survey process for all external payload customers by providing regular inputs to and maintenance of the Payload Customer Survey (PCS) database to collect NASA survey results, assisting in identifying customers, and participating in the response screening panel.

2.1.3 Work Control & Scheduling

2.1.3.1 Payload Integrated Planning and Scheduling

The contractor shall develop, implement, update, and maintain a work control process to include planning, scheduling, executing, monitoring and improving payload processing activities. The process shall integrate the activities of the CAPPS contractor, NASA Utilization, payload customers, other KSC contractors, and the ISS, Space Shuttle Program (SSP), Constellation projects, and ELV program. The contractor's work control process shall integrate processing activities across all areas of the SOW to optimize resources. The contractor's work control process shall respond to schedule and requirement changes and provide daily performance-to-plan status. The contractor shall provide integrated Constellation level IV operations scheduling support to projects as identified by NASA.

The contractor shall implement an integrated scheduling system to identify high level milestones, mission processing activities, detailed processing activities, and deliverable milestones (DR-5). The scheduling system shall:

- Provide the capability to integrate KSC data and milestones into ISS and Space Shuttle, and Constellation program milestone scheduling systems. For ISS payloads and elements, the contractor shall input the data into the International Space Station Program's (ISSP) Common Schedules Database (CSD) per the Integrated Schedule Planning Process Document (ISPPD) (DR-6) and participate in the ISSP-wide Schedule Management and Resource Team (SMaRT). For non-ISS shuttle payloads, the contractor shall input data into the space shuttle's Flight Assignment Menu Operating System (FAMOS) file servers per JSC 25677, FAMOS Interface Control Document (DR-6) and support the monthly Johnson Space Center (JSC)-SSP Scheduling Systems Working Group.
- Identify the critical path for each mission for management by the contractor
- Be electronically accessible to multiple government, payload customers and other contractor users.

The contractor shall integrate payload customer activities with all contractor activities when they include:

Modification 215

- Hazardous processing activities
- Impacts to any other payload processing activity
- Resources such as KSC personnel, Ground Support Equipment (GSE), and other services
- Milestone activities that affect integrated operations or other payloads/missions

The contractor shall schedule activities including, but not limited to:

- Work Authorization Documents (WADs) to be implemented
- Personnel required for each activity
- Parts required to implement the task
- Handling and testing equipment
- Crane operations and maintenance
- Facility and GSE maintenance tasks that impact operations
- Communications support
- Consumables required from other contractors
- Non-Destructive Evaluation (NDE), sampling and support required from the CAPPS contractor or other organizations and contractors
- Heavy equipment
- Door operations support
- Concurrent hazardous activities
- Photography and imagery

The contractor shall identify and resolve all resource conflicts and constraints including:

- Technicians, quality, safety and engineering personnel
- WADs ready to be worked
- Logistics support (all parts kitted and ready to support scheduled job)
- Handling and testing equipment
- Facility outages
- Facility maintenance tasks affecting operations (including cranes)
- GSE maintenance tasks
- Overhead crane usage
- Support (personnel, consumables, equipment) required from other organizations and contractors
- Electromagnetic Interference (EMI) incompatibilities (conflicts with powered-up testing and ordnance)
- Hazardous operations
- Testing operations

The contractor shall integrate and coordinate payload processing activities with the SFOC contractor for Shuttle integration.

The contractor shall record and analyze as-run scheduling data for all daily processing activities and maintain historical data to develop and implement lessons-learned for process improvements.

The contractor shall report performance-to-plan at the government weekly management operations meeting. The report shall address any recent anomalies; upcoming payload

Modification 173

customer support issues, concerns and operations; facility and GSE utilization concerns; budget status; and any new development or modifications activities. The contractor shall provide minutes and track and maintain an action item log.

2.1.3.2 Operations Desk

The contractor shall provide an operations desk in the Space Station Processing Facility (SSPF) and Operations & Checkout (O&C) building highbays to support payload processing activities.

The operations desk shall:

- Provide a single point of contact for critical activities and emergency response issues
- Track and provide progress of processing area activities to the government and payload customers
- Coordinate real-time processing requirements and resolve conflicts with priorities and resources
- Notify appropriate government and payload customer representatives of flight hardware, GSE, and facility issues and problems

2.1.3.3 Multi-flow and Manifest Assessments

The contractor shall perform manifest assessments including resource utilization for government provided Shuttle and ELV manifests and ISS assembly sequences. At a minimum, after every major Shuttle manifest baseline and assembly sequence revision, the contractor shall produce long-range (through the end of the manifest) and short-term (the next 12 months) multi-mission planning assessments (DR-8) per KDP-P-1069, Payload Multi-flow Assessment (MFA) Development showing resource utilization (floor space, GSE, work stands, test equipment, and other resources). The contractor shall coordinate element and mission unique facility utilization requirements. The unique facility requirements include, but are not limited to, crane lifts, GSE layout, floor space allocation, and hardware arrival and departure dates. The contractor shall assign the resources, recommend facility assignments (the government will make final facility assignment decision) and produce an assessment reflecting the resource allocation. The contractor shall identify resource conflicts, recommend options for resolution, and implement and coordinate the solutions.

The contractor shall produce a report using three-dimensional and two-dimensional models of the flight hardware, processing areas and GSE, in the Payload Processing Facilities (PPFs), including the SSPF and O&C. The report will show the two and three-dimensional views of the layout of flight hardware and ground support equipment in all of the facility test areas of the SSPF and O&C (DR-8).

2.1.3.4 Work Shift Guidelines

The contractor shall comply with KNPR 8715.3, KSC Safety Practices Procedural Requirements for maximum work time rules and plan for the shifting guidelines shown in Table 2-1.

Table 2-1 Work Shift Guidelines

Function	8-Hr Shifts / day	Days / Week	Surge Capability
Payload customer operations support **	1st shift, 2nd shift	Monday-Friday	On-call
Launch site services supporting payload customer operations **	1st shift	Monday-Friday	2 shifts, 6 days
Payload operations at Shuttle facilities (Orbiter Processing Facility [OPF], Payload Changeout Room [PCR], Landings)	1st shift, 2nd shift	Monday-Friday	Possible weekends and holidays per shuttle scheduling.
Active Multi Purpose Logistics Module (MPLM) Pre-launch and Post-landing Refrigerator/ Freezer support	24 Hours	7	
Contractor-led payload processing	Contractor propose	Contractor propose	Contractor propose
Contractor-led integrated testing	Contractor propose	Contractor propose	Contractor propose
NASA-led Utilization testing	1st shift	Monday-Friday	24 hours x 5 days
NASA-led Multi-Element Integrated Test (MEIT)	Extended 1st shift (12 hours)	7	24 hours x 7 days
NASA-led Integrated Systems Test (IST)	Extended 1st shift (12 hours)	Monday-Friday	24 hours x 7 days

*All shifting is nominal and may change to meet new requirements and schedules
** The contractor shall support extended processing of requirements for Mars Exploration Rover (MER) A and B from April through July 2003.

2.1.4 Configuration Management

The contractor shall develop, update and implement a Configuration Management Plan (DR-9) for assigned hardware listed in Appendices 2, 5A, 5B, 11, 12, 13, 14, and 16. Hardware and software will be added and deleted from the contractor's assigned responsibilities based on changes to the Appendix 4 manifest and ground system requirements.

The contractor shall identify and integrate ISS, Shuttle, Constellation, and ELV impacts for government approval, including quick turnaround Rough Order of Magnitude (ROM) cost estimates, for new initiatives and design, schedule and requirement changes at the request of Program Review, Control Board, Panel, Working Group and Team Chairs. The contractor shall integrate review material for status reviews and provide support to UB project boards (e.g. UB Level III and IV Control Boards, CCBs, SRRs, PDRs/CDRs, etc.) including presentation development support, administrative support, setting up meetings, accumulating and distributing minutes and tracking action items. These changes include but are not limited to:

- Interface Control Document (ICD) Preliminary Interface Revision Notices (PIRNs) and Interface Revision Notice (IRNs)
- Engineering Change Request (ECRs)
- Engineering Change Proposal (ECPs)
- Engineering Support Request (ESRs)
- Field Engineering Changes (FECs)
- Logistics Management Responsibility Transfers (LMRT)
- Software Change Notices (SCNs)
- Launch Commit Criteria (LCC) Change Notices (LCNs)
- Shuttle Operations and Maintenance Requirement Specification (OMRS) Requirements Change Notices (RCNs)
- ISS Assembly, Checkout, Operations Maintenance and Configuration (ACOMC) changes
- Space Shuttle Program and Project Change Requests (CRs) and Special Requests (Chits)
- ISS CRs and Chits
- Constellation SRRs, SDRs, PDRs, and CDRs

The contractor shall operate a Configuration Management Receipt Desk that includes:

- A single point of contact for payload processing to various other Configuration Management (CM) Receipt Desks operated by the government, IP/Ps, and other contractors and payload customers
- Dissemination of meeting notices, agendas and CR packages to government, contractor and payload customer personnel at KSC (including notification of Utilization and shuttle personnel of ISS activities)
- Requesting impacts and comments to CR packages from government, contractors and payload customers
- Maintaining a log of changes requiring KSC action including: responsible lead organization, inputs due to and received from, and closed items
- Consolidation of the impacts and comments from NASA and contractor to CR packages
- Transmittal of the government-approved impacts and comments back to the controlling program CM Receipt Desk
- Generating and maintaining evaluation forms for each applicable change as coordinated with the designated government KSC CM representative

The contractor shall manage and operate a Configuration Control Board (CCB) for the formal disposition of GSE and facility ESRs and other engineering change documentation for contractor-sustained hardware and software. The contractor shall coordinate the disposition of ESRs and Facilities and GSE studies with the appropriate contractor's CCB including, but not limited to, the ISS Development Contractor, SFOC, J-BOSC, Expendable Launch Vehicle Integrated Support (ELVIS), and Consolidated Space Operations Contract (CSOC) when an ESR, study or engineering change will require action by another contractor.

The contractor shall update, maintain and operate an on-line cross-reference between the As Built and ISS Inventory Management System (IMS) to provide content and location information of installed hardware.

2.1.5 Data Management

The contractor shall develop, update and implement a Data Management Plan (DR-10), which provides for the management, preparation, publication, control, and distribution of data generated during the performance of this contract in compliance with NPD 1440.6, NASA Records Management. The contractor shall develop and maintain data repositories to support contract requirements including Data Requirements Document (DRD)/Data Requirements List (DRL) related products. The contractor shall provide for the handling and control of payload customer and proprietary data and software. The contractor shall provide a Data Accession List of documents produced and maintained for this contract.

The contractor shall maintain existing documentation and provide the library functions to catalogue, store (hardcopy and electronic), maintain and provide access to the ISS, Utilization Payloads, and Payload Carrier Acceptance Data Packages (ADPs) and closeout photos.

The contractor shall maintain and operate a repository for engineering documentation that includes a formal release system. The contractor's repository and release system shall include basic engineering drawings and all released revisions, for contractor drawings, vendor drawings, shop drawings and WADs.

Alenia will provide the library functions for the MPLM engineering drawings required to support processing. The contractor shall provide the library functions for the Node 2 engineering drawings required to support processing.

The contractor shall provide systems and integration engineering support to the KSC Engineering Directorate (NE) and Constellation Program for design data management system architecture development.

Modification 317

2.1.6 Work Authorization Documentation

The contractor shall develop, update and implement a WAD process that controls all work performed on flight hardware and software, facilities, facilities systems, GSE hardware and software. The contractor's process shall comply with KNPR 8715.3, KSC Safety Practices Procedural Requirements, and KDP-P-1064, Work Authorization Document (WAD) Implementation. The contractor's process shall perform configuration control of WADs, to include WAD publication, revision, and release. The WADs shall provide detailed instructions for all activities, identify hazardous activities and establish controls, track as built configuration, and verify all approved requirements are satisfied.

The contractor shall provide an upgraded Manufacturing Execution System (MES) for Work Authorization Document (WAD) authoring, WAD execution and noncorformance management to be compatible with current database management systems and operating systems.

2.1.7 Requirements for Payload Processing

The contractor shall conduct payload processing activities in accordance with government approved requirement systems.

The current payload requirement systems are:

- OMRS per NSTS 08171
- ACOMC
- Payload Requirements Document/Payload Support Plan (PRD/PSP)
- Operations Requirements/Operations Directives (OR/OD)
- Shuttle LCC per NSTS 16007
- Time-critical Ground Handling Requirements (TGHR)
- ISS or Shuttle Special Request (Chits)
- Limited Operational Life Items (LOLI) and Time/Cycle requirements
- Repeatable Maintenance Recall System (RMRS)
- Design specifications, drawings and released engineering documents

2.1.8 Closed Loop Requirement Traceability Process

The contractor shall maintain, update and operate a closed loop requirements traceability process for assigned hardware, software, and facilities and for NASA-led activities. The contractor shall:

- Identify requirements applicable to the assigned missions for implementation
- Incorporate applicable requirements into mission planning documentation including WAD, facility utilization schedules and plans, and coordination with other KSC contractors
- Perform applicable tasks associated with satisfying the requirements
- Verify the requirements are satisfied from implementation documentation to requirement source following WAD execution
- Prepare, process and present waivers and exceptions for requirements that can not or will not be met for approval by the source authority

The contractor shall provide measures of performance to plan, waivers and exceptions to requirements in preparation for test readiness reviews and major milestone reviews including,

but not limited to, flight hardware closeouts, payload bay door closure for flight and Certification of Flight Readiness (CoFR) reviews. Upon satisfactory completion of processing activities, the

contractor shall provide requirement closure reports to the requirement source authorities and the government.

2.1.9 Export Control

The contractor shall develop, update and implement an Export Control Plan (DR-11). The contractor shall identify an Export Control Plan Focal Point to the Center Export Control Working Group (ECWG) Administrator that will be the contractor's representative to support the KSC ECWG. The contractor shall apply for all required export licenses within 30 days of contract start.

2.1.10 Program Boards and Reviews

The contractor shall provide technical support to program boards, panels, teams, working groups, and reviews listed below:

- Certificate of Flight Readiness Reviews
- Program Requirement Control Boards
- Project, Vehicle, Element, Operations, Test & Verification Control Boards/Panels
- Integrated Test Requirements Group (ITRG)
- ISS Hardware Utilization Board (HUB)
- Payloads Operations Requirements Review (PORR)
- System Requirement Reviews
- Preliminary and Critical Design Reviews
- SSP Reinvention Process Integration Team (RPIT)
- Design Certification Reviews
- Ground Operations Reviews (GORs)
- Cargo Integration Reviews (CIRs)
- Payload Ground Safety Review Panel (Shuttle/Station/ELV)
- Pre-ship Reviews and Acceptance Review Boards
- In-Flight and Ground Anomaly Resolution Teams/Problem Resolution Teams
- Functional and Physical Configuration Audits
- Budget Review Teams
- Materials and Processes (M&P), Electromagnetic Compatibility (EMC)/EMI, Manifest, Launch Countdown and other Working Groups (WGs)
- Subsystem and Functional Group TIMs
- Crew Briefings
- Test Readiness Reviews
- Safety and Mission Assurance (S&MA) Analysis and Integration Team (AIT)
- KSC Institutional Reviews and Boards
- Government Weekly Operations Meeting
- Constellation Reviews and Boards

The contractor shall provide services, as described in Table 2-2, Review Support Matrix, to various program reviews, control boards and panels, WGs, TIMs, ad hoc or special issue teams, and all internal, payload customer and government readiness reviews leading up to the formal review or board meeting.

Table 2-2 Review Support Matrix

	Conference Rooms and Telecon Services	Agenda and schedule	Presen-tation material	Action items	Meeting minutes	Functional Support	Freq of Meeting *
ISS Material and Engineering Review Board	S, T	S, De, Di, R	C, Di, R	A, Di	G, Di	Rc, E	Daily
Ground Safety Review Panel	S, T	Di, R	Di, R	A, Di	G, Di	Rc, E	Per Mission
S & MA AIT	S, T	S, De, Di, R		A	G, Di	Rc, E	Weekly
ISS Support Equipment Control Board	S, T	S, De, Di, R	C, Di, R	A, Di	G, Di	Rc, E	Weekly
Ground Operations Review	S, T	S, De, Di, R	C, Di, R	A, Di	G, Di	Rc, E	Per Mission
Payload Certificate of Flight Readiness Reviews	S, T	S, De, Di, R	C, Di, R	A, Di	G, Di	Rc, E	Per Mission
KSC Ground Support Equipment and Facility Control Boards	S, T	S, De, Di, R	C, Di, R	A, Di	G, Di	Rc, E	Monthly
Program Control Boards/Panel, Working Groups and TIMs hosted by KSC	S, T	S, De, Di, R	C, Di, R	A, Di	G, Di	Rc, E	Quarter-ly
Space Station and Space Shuttle Program Control Boards	S, T	Di, R	R			E	Weekly
Daily Space Station Review/Felicity	S, T	Di, R	R			E	Daily/ Weekly
ISS Vehicle/ Avionics Software/Program Integration/Mission Integration and Operations Control Board	S, T	Di, R	R			E	Weekly
ISS Vehicle Systems Integration/Test and Verification Control Panel	S, T	Di, R	R			E	Weekly
Multiflow/Space Allocation Team (M/SAT)	S, T	Di, R	C, Di, R	A, Di	Di	E	Weekly
SSP Flight Template Working Group	S, T	Di, R	R	A, Di	Di	E	Weekly

Legend:
A = Action Item Tracking through Closure
C = Consolidation of meeting presentation inputs
into a single agenda based package
De = Development
Di = Distribute
E = Engineering support to present and discuss agenda items

G = Generate and gain approval
R = Reproduction Services
Rc = Recorder Support to formal reviews
S = Schedule
T = Teleconference and Videoconference Support: Schedule, Initiate and Answer

* Frequency of Meeting is approximate and the meetings will be scheduled at the convenience of the Chairs. The meeting schedules and agendas are posted on the respective meeting home page.

2.1.11 Flight Readiness

The contractor shall develop, update and implement a CoFR Plan (DR-12) that demonstrates compliance with NSTS 08117, Requirements and Procedures for Certification of Flight Readiness, and SSP 50108, Certification of Flight Readiness for Space Station. The contractor shall develop and implement an auditable approach to verify and ensure that flight preparation responsibilities and requirements are met and all problems dispositioned. This approach shall

Modification 317

include open item reviews, test readiness reviews, post-test deconfiguration reviews, Payload Endorsement Reviews, Flight Readiness Reviews (FRRs), Prelaunch Mission Management Team (MMT) Reviews, pre-test briefings, and presentation of an integrated CoFR endorsement. The contractor shall prepare and endorse the CoFR in accordance with K-SS-10.5, Kennedy Space Center Payload Processing Certification of Flight Readiness Implementation Plan.

2.1.12 Continuous Improvement

The contractor shall develop, update and implement a Continuous Improvement (CI) Plan (DR-13).

The contractor shall serve as a member of the SSP Flight Production and Templates (JSC 25187) working group and Space Station and Shuttle improvement teams including, but not limited to, JSC SSP RPIT. Current RPIT studies include the Cargo Support System/Cargo PC (CSS/CPC), Load and Go, Payload Ops Support Team (POST), Payload Integration Tool (PIT), payload data products, Cargo Avionics Upgrade (CAU), Avionics Instrumentation Systems (AIS), Pulse Code Modulation Master Unit (PCMMU) upgrade and a Shared Data Repository (SDR).

2.1.13 International Organization for Standardization (ISO) 9001 Compliance

The contractor shall be certified to the requirements of American National Standards Institute (ANSI)/ISO/American Society For Quality (ASQ) Q9001-2000, American National Standard, Quality Management Systems (QMS) – Requirements, and Society of Automotive Engineers (SAE) AS9100, Quality Systems – Aerospace – Model for Quality Assurance in Design, Development, Production, Installation and Servicing by a registrar accredited by the Registrar Accreditation Board (RAB) within 18 months of the effective date of the contract. In the event the contractor's ISO 9001 certification is revoked, the contractor shall notify NASA within five business days. The contractor shall obtain government approval of the scope of certification.

2.1.14 Security

The contractor shall operate a security program in accordance with governing NASA and Department of Defense (DOD) directives. The contractor shall implement payload specific security requirements in support of payload processing operations. The contractor shall develop, update and implement a Security Plan (DR-14).

2.1.15 Emergency Preparedness

The contractor shall develop, update and implement an Emergency Preparedness Plan (DR-15) in compliance with JHB 2000, Consolidated Comprehensive Emergency Management Plan and JDP-KSC-P-3014, Generic Emergency Procedures Document. The plan shall include the contractor's assigned flight hardware, facilities, systems, equipment and operations. The contractor shall plan for and participate in drills and implement their Emergency Preparedness Plan for declared emergencies.

2.2 Business Management

The contractor shall perform all business and administrative functions and integrate these functions across all areas of performance. The contractor shall provide ongoing business

analysis and respond to requests and inquiries from the government relating to budget, schedule, and cost performance. The contractor shall implement, maintain, and update a contract financial system which discretely tracks resources by fund source, mission and project Work Breakdown Structure (WBS) and elements of cost including, but not limited to, labor, overhead, other direct cost, indirect cost, and intra-company work authorizations. The contractor shall develop, update, and maintain a WBS Dictionary (DR-16).

2.2.1 Financial Management

The contractor shall develop, update and implement a financial management process in compliance with Federal Acquisition Regulation (FAR) and NASA FAR Supplement (NFS) financial management policies. The contractor shall provide monthly and quarterly accumulated expenditures and projections of program costs and workforce utilization in accordance with Contract Financial Management Reports (DR-17). The contractor shall manage this contract in a manner that ensures all activities required by this SOW are properly accomplished and accounted for in accordance with all applicable NASA/Federal Government procedures and regulations and guidance provided in DR-17. The contractor shall manage contract resources to maintain the required flexibility to respond to surge, one-of-a-kind, and unforeseen requirements, and shall coordinate with the NASA business office to prioritize such requirements. The contractor shall develop, recommend and implement innovative approaches consistent with government regulations that support and expedite the contract change process.

The contractor shall establish a contract resource management system that will provide the government visibility of cost, schedule, and technical performance for the total contract work activity traceable by Unique Project Numbers (UPN), fund sources to discrete missions, projects and facility utilization. The contractor shall develop and submit, consistent with government budget schedules, financial planning as required to support the government budget process, i.e., multi-year Program Operating Plan (POP) calls, annual operating plan calls, Construction of Facility (CoF) calls, Information Technology (IT) budget calls, Task Agreements, and to support special requests for budget impacts. The format and content of the contractor's inputs and supporting rationale shall be in accordance with the budget or special request guidelines, and formats specified by the government. Based on near- and long-term mission requirements projections provided by NASA, the contractor shall establish, maintain and update an advanced planning tool that identifies resources needed to satisfy these projected mission requirements.

With the termination of the Payload Carrier Program (PCP) and the reallocation of PCP assets to other programs, the contractor shall modify the contract resource management system to provide the government with visibility of cost, schedule, and technical performance traceable by UPNs for the receiving customer programs, i.e., the Expendable Launch Vehicle (ELV) a.k.a. Launch Services Program (LSP), the Shuttle Transportation System (STS), the Department of Defense (DOD), and the KSC Institution. These cost tracking and reporting requirements increased the business management support for activities such as Monthly Business Reviews, 533 financial reporting, and POP budget cycle products.

The contractor shall conduct monthly performance-to-plan reviews to provide the government with insight into the contractor's, subcontractors' and vendors' overall progress. The contractor's planning, tracking and reporting shall include the integration of cost, technical performance, workforce and schedule data for mission processing, facility and support equipment operations and maintenance, facility and support equipment sustaining engineering, launch support/mission operations, logistics operations, energy utilization and consumption, on-

site and off-site headcounts, information technology, any new work requirements, Indefinite Delivery/Indefinite Quantity (IDIQ) tasks, and geographic economic impacts. For any task, activity or project that the contractor has responsibility for that is estimated to exceed predetermined established cost or schedule plans, the contractor shall provide a recovery plan.

2.2.2 Subcontract Management

The contractor shall accomplish the management and technical control of intra-company, subcontractor, and major vendor activities required to fulfill the contract. The contractor shall be accountable for the quality and timeliness of the goods and services that are subcontracted out within the scope of this contract.

The contractor shall provide visibility for the government into all aspects of intra-company, subcontractors, and major vendor activities and shall integrate subcontractor management systems with other required management systems and reporting requirements of the prime contractor. The contractor shall provide performance to plan reports that provide status of progress and performance measurement.

The contractor shall submit procurement documents in accordance with KNPR 8720.1, to the designated government quality representative for determination of the need for Government Source Inspection (GSI) prior to release of the procurement. The contractor shall include the following statement on all procurements that require GSI, "The government has the right to inspect any or all of the work included in this order at the supplier's plant."

2.3 International Travel

The contractor shall coordinate with the government, in advance, all travel to locations outside of the United States by Contractor employees to determine that travel is necessary to the efforts required under the contract and it is otherwise in the best interest of NASA.

3.0 Safety, Mission Assurance, Occupational Safety and Health, and Environmental Compliance

3.0.1 The NASA Safety Hierarchy

The Agency Safety Initiative establishes the NASA safety hierarchy – the order NASA will use to prioritize its safety efforts. The safety hierarchy is:

First, **safety for the public**. NASA absolutely must protect the public from harm.

Second, **safety for astronauts and pilots**, because they expose themselves to risk in high hazard flight regimes.

Third, **safety for NASA workforce**, because NASA owes it to the workforce to provide them with a safe and healthful workplace.

Fourth, **safety for high-value equipment and property**, because NASA is a steward of the public's trust.

By focusing on the safety of NASA's mission and operations, NASA will improve quality and decrease cost and schedule.

3.0.2 Integrated Safety, Health and Mission Assurance Plan

The contractor shall develop, update and implement an Integrated Safety, Health and Mission Assurance (ISH&MA) plan (DR-18). The contractor shall implement and satisfy the Safety and Mission Assurance tasks, activities and requirements in NPD 8700.1, NASA Policy for Safety and Mission Success.

3.1 Safety

The contractor shall establish and implement a safety program that provides protection from injury or damage due to the contractor's operations, to members of the general public, personnel, facilities, systems and equipment. The safety program shall comply with federal regulations, NASA and KSC requirements. The contractor shall develop auditable processes to document this program and its associated activities.

The contractor shall reassess and validate all approved safety variances that affect contractor operations. The contractor shall resubmit all validated and contractor approved safety variances to government safety for re-approval within 30 days of contract start.

3.1.1 Payload Ground Safety

The contractor shall participate, as a non-voting member, in the NASA Payload Ground Safety Review process. Participation includes, but is not limited to, the review and documentation of comments on ground safety data packages and attendance at GSRP meetings

The contractor shall comply with the requirements of a payload's approved ground safety data package.

3.1.2 Systems Safety

The contractor shall develop and implement a process, as documented in the ISH&MA Plan, and is in accordance with section 1D201, System Safety, of NSTS 5300.4 (1D-2), Safety, Reliability, Maintainability and Quality Provisions for the Space Shuttle Program, for the identification, mitigation and control of hazards throughout the complete life cycle (design, development, manufacture, test, operations, maintenance, and disposal) of the facilities, equipment and processes for which the contractor is responsible. The process shall include quantitative or qualitative risk assessments, hazard analyses, and other analytical methods. The contractor shall submit all system safety assessments to NASA Safety for review and approval. The contractor shall select the type of assessment based on the identified level of risk.

The contractor shall develop and update a payload safety engineering assessment (DR-52) for each Space Shuttle mission covering contractor payload operations and equipment.

The contractor shall develop and update the ground portion of the Integrated Cargo Hazard Assessment Report (ICHAR)(DR-19). The contractor shall incorporate the payload safety engineering assessment (DR-52) into the ICHAR.

The contractor shall comply with the NASA Managed Safety Program for Pressure Vessels and Pressure Systems in accordance with NPD 8710.5, NASA Safety Policy for Pressure Vessels and Pressurized Systems.

3.1.3 Operations Safety

The contractor shall develop and implement a process, as documented in the ISH&MA Plan, in which testing, ground operations and maintenance activities are assessed for hazards. The process shall identify how personnel and property will be protected from injury or harm as a result of exposure to these hazards. The process shall provide for hazardous operation surveillance, hazardous procedure review, and risk assessments associated with deviations from procedures or safety and health requirements. The contractor shall document the assessments.

The contractor shall conduct an operations safety assessment on all high risk, first time and out-of-family operations and submit the assessment to NASA Safety for review and approval.

3.1.4 Local Administration of the Data Management System for Payload Safety

The contractor shall provide administration, access control, and data entry for the GSRP portion of the government-provided Data Management System (operated by JSC). Administration includes, but is not limited to:

- Maintaining access control of GSRP members
- Issuing system passwords
- Downloading safety data for distribution
- Uploading status information
- Confirming hard-copy-only safety data is scanned into the system
- Generating and modifying ground related payload safety review status reports

Modification 271

- Coordinating with the JSC system administrator

3.2 Reliability and Maintainability

The contractor shall develop, update and implement a process, as documented in the ISH&MA Plan, which ensures the reliability and maintainability throughout the lifecycle of the facility systems and equipment for which the contractor is responsible. The process shall include assessments of reliability and maintainability performance against baseline allocations; preparation, maintenance, and control of reliability assessments and trend analyses, assessments of materials and parts in support of operational integrity, and evaluation and participation in failure reviews. The contractor's process shall be based on the fundamental Reliability and Maintainability concepts and principles described in NASA-STD-8729.1. The preparation, maintenance, and control of the FMEA/CIL shall be in accordance with the appropriate program requirements; SSP 30234, Failure Modes and Effects Analysis and Critical Items List for Space Station or NSTS 22206, Requirements for Preparation and Approval of Failure Modes and Effects Analysis and Critical Items List. The contractor shall integrate the results of the reliability assessments with the Systems Safety function of risk identification.

The contractor shall participate in the Government Industry Data Exchange Program (GIDEP) and NASA Advisory reporting systems in accordance with NPR 8735.1, Procedure for Exchanging Parts, Materials, and Safety Problem Data Utilizing the Government-Industry Data Exchange Program and NASA Advisories.

3.3 Mission Assurance

The contractor shall develop, implement and update a mission assurance plan, as documented in the ISH&MA Plan, which ensures that the performance of the SOW requirements is in accordance with SOW Section 2.1.13 and the sections of SSP 41173, Space Station Quality Assurance Requirements, listed in Table 3-1.

Table 3-1 Applicable Requirements from SSP 41173, Space Station Quality Assurance Requirements

Procurement	Fabrication Control	Test Controls	Nonconforming Articles and Materials	Stamp Controls	Control of NASA and International Partner Property
3.4.2.3	3.5.1	3.6.2	3.7.4.1	3.9.9	3.12.1
3.4.2.4		3.6.2.3	3.7.5.1		3.12.1.1
3.4.4		3.6.2.7	3.7.5.2		3.12.1.2
		3.6.2.8	3.7.5.2.4		3.12.1.3
		3.6.2.9			3.12.1.4
		3.6.2.10			3.12.1.5
		3.6.2.11			3.12.2
		3.6.2.16			
		3.6.3.2			

3.3.1 Mission Assurance Support to Government Led Activities

For government-led tasks for which the government is providing mission assurance, contractor support shall include, but not be limited to:

- Historical documentation archiving and data retention
- Closure in automated tracking systems (All WADs/Technical Operating Procedures [TOPs], including nonconformances)
- Establish and update nonconformance Test, Assembly, and Inspection Record (TAIR) indices
- Closure in TAIR indices
- Add to and update automated nonconformance tracking system database
- Program Problem Reporting and Corrective Action (PRACA) evaluation and reporting
- Provide storage area and control access to storage area for nonconforming articles, including Material Review Board (MRB) items
- Establish and control connect/disconnect logs
- Establish and control temporary installation logs and issue identification tags
- ADP processing
- All mission assurance activities associated with contractor led subtasks

For non-middeck Utilization payloads, the contractor shall perform all non-PRCU mission assurance activities

3.3.2 Quality Assurance

The contractor shall collect and compile evidence derived from empirical data including, but not limited to, test results, analysis reports, inspection records, and delivery logs to establish that the products and services delivered to the government are in compliance with the requirements and specifications in this contract.

3.3.3 Quality Control

The contractor shall develop, implement and update a process to control and improve the quality of products and services provided under this contract. The contractor shall develop a set of parameters with government concurrence, to be monitored by contractor quality personnel for the measurement and verification of critical processes that control key product characteristics. The measurements shall include, but not be limited to, data on product and service quality, workmanship errors and rework. The process shall be auditable by the government and documented by the contractor. The contractor shall provide Process Control Reports (DR-20).

For those items in the custody of the contractor, the contractor shall generate, update, store and archive an ADP (DR-21) in accordance with SN-D-0007, National Space Transportation System Acceptance Data Package Requirements, SN-S-0008, National Space Transportation System Software Deliverable Data Package Requirements Specification, and SSP 30695, International Space Station Alpha Program Acceptance Data Package Requirements Specification.

The contractor shall identify, report, and resolve nonconformances in accordance with NSTS 08126, National Space Transportation System Problem Reporting and Corrective Action (PRACA) System Requirements; NSTS 08170, Space Shuttle Subsystem Codes; SSP 30223, International Space Station Problem Reporting and Corrective Action (PRACA) System Requirements; SSP 41173, Space Station Quality Assurance Requirements; and SSP 30524 Problem Reporting and Corrective Action Data System Requirements.

The contractor shall create and sustain open communications with employees and subcontractors to identify, report, and resolve nonconformances, problems, and anomalies including close calls.

The contractor shall initiate action, including requesting government approval, to change requirements that are indicated by trending and data analysis to be unreasonable or unnecessary, and to improve processes that result in products or services that fail to meet requirements.

3.4 Software Safety and Assurance

3.4.1 Software Quality Assurance/Engineering

The contractor shall develop, update and implement a software assurance process, as documented in the ISH&MA Plan, in accordance with ISO/IEC 12207, Standard for Information Technology - Software Life Cycle Processes. The contractor shall identify a single point of contact for Software Quality Assurance/Engineering.

The contractor shall evaluate the need for the performance of Independent Verification and Validation (IV&V) testing in accordance with NPD 8730.4, Software Independent Verification/Validation Policy, and provide a determination of applicability to the government.

3.4.2 Software Safety

The contractor shall develop, update and implement a software safety process, as documented in the ISH&MA Plan, in accordance with NASA-STD-8719.13A, Software Safety NASA Technical Standard.

3.5 Occupational Safety and Health

3.5.1 Voluntary Protection Program

The contractor shall submit an application for Voluntary Protection Program (VPP) certification of the safety program to the Occupational Safety and Health Administration (OSHA) within 18 months of contract start. The contractor shall achieve certification within 24 months of contract start.

3.5.2 Mishap Investigating and Reporting

The contractor shall investigate and report mishaps, in accordance with NPR 8621.1A, NASA Procedural Requirements for Mishap Reporting, Investigating, and Recordkeeping, and KNPR 8715.3, KSC Safety Practices Procedural Requirements. All investigation reports shall include a human factors assessment, root cause analysis and any remedial/corrective actions performed.

The contractor shall develop and implement a call tree with government and payload customer contacts for the reporting of a mishap, near-miss incident, equipment problem or a system going out of specification. The contractor shall report incidents and problems within four hours of the occurrence.

The contractor shall provide summary data on mishaps (DR-22).

3.5.3 Lessons Learned

The contractor shall develop, update and implement a process, as documented in the ISH&MA Plan, to capture, disseminate, and implement lessons learned, both positive and negative, in accordance with NPR 8621.1A, NASA Procedural Requirements for Mishap Reporting, Investigating, and Recordkeeping, and NPG 7120.5, NASA Program and Project Management Processes and Requirements. The contractor shall enter the lessons learned into the government provided Lessons Learned Information System operated by the Goddard Space Flight Center (GSFC).

3.5.4 Industrial Hygiene

The contractor shall develop, update and implement an industrial hygiene process, as documented in the ISH&MA Plan, in accordance with the requirements of NPR 1820.1, Hearing Conservation, KNPR 1840.19, KSC Industrial Hygiene Programs, KNPR 1820.3, KSC Hearing Loss Prevention Program, and KNPR 1820.4, KSC Respirator Protection Program.

3.5.5 Health Physics

The contractor shall develop, update and implement a health physics process, as documented in the ISH&MA Plan, in accordance with the requirements of KNDP 1860.1, KSC Radiation Protection Program, KNPR 1860.1, KSC Ionizing Radiation Protection Program, KNPR 1860.2, KSC Non-Ionizing Radiation Protection Program, and the requirements of the Nuclear Regulatory Commission.

3.6 Environmental Compliance

The contractor shall develop, update and implement an environmental compliance process in accordance with KMI 8800.8, KSC Environmental Management and KNPD 8500.1, KSC Environmental Management (DR-23). The contractor shall handle all waste streams generated by their processes in accordance with KHB 8800.7, Waste Management Handbook.

The contractor shall apply for and maintain all necessary permits required by federal, state or local rules and regulations. Permits shall be submitted through the NASA/KSC Environmental Program Office.

4.0 Spacecraft/Payload Processing & Integration

Spacecraft/Payloads include, but are not limited to, ISS and related flight elements, MPLM, Shuttle and related flight elements, Constellation Flight Systems and related flight elements, SPACEHAB Module, Hitchhikers, Get-Away Special (GAS) canisters, ELV payloads, satellites, external carriers, middeck payloads, experiments, and pallet carriers with special Research and Development (R&D) instruments.

The contractor shall perform payload processing, including but not limited to, planning, scheduling, test, operations, preparation for flight, Shuttle and Constellation integration, launch operations, mission support, post landing and mission equipment return based on requirements documents.

The contractor shall maintain, operate, configure, deconfigure, integrate, deintegrate, implement modifications, and refurbish hardware listed in Appendix 2.

For assigned payloads, the contractor shall partner with the payload developer to develop integration and test requirements. The contractor shall implement the final integration and test requirements to conduct test operations including, but not limited to:

- Physical integration and de-integration
- Interface and verification testing
- Fluid servicing

The contractor shall provide closed-loop traceability denoting OMRS, ACOMC, TGHR, Chit, LOLI and time cycle requirement satisfaction from the implementing document back to the source requirement per Section 2.1.8.

The contractor shall prepare, update, and provide performance-to-plan and open item status reports for pre-test briefings and pre-test reviews.

Prior to deconfiguring a test setup, the contractor shall conduct post-test reviews, decable reviews, analysis of test and operations data, and briefings.

The contractor shall develop, update and implement technical processes and products including:

- Mission Unique Drawings (MUDs), Mission Interface Diagrams (MIDs) and Mission Integration Schematics (MISs)
- WADs
- Schedules for planning and traceability of implementation (per Section 2.1.3)
- Problem Reports (PRs)
- Test application software

The contractor shall repair, fabricate and implement approved flight and ground equipment (including cabling and connections) configuration changes to, but not limited to:

- Mechanical systems
- Electrical Power systems
- Command and Data Handling systems
- Avionics systems

Modification 215

- Fluids systems
- Pressure shells
- Primary and secondary structures
- Multi-Layered Insulation (MLI)
- Fiber Optics

The contractor shall support development projects by performing feasibility studies, supporting reviews, providing design support and engineering expertise, planning and performing activation and validation, and providing operational expertise. A representative list of development projects include:

- Spacecraft Processing Element (SPE)

    o CEV/Orion GSE

    o Multi-Mission Support Equipment (MMSE)

    o Multi-Payload Processing Facility (MPPF) facility systems

    o Recovery and Retrieval GSE

- Command, Control, and Communication Systems

The contractor shall support studies, system architecture updates, system development, and definition of implementation approaches for the Launch Control System (LCS)/Command, Control, & Communications project as follows:

- Software engineering support to the early concept development of the Integrated Launch Operations Application (ILOA)
- Engineering support to increased development, additional testing and reviews of the Archive and Retrieval subsystem development project
- Engineering and technical resources to increase the uninterruptible power supply (UPS) capability in SSPF control rooms 2387 and 2393

4.1 Advanced Planning

The contractor shall perform advanced planning activities. Advanced planning begins as soon as the government approves the payload for flight assessment.

The contractor shall develop and update an element/mission planning milestones schedule that identifies advanced planning activities including, but not limited to, formal meetings (as listed in Section 2.1.10), LSSP development, and project milestones such as Preliminary Design Review (PDR)/Critical Design Review (CDR) and the GOR. The contractor shall update the schedule as milestone dates change. The contractor shall publish a report for the weekly management operations meeting as detailed in Section 2.1.10.

At early planning meetings, as listed in Section 2.1.10, the contractor shall, as a minimum:

- Identify cost and schedule processing impacts affecting KSC
- Identify and document top-level payload flow schedule templates, for each mission, that impact launch site policies, capabilities and cost
- Identify KSC owned equipment and processes that may contribute to payload customer and government cost saving and enhance mission success
- Identify and propose resolution to facility and GSE utilization conflicts
- Identify and document payload customer support and technical requirements

- Identify and propose resolution to potential ground systems and flight hardware and software processing issues and concerns
- Identify and propose resolution to payload access and interference analysis
- Compare new payload customer support and technical requirements with other missions and flows and identify any existing or potential conflicts

The contractor shall conduct LCC analysis during the early payload design cycle discussion and development process (preliminary requirement review, PDR, CDR) and provide guidance to the payload developer. The contractor shall conduct an analysis of the LCC change notices per KDP-P-1087, Launch Commit Criteria (LCC) Development.

Figure 4-1 illustrates a representative advanced planning template from L-18 months through L+2 months is generic for Shuttle/ISS payloads and should be used as a guide only.

Figure 4-1 Advanced Planning Guide
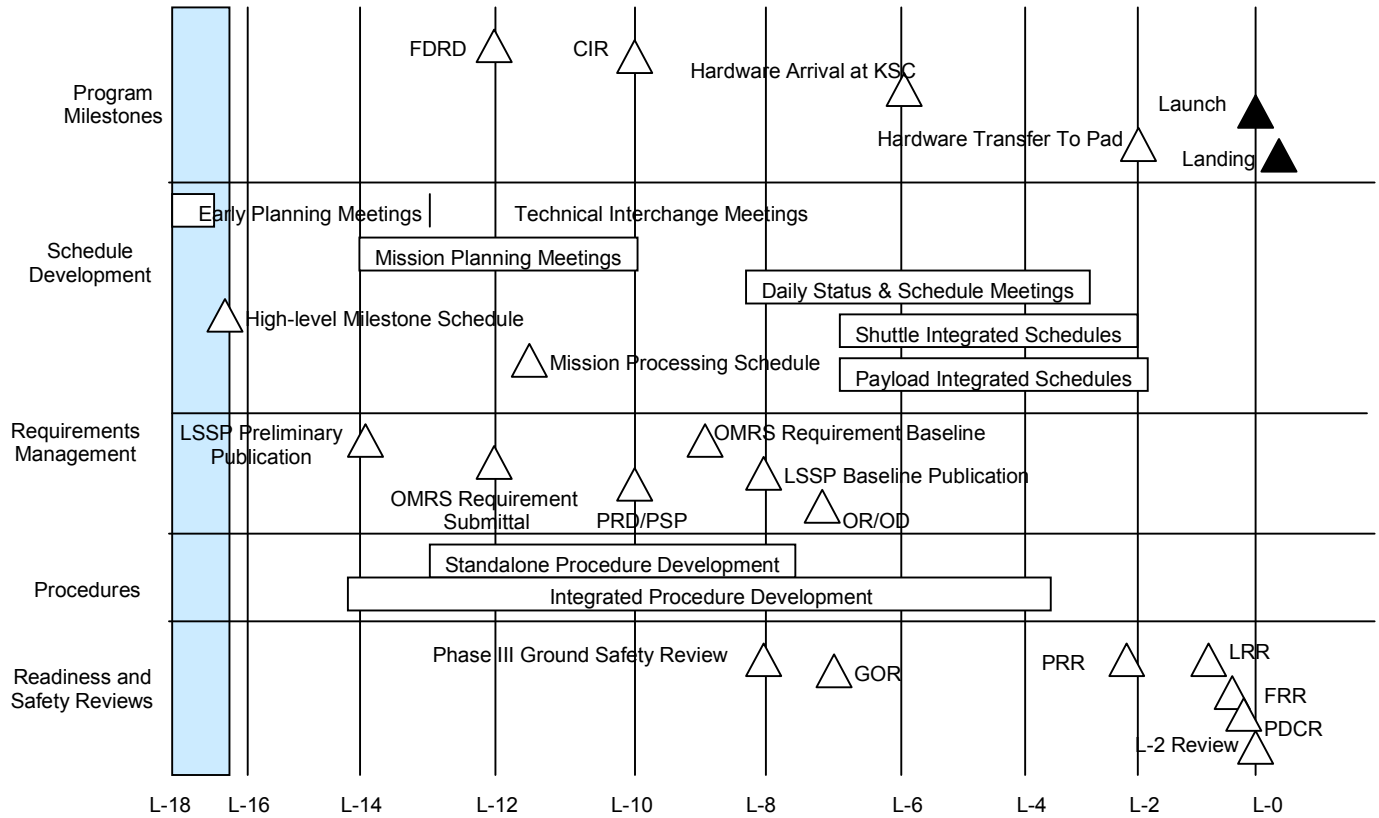
4.1.1 Ground Operations Planning

The contractor shall develop a mission communication plan that describes the advanced planning team and mission processing team roles, responsibilities and interfaces (DR-24).

4.1.2 Customer Support

The contractor shall provide payload customers with launch site policies, requirements, and capabilities (DR-25), no later than the first formal meeting with the customer.

The contractor shall conduct an internal KSC review of payload customer procedures in accordance with KDP-P-1065, Review of Customer Procedures and Contractor Developed Operations and Maintenance Instructions (OMIs) and Test Preparation Sheets (TPSs).

The contractor shall prepare and update a transportation plan for each shuttle and ELV payload to include the payload and GSE transportation requirements, as documented in the LSSP.

The contractor shall assist the payload customer in preparation of customer unique plans, including the emergency preparedness plan, and any unique contamination control plans.

4.1.3 Customer Agreements

4.1.3.1 Launch Site Support Plan

The contractor shall gather launch site support requirements from the payload customer and develop the payload LSSP for government approval per KDP-P-2835, ISS/Payload Processing Launch Site Support Plan Development. The contractor shall develop a LSSP per a government and contractor agreed-to planning template and ensure the LSSP is in agreement with the associated Mission Integration Plan (MIP), Payload Integration Plan (PIP) or Carrier Integration Plan (CIP). The LSSP includes payload customer requirements, agreements, and processing flows.

The contractor shall identify support capability issues with the preliminary LSSP and propose solutions. The contractor shall integrate the requirements with other missions and flows and identify any existing or potential conflicts.

The contractor shall develop support capability data and cost estimates in response to the launch site support requirements accepted by the government.

The contractor shall obtain approval by the payload customer and government, release and publish the baseline LSSPs.

4.1.3.2 Bilateral Plans and Agreements

The contractor shall provide technical inputs, cost and schedule impacts and resolutions involving KSC payload processing to NASA for all bilateral plans and agreements between NASA and its International Partners/Participants. The contractor shall document relevant

payload processing agreements in the associated LSSP. The current bilateral agreements and plans are listed in Appendix 3.

4.1.4 Customer Support Requirements

The contractor shall coordinate LSSP support requirements with affected supplier organizations, provide traceability and shall ensure that these support requirements are satisfied.

The contractor shall comply with JSC-27379, Space Shuttle/ISS Support Requirements System Management Plan, by utilizing the Automated Support Requirements System (ASRS) to document the requirements for each mission and payload. The contractor shall update and maintain the applicable payload databases in the ASRS per the guidelines documented in KSC-HB-GP60-3, ASRS Handbook and publish the support requirements documentation (DR-26).

4.2 Launch Site Services

Launch site services are defined as the contractor services provided to the payload customer(s). These include facility infrastructure, power, fluids and gases, clean rooms, labs, transportation, logistics, and crane operations. The required services are identified by the payload customer and the government through the MIP, PIP, CIP and LSSP. The contractor shall obtain government and payload customer approval of additional requirements and real-time requests for additional services prior to implementation.

Table 4-1 represents the services typically required to process each "class" of payload. The contractor shall perform any launch site services listed in Table 4-1 per approved requirements and manifests (Appendix 4).

Table 4-1 Launch Site Services

LAUNCH SITE SERVICES	ELV	Mid-decks	GAS/ Hitchhikers	ISS Elements	Commercial Carriers	Other Shuttle Payloads	Utilization
TRANSPORTATION SERVICES							
Load/offload coordination, transport to the assigned PPF and required services at KSC point of entry	X	X	X	X	X	X	X
Clean vehicle and shipping container before clean work area entry	X	X	X	X	X	X	X
Transport payload and GSE between KSC and/or Cape Canaveral Air Force Station (CCAFS) facilities	X	X	X	X	X	X	X
Prepare payload and GSE for departure from KSC and CCAFS		X	X	X	X	X	X
Coordinate aircraft/ship/truck fueling for payload and GSE arrival/departure	X		X	X	X	X	X
Perform canister rotations in the Canister Rotation Facility (CRF) and/or Vehicle Assembly Building (VAB)			X	X	X	X	
FLIGHT HARDWARE HANDLING							
Perform crane operations in the PPFs	X		X	X	X	X	X
Relocate payloads, GSE, shipping containers, and access stands hardware within PPFs	X	X	X	X	X	X	X
Provide payload customer training for facility access, pendant crane operations, and unique facility capability	X	X	X	X	X	X	X
PAYLOAD PROCESSING SUPPORT							
Provide and operate GSE, facility systems and equipment per approved ICDs, drawings, requirements	X	X	X	X	X	X	X
Provide access equipment and stands	X	X	X	X	X	X	X
Provide PPF and Lab clean room environment per K-STSM-14.2.1, KSC Payload Facility Contamination Control Requirements/Plan	X	X	X	X	X	X	X
Provide 10K clean work area	X	X	X		X	X	X
Laboratory space in the O&C and SSPF		X	X	X	X	X	X
Set up payload customer Payload Operations Control Center (POCC) at KSC	X				X	X	X
Set up and configuration of control rooms to support tests	X	X	X	X	X	X	X
Handling, delivery, procurement coordination and provision of propellants, liquids, and gases	X	X	X	X	X	X	X
Provide standard and digital photographic and video services		X	X	X	X	X	X
Materials sampling and analysis services including solids, fluids and gases per Section 7.2.1	X	X	X	X	X	X	X
Coordinate, assemble, control, handle ordnance (Receiving inspection, storage, bridge-wire checks, leak tests, x-rays)	X		X		X	X	X
Hazardous fluids/gas servicing	X			X	X	X	X
Radiological source storage and coordination of institutional services with other contractors and government agencies	X	X			X	X	
Command and monitor payload via the T-0 interface			X	X	X	X	X
Receive, prepare, load and verify load of payload flight software on flight and GSE components.					X	X	X
Storage, transportation, activation, charging and conditioning of payload batteries.		X	X	X	X	X	X

Modification 289

LAUNCH SITE SERVICES	ELV	Mid-decks	GAS/ Hitchhikers	ISS Elements	Commercial Carriers	Other Shuttle Payloads	Utilization
Electromagnetic measurement and analysis services	X	X	X	X	X	X	
Component cleaning including flex hoses, servicing cart (down to 100A), gauges, and valves	X	X	X	X	X	X	X
LOGISTICS							
Provide shop support for failure analysis, alignment table, fabrication/repair of payload customer flight/GSE hardware	X	X	X	X	X	X	X
Provide shipping and receiving services	X	X	X	X	X	X	X
Provide bench stock consumables items such as plastics, foams, adhesives, wipes, and cleaning materials	X	X	X	X	X	X	X
Issue loan-pool equipment including tools, headsets, and clean-room/anti-static/protective garments	X	X	X	X	X	X	X
Facilitate payload customer interface with U.S. Customs		X	X	X	X	X	X
Storage for shipping containers, GSE, and flight hardware (subject to availability)	X	X	X	X	X	X	X
ADMINISTRATIVE AND INSTITUTIONAL SUPPORT							
Provide office and laboratory space with access to telephone, video conferencing, FAX machines, computers connectivity, mail and reproduction services	X	X	X	X	X	X	X
Escort payload customers (including foreign nationals) without unescorted access within restricted facilities		X	X	X	X	X	X
Provide security services such as access stand monitor, guard shack coordination, and hazardous materials security	X	X	X	X	X	X	X
Hazardous waste accumulation area setup in PPFs and disposal coordination with J-BOSC	X	X	X	X	X	X	X

The contractor shall schedule, perform, and provide pre-integration activities and launch site services for ISS, Shuttle, and ELV payloads per approved requirements and manifests listed in Appendix 4.

The contractor shall perform unique services for the Japanese Experiment Module (JEM) per approved requirements

The contractor shall provide calibration and proof-load services in support of 1J Japanese Experiment Module (JEM) and 1J/A Experiment Logistics Module - Pressurized Section (ELM-PS) processing per approved requirements.

The contractor shall provide support for the Japan Aerospace Exploration Agency (JAXA) to provide cooling agent (110 gallons of Fluorinert FC-72) for JAXA to complete preparation of the Japanese Experiment Module – Exposed Facility (JEM-EF).

.

4.3 Payload Integration

The contractor shall schedule and perform integration activities including, but not limited to, assembly, buildup, integration, fit checks, test, servicing, closeouts, alignment checks, payload envelope checks, weight and Center of Gravity (CG) determination, maintenance, handling and de-integration for assigned manifested payloads listed in Appendix 4, in accordance with approved requirements.

4.3.1 ISS Elements

The contractor shall perform the integration activities for all ISS elements per approved requirements and manifests listed in Appendix 4, including, but not limited to

- MLI and debris shield installation
- Ammonia servicing
- Internal Thermal Control System (ITCS) water production and servicing
- Space Vision System (SVS) targets survey and installations

The contractor shall perform the integration activities for all ISS elements per approved requirements and manifests listed in Appendix 4, including, but not limited to:

- MLI and debris shield installation
- Ammonia servicing
- Internal Thermal Control System (ITCS) water production and servicing
- Space Vision System (SVS) targets survey and installations

The contractor shall perform battery reconditioning and Orbital Rate Capacity Testing (ORCT) for the 12A and 13A truss elements.

The contractor shall perform support tasks associated with the replacement of batteries on the P4 cargo element prior to launch per approved requirements. These activities shall include an additional ammonia operation for 12A, extended shift support for SSPF high bay and instrument library, and imagery support to capture and document the removal and replacement of the P4 batteries and solar array wings, closeouts and final configuration activities.

4.3.1.1 Node Processing

The contractor shall perform Node processing per approved requirements.

The contractor shall develop a list of GSE (including Alenia hardware) required for Node processing activities. The contractor shall perform validation and operation of Node GSE.

The contractor shall provide data monitoring, data processing and commanding capabilities for Node processing. The contractor shall develop and produce ground software displays based on Standard Out and NASA supplied requirements.

The contractor shall provide and configure flight hardware and GSE for the On Orbit Constraints Test (OOCT), the Node Systems Tests (including IST), and Multiple Element Integrated Testing (MEIT) per approved requirements (Ref. 4.4 Payload Testing).

The contractor shall perform Node 2 assembly and integration work, per approved requirements, that was originally planned to be performed prior to shipment to KSC. The contractor shall perform removal, reinstallation and retest of the Node 2 Remote Power Control Module (RPCM).

The contractor shall perform special testing and tasks on Node 2 per approved requirements. The contractor will perform a series of simple tasks and tests that will not change form, fit or function of the Node 2 element.

The contractor shall perform 13 additional tasks for Node 2 processing to incorporate program design changes, design integration, problem report corrections, and maintenance activities.

The contractor shall perform Node 2 bulkhead modifications for each of the six Node 2 hatches (forward, aft, and four radial). The contractor will be responsible for procedure development and implementation of the modifications to enlarge the Node 2 bulkhead pockets to accommodate the hatch pawl pin in order to prevent overloading of the hatch latch mechanism and hatch link failure. The contractor shall re-modify the six Node 2 bulkhead hatch pockets to updated engineering requirements and repair the radial hatch seal inserts.

Modification 248

The contractor shall perform removal and installation of common hatches from the Node 2 element. The contractor is authorized to use Node 3 hatches as replacement hatches on the Node 2 elements.

The contractor shall provide host support to Alenia in the removal of the closeout panels on the Node 2 element that will enable access to solve interference issues between the seals of the Node 2 closeout panels and the radial hatches. Other host support tasks include WAD development and closure, element rotations and floor installations, laser measurements to verify modifications corrected the interference, and re-phase of the baseline to accommodate the new work.

The contractor shall perform replacement of the existing flight processing coolant mixture in the Node 2 Internal Thermal Control System (ITCS) with the final flight coolant composition, Ortho-phthaldehyde (OPA), to eliminate water contamination onboard the International Space Station.

The contractor shall remove and replace damaged Thermal Control System (TCS) flex hoses on the Node 2 element.

The contractor shall provide Node 2 host services in support of ESA/AAS warranty work.

The contractor shall perform inspections, trouble shooting plans, repair, retest, and closeout activities on Inter Module Ventilation (IMV) valve flanges and Negative Pressure Relief Valves (NPRVs) on the Node 2 element.

The contractor shall perform the activities required to complete Node 2 Internal, External, and Active Common Berth Mechanism (ACBM) closeouts.

The contractor shall perform troubleshooting on two Node 2 Nitrogen Interface Assemblies (NIAs).

The contractor shall de-scope the Node 3 processing activities and re-scope the Cupola processing activities per approved requirements.

The contractor shall provide Node 2 access and perform modifications to the Node 2 element to accommodate the on-orbit installation of ISS Treadmill-2 (T2) during the ULF-2 mission.

The contractor shall perform Node 3 advanced planning, host services, ammonia servicing, Shuttle integration, and provide Internal Thermal Cooling System (ITCS) water in support of Node 3 processing per approved requirements. The contractor shall perform additional tasks including reviews, planning, scheduling, and support requirements development. The contractor will be responsible for the development of all GSE and Test Support Equipment and accompanying documentation and procedures required to provide support of approved Node 3 requirements.

4.3.1.2 Multi-Purpose Logistics Module

The contractor shall manage and perform prelaunch and turnaround MPLM processing, maintenance, and refurbishment.

The contractor shall develop, update and implement a MPLM Ground Processing Plan (DR-27).

The contractor shall perform removal and installation of common hatches from MPLM elements. The contractor is authorized to use Node 3 hatches as replacement hatches on the MPLM elements.

The contractor shall perform non-destructive evaluation and inspection of weld locations (radial, circumferential, and longitudinal) on MPLM flight modules 1 and 2 per approved requirements.

The contractor shall perform thermostat modifications to insulate the thermostat leads from the multi-layer insulation and to prevent future occurrences.

The contractor shall perform modifications to the LF-1 MPLM Resupply Stowage Racks (RSR), taping of all LF-1 rack locking pins, re-torque of Human Research Facility #2 (HRF-2) rack fasteners, and securing of the HRF-2 refrigerated centrifuge unit.

4.3.1.2.1 MPLM Cargo Integration

The contractor shall receive flight ready stowage subassemblies (e.g. soft-pack bags, drawers, and trays) from the Cargo Mission Contract (CMC) contractor, International Partners, the science community, the government, and other ISS Program participants and integrate the subassemblies into the appropriate carrier system (Resupply Stowage Rack [RSR], Resupply Stowage Platform [RSP], or other rack type). The contractor shall integrate all manifested cargo into the MPLM in accordance with ISSP requirements. Installation of Utilization subassemblies on dedicated Utilization racks will be the responsibility of the government. The contractor shall perform late stowage following rack installation in the SSPF and at the pad per approved mission requirements.

The contractor shall perform early access operations at the Primary Landing Site (PLS) and Secondary Landing Site (SLS) per approved mission requirements.

Upon return to the SSPF, the contractor shall de-integrate racks from the MPLM, subassemblies from the racks, and provide the subassemblies to the CMC contractor and the government. The contractor shall return unopened ISS trash containers to CMC. The contractor shall plan and implement provisions to clean up any cargo-related spills or leakage in the MPLM

4.3.1.3 Cupola Processing

The contractor shall perform Cupola processing per approved requirements.

4.3.1.4 Japanese Experiment Module (JEM) Processing

The contractor shall support end-to-end testing of the JAXA Japanese Experiment Module (JEM) Pressurized Module (PM). The contractor shall perform planning, procedure development, test set-up, cable procurement, and a readiness test along with providing mission processing team test support during the End-to-End test.

The contractor shall support Japanese Experiment Module–Pressurized Module (JEM-PM) and JEM Experiment Logistics Module–Pressurized Section (ELM-PS) Passive Common Berthing Mechanism (PCBM) Bilateral Integration and Verification Plan (BIVP) tests per approved requirements.

4.3.2 Non-ISS Payloads

The contractor shall schedule and perform integration activities including, but not limited to, payload integration, fit checks, test, servicing, handling and de-integration for assigned manifested payloads listed in Appendix 4 in accordance with approved requirements.

4.3.2.1 ELV Offsite Fueling Support

The contractor shall perform fueling simulations and servicing operations for customer spacecraft at non-KSC facilities or locations per Appendix 4B.

The contractor shall perform hazardous fluids servicing for payloads in compliance with approved requirements and applicable safety standards for mitigating risk to personnel, flight hardware and GSE. The contractor shall be responsible for the overall planning, procedures, personnel training, safety, emergency planning, security, facility support, GSE setup and breakdown, flight hardware handling, leak checks, servicing, contingency operations (including, but not limited to spill cleanup), launch configuration closeouts and integration.

4.3.3 Utilization Payloads

This section delineates the government and contractor responsibilities for processing Utilization Payloads as defined in the SOW Dictionary. The government will identify Utilization Payloads prior to hardware arrival at KSC. Due to the specialized nature of certain engineering and payload customer requirements, the payload customer or government personnel may perform a limited amount of actual "hands-on" work, including, but not limited to, post-landing middeck support.The contractor shall perform functions identified in the contractor responsibility column in Table 4-2.

Table 4-2 Utilization Contractor and Government Responsibilities

Function	Government Responsibility	Contractor Responsibility
Approval authority for agreements with Utilization Payload customers	Agreement approval	N/A
Safety and Mission Assurance	Per Section 3.0	Per Section 3.0
Scheduling and planning	• Provide schedule input • Develop internal schedules • Resolve conflicts and impacts	• Provide access to scheduling process • Integrate and coordinate the government input into scheduling process • Identify conflicts and impacts
Systems engineering • Develop WADs • Perform hardware integration, deintegration, servicing (includes late and early access), weight and CG determination for middeck payloads, and stand-alone and integrated testing • Technical interface with Utilization Payload customers • CoFR for Utilization Payloads at reviews involving that hardware • Requirements evaluation and input	Provide	N/A
Documentation production and release per Section 2.1.6	N/A	Perform
Launch Site services per Section 4.2*	N/A	Perform
Configuration management, operation and maintenance of assigned systems and support equipment	N/A	Per Sections 2.1.4, 5.2, 5.3 and Appendices 5A, 5B, 13 and 14
Sustaining engineering of assigned systems and support equipment.	Per Section 5.3 and Appendix 14	Per Sections 5.2 and 5.3 and Appendices 5A, 5B, and 14
Configuration management of Utilization Payload flight hardware per Section 2.1.4	User and input	Perform
Technicians	N/A	Provide
Logistics support including, but not limited to bonded storage, hardware tracking, kitting, packaging, handling, storage and transportation per Section 7.0	N/A	Perform
Closed loop requirement tracking per Section 2.1.8	Provide input	Provide and operate system
Open item status report maintenance	Provide input	Provide and operate system
Non-conformances and WAD development processes	User privileges	Provide read and write access
Training for government personnel per Section 8.1	Certification if required	N/A – Not Applicable
Mid-deck pre-launch and post landing payload processing	Systems engineering	Pre-launch handling and transportation support only

*Launch site services shall be provided to the government per schedule input.

4.3.4 Commercial Carriers

The commercial carrier provider will accomplish all cargo integration functions and transport the integrated carrier to the PPF. The cargo provider will be responsible for late stowage and early sample removal.

The contractor shall provide launch site processing services including, but not limited to, payload offloading, transportation between facilities, Multi-Mission Support Equipment (MMSE) canister operations, Spacelab tunnel configuration, orbiter installation, post-landing de-integration from the orbiter and MMSE Transportation to the PPF as required.

4.3.5 External Carriers

The contractor shall manage, and perform external carriers processing, maintenance and refurbishment with the exception of Utilization and experiment integration activities as defined in section 4.3.3. The contractor shall provide access and support rework of the ESP-2 External Stowage Platform Attach Device (ESPAD) and perform rework of the LMC Passive Flight Releasable Attach Mechanism (PFRAM).

The contractor shall prepare the Space Lab Pallet (SLP) for STS-123/ISS-1J/A mission for hardware integration and flight.

4.3.5.1 Partial Payloads

The contractor shall manage and integrate partial payload processing activities with the exception of Utilization activities identified in Section 4.3.3.

The contractor shall process all configurations of the partial payload carrier and subsystems including, but not limited to:

- Hardware Integration
- Subsystem servicing and checkout
- MLI installation
- Subsystem deservicing
- Hardware deintegration
- Refurbishment and reconfiguration for subsequent flights

4.3.6 Fluids and Gasses Servicing

The contractor shall perform fluids and gasses servicing for Shuttle, ISS and ELV payloads per approved requirements.

4.3.6.1 High Pressure Gas Servicing

Gases for high pressure servicing include hydrogen, oxygen, nitrogen, helium, and other high-pressure gases.

The contractor shall perform high pressure gas servicing for payloads in compliance with approved requirements and applicable safety standards for mitigating risk to personnel, flight hardware and GSE. The contractor shall be responsible for the overall planning, procedures, safety, emergency planning, security, facility support, GSE setup and breakdown, flight hardware handling, leak checks, servicing, launch configuration closeouts and integration of high pressure gas tanks on the payload carrier.

4.3.6.2 Hazardous Fluids Servicing

The contractor shall perform hazardous fluids servicing for payloads in compliance with approved requirements and applicable safety standards for mitigating risk to personnel, flight hardware and GSE. The contractor shall be responsible for the overall planning, procedures, safety, emergency planning, security, facility support, GSE setup and breakdown, flight hardware handling, leak checks, servicing, contingency operations (including, but not limited to spill cleanup), launch configuration closeouts and integration.

Hazardous servicing includes, but is not limited to, the following fluids:

- Ammonia (NH_3)
- Hydrazine (N_2H_4)
- Monomethylhydrazine (MMH)
- Unsymmetrical dimethylhydrazine (UDMH)
- Nitrogen Tetroxide (N_2O_4)
- JP8/RP1
- Hydrogen Peroxide (H_2O_2)
- Cryogens (LN_2, LO_2 and LH_2)

The Contractor shall perform an additional ammonia operation in support of the Flight 15A S5 cargo element confidence test.

4.3.7 Vehicle Integration Test Office Support

The contractor shall ensure all Vehicle Integration Test Office (VITO) activities are integrated into the processing schedules. The contractor shall provide and configure GSE and Flight Support Equipment (FSE) to support VITO activities. The contractor shall resolve all VITO discrepancies for which they have responsibility.

4.4 Payload Testing

The contractor shall perform payload testing per approved requirements. The contractor shall develop and implement test plans and procedures.

Tests include, but are not limited to:

- EMC (Reference Sections 4.4.2 and 8.2.1)
- Leak Test (Reference Section 4.4.3)
- Post Delivery Verification Testing (PDVT) (Reference Appendix 1A)
- Orbiter Interface Verification Test (IVT) and End-to-End (ETE) (Reference Section 4.7.1)
- Flight Load Verification (Reference Section 4.7.1)
- Launch Sims (Reference Section 4.7.1)
- Combined Systems Tests: Mission Sequence Test (MST) and Integrated Compatibility Test (ICT) (Reference Appendix 1A)
- Subsystems Testing (Reference Appendix 1A)
- Crew Equipment Interface Test (CEIT) (Reference Section 4.4.1)

The contractor shall perform all testing responsibilities designated by an "X" in Table 4-3. A description of each test can be found in Appendix 1A, Glossary. Table 4-3 lists the expected testing responsibilities for each type of test. The government will be the task leader for the MEIT, IST, Node System Tests (Reference Appendix 1A), and Utilization tests.

Table 4-3 Test Function Responsibilities

Function	Test Leader			
	NASA		Payload Customer	CAPPS
	Node System Tests, IST & MEIT	Utilization Testing	On Orbit Constraints Test	CAPPS Managed Testing
Planning				
Review and comment on test concepts, groundrules, plans and justification	X	X	X	X
Requirements				
Review and comment on payload developer and program test requirements	X			X
Concur with test requirements				X
Provide traceability from implementing WAD back to the source requirement (Ref. 2.1.8)	X			X
Procedures (Reference Section 2.1.6)				
Develop and update the pre-ops, post-ops, staging and test site procedures for flight hardware (per assigned payload)	X			X
Develop and integrate test procedures				X
Collect, prepare, publish, distribute, and maintain test procedures	X	X[6]		X
Review, redline and concur on test procedures	X		X	X
Approve procedures				X
Program & Payload Provider Flight Hardware & Software				
Identify need, coordinate shipping, track delivery	X			X
Provide and maintain Deliverable Items Sheets	X			X
Configure test setup; activate and maintain test site	X	X[5]	X	X
Operate flight hardware	X[2]	X[5]		X
Schedules				
Create, plan testing timelines; conduct reviews with NASA and others				X
Review, comment and concur	X	X		X
Publish test timelines and actual durations	X	X		X
Archive planned and actual test timelines	X	X		X

Function	Test Leader			
	NASA		Payload Customer	CAPPS
	Node System Tests, IST & MEIT	Utilization Testing	On Orbit Constraints Test	CAPPS Managed Testing
Schematics, Drawings, & Diagrams				
Develop, publish and update test schematics, drawings, and diagrams (including, but not limited to MUDs, MIDs and MISs)	X			X
Conduct engineering and operations reviews with NASA and others	X			X
Emulators, GSE & Checkout Systems				
Develop, acquire, configure, stage, operate and maintain - Perform software loads and diagnostic testing - Create displays, applications, scripts and databases - Provide monitoring and commanding - Detect, track, isolate and resolve anomalies	X	X[3]	X	X
Develop, integrate, and update pre-ops, post-ops, staging, and test site procedures	X			X
Perform GSE-to-flight hardware connection and disconnection (per government and payload customer agreement)	X	X[5]		X
Testing				
Manage and conduct	X[4]			X
Provide Safety, Quality Assurance (QA) and Quality Engineering (QE) support per section 3.0	X	X	X	X
Detect, track, isolate, resolve anomalies and close paper				X

[1] (Deleted)
[2] Limited to command and telemetry interface to flight hardware (e.g. PCS, Mate, RWS).
[3] Utilization emulators and PRCU checkout system are operated and maintained by the government
[4] Provide On-Console direction of Test Operations and Emergency Response
[5] Technician touch labor
[6] Procedure Release Only

4.4.1 Crew Equipment Interface Test

The requirements for CEIT are developed jointly by the KSC and JSC VITO and are documented in a VITO memorandum. These requirements will be contained in the MIP, PIP, or CIP for each payload or ISS element.

For assigned flight hardware, the contractor shall configure the flight hardware in a near launch configuration per documented requirements. The contractor shall provide and configure GSE and FSE to support the test. Following the test, the contractor shall reconfigure the assigned flight hardware to a pretest condition as applicable. The contractor shall document and disposition the CEIT anomalies that affect the hardware for which the contractor has responsibility. The contractor shall perform payload and ISS CEITs in the PPFs, SFOC will lead CEITs in the Orbiter

4.4.2 Electromagnetic Compatibility Testing

The contractor shall develop procedures and perform EMC testing for ISS payloads and ISS elements to satisfy approved requirements. EMC testing for ISS elements will be performed in accordance with SSP 30238, Space Station Electromagnetic Techniques and SSP 30237, Space Station Electromagnetic Emission and Susceptibility Requirements referenced in Section 8.2.1.

4.4.3 Component Level and Gross Leak Test

The contractor shall provide overall planning and execution of leak tests including component level and gross leak tests for all assigned pressurized elements including, but not limited to MPLMs, Nodes, Cupola, European Space Agency (ESA) Columbus Orbiting Facility (COF), Japanese Experiment Module – Pressurized Module (JEM-PM), and the JEM Experiment Logistics Module – Pressurized Section (ELM-PS) per approved requirements.

The contractor shall provide all materials, components and consumables necessary to prepare and conduct each test including, but not limited to:

- Air and gaseous helium K bottles per SSP 30573, ISS Fluid Procurement and Use Control Specification
- High-pressure gas panels
- Valves, fittings, tubing, flex-hoses, feed-throughs, filters, gauges, pressure transducers
- Flight interface hardware

The contractor shall review and provide comments to IP/P provided leak test procedures.

The contractor shall configure the test article for leak tests and reconfigure the test article following the completion of test for assigned flight hardware.

The contractor shall perform component level leak tests and gross leak tests as close to launch as practical.

The contractor shall perform leak detection and isolation techniques to resolve anomalies with flight hardware and GSE.

The payload developers will conduct the gross leak checks of the Russian Space Agency (RSA) Science Power Platform at KSC.

4.4.4 (Reserved)

4.4.5 (Reserved)

4.4.6 Forum Participation for Support to Government Testing

The contractor shall participate in government led test team forums, including but not limited to, ITRG TIMs and test processing team meetings. The contractor's participation includes, but is not limited to:

- Project and technical comments to products and processes developed by the government, International Partners and other team members
- Presentation including present status and future planning of the contractor required products and processes
- Review other team member comments and update of contractor products and processes
- Program Management Review (PMR), shift turnover review and anomaly review

The contractor shall schedule and provide Section 4.2 Launch Site Support services in support of government led testing.

4.4.7 Alpha Magnetic Spectrometer Interface Tests

The contractor shall provide testing support to the Alpha Magnetic Spectrometer Functional Interface Test (FIT). The contractor is responsible to sustain, maintain, and operate the Cargo Integrated Test Equipment (CITE) and Payload Test and Checkout System (PTCS). The contractor shall perform a simulated risk mitigation FIT test to verify:

- Alpha Magnetic Spectrometer (AMS-02) Command and Data Handling (C&DH) hardware and software
- AMS-02 C&DH interface communication paths of the ground segment to the ISS PTCS and Space Shuttle CITE
- Relationships to the Payload Operations Integration Facility (POIF) Payload Data Service System (PDSS) at the Kennedy Space Center

The contractor shall plan, prepare, and perform the Alpha Magnetic Spectrometer (AMS) Preliminary Orbiter Processing Interface Test (POPIT).

4.5 Shuttle Integration

The contractor shall coordinate payload customer requirements with the SFOC contractor.

The contractor shall conduct shuttle to payload integration tasks including:

- Payload access control monitoring at the pad and OPF
- Payload specific pad, OPF, Mobile Launch Platform (MLP) and VAB operations
- Launch on Need (LON) activities (Reference Section 4.6)
- Late and early access assessments and execution
- Problem identification, documentation, tracking and resolution
- Canister operations
- Orbiter interface connects and disconnects in coordination with SFOC

The contractor shall develop procedures, setup and activate payload GSE including payload customer-provided equipment. The contractor shall schedule payload activities and perform the specified testing after installation.

4.6 Launch On Need

LON is a process to have all activities preplanned in the event an ISS critical spare is required on ISS and manifested late in a flow for a possible change out of an experiment or Orbital Replacement Unit (ORU) for an ISS critical spare.

The contractor shall develop and update a LON Ground Processing Plan (DR-28) and shall coordinate and implement the plan with the SFOC contractor.

The contractor shall perform drawing development and factory equipment verification in support of LON efforts.

As part of the preplanning activities, the contractor shall perform three-dimensional modeling simulations as defined in Section 6.1.6 for LON missions. The contractor shall perform three-dimensional simulations for each LON mission (reference Appendix 4A) to assess ORU, FSE, and Carrier integration and deintegration.

4.6.1 ORU Servicing for Flight Spares

The contractor shall perform ORU servicing per approved requirements for spares prior to flight. The contractor shall provide technical expertise for requirements development and develop procedures required for ORU servicing activities including ORU inspections, functional testing, fluid fills, and Electronically Erasable Programmable Read-Only Memory (EEPROM) refresh. The contractor shall develop engineering drawings for hazardous procedures. The contractor shall identify new support equipment or modifications to existing equipment in support of ORU servicing per approved requirements. The contractor shall provide input into safety assessments.

4.7 Payload Launch and Landing Operations

4.7.1 Orbiter and Pad Operations

The contractor shall integrate payload requirements and activities with the SFOC contractor and Constellation contractors for Launch Complex 39 operations, including the delivery of payload mission unique equipment. The SFOC has overall responsibility for installation of the payload into the orbiter, AFD equipment and other orbiter-specific FSE into the orbiter.

The contractor shall perform electrical interface pre-connection tests for payloads to orbiter direct and T-0 umbilical from MLP Compartment 10A to the orbiter.

The contractor shall perform interface testing. The contractor shall conduct payload to orbiter integration, IVT, and ETE testing tasks including:

- Test planning
- WADs and schedules development

Modification 215

- Launch Processing System (LPS) data processing application software and data displays development and delivery to SFOC
- Shuttle Data Tape (SDT) and Payload Data Tape (PDT) integration
- Payload Test Configuration Identifier (TCID) build-up and delivery to SFOC
- Payload and Launch Control Center C1 console configuration
- SFOC delivery products coordination and negotiation
- Mission unique equipment and software installation
- SSP payload flight software Telemetry Format Load (TFL) /Downlist Format Load (DFL) format checks verification
- Load check of software on LPS
- Tracking Data Relay Satellite (TDRS) usage coordination for ETE testing
- PC Goal Software and displays configuration and validation
- SSPF Customer Management Room (CMR) and Launch Control Center Firing Room 2 payload console configuration

The contractor shall develop and coordinate launch countdown simulations, scenarios, schedules, procedure, and problem conditions with SFOC.

The contractor shall certify personnel required to participate in launch countdown operations.

The contractor shall create LCC flow charts, contingency plans and procedures to satisfy the approved LCC requirements.

4.7.2 Late Access

The contractor shall provide and maintain the capability to access payload carriers, commercial carriers and the MPLM in the orbiter at the pad.

The contractor shall perform late pad operations and stowage in coordination with the SFOC.

4.7.3 Launch Operations

The contractor shall:

- Create the Launch Control Center C1 console seating arrangements and charts for approval by the government
- Develop the payload sections of the launch countdown procedures
- Execute the procedures
- Load and verify Launch Control Center C1 console applications software and displays
- Verify payload TCID measurements are loaded into the LPS mission TCID
- Document payload Launch Commit Criteria operations
- Staff the payload consoles in the Launch Control Center during payload pad and launch countdown activities.
- Configure and validate PC Goal software in SSPF CMR and displays in Launch Control Center Firing Room 2
- Configure CMR and Launch Control Center Firing Room 2 payload consoles

- Configure, validate and operate Test, Control and Monitor System (TCMS) for launch activities

4.7.4 Launch Contingency Operations

The contractor shall plan and provide contingency procedures and strategies for payload operations covering launch delay, scrub turnaround, and launch termination scenarios for presentation to and approval by the government. The contractor shall coordinate the procedural sequences for incorporation into OMI S0007 Launch Countdown Volumes.

4.7.5 Post Launch Activities

The contractor shall perform post launch activities such as removing payload-servicing components, support equipment, T-0 patch boards, payload office products and documentation at the OPF, Launch Control Center, pad, Rotating Service Structure (RSS)/PCR, and MLP.

4.7.6 Mission Operations/Payload In Flight Anomalies

During on-orbit operations, the contractor shall provide on-call engineering expertise for payload In-Flight Anomaly (IFA) resolution through the JSC Mission Evaluation Room (MER) and POCC request. IFA analysis shall include requirements satisfaction traceability, historical problem report resolution identification, and problem resolution recommendations based on past payload performance.

The contractor shall perform post flight investigation and corrective action of in-flight anomalies per program level requirements.

4.7.7 Post Landing

The contractor shall satisfy post-landing requirements at the PLS and at the SLS.

The contractor shall perform post-landing and destow operations in coordination with the SFOC.

The contractor shall develop and publish a Mission Annex to the Off-Site Operations Plan (SFOC-GO0021) to document payload requirements and recovery plans for a non-KSC landing. The contractor shall staff and implement appropriate sections of the Mission Annex to the Off-Site Operations Plan in the event of an orbiter landing at a Contingency Landing Site (CLS).

The contractor shall provide post-landing capability as specified in Table 4-4 unless superseding requirements have been documented in the mission LSSP.

The contractor shall apply available resources, in real time, to critical landing activities and prioritized requirements in a best effort situation.

Table 4-4 Post-Landing Capabilities

Condition	Notification	Capability
Nominal EOM (KSC)	Planned	Full
Nominal EOM (SLS)	> 48 hours	Full
Nominal EOM (SLS)	< 48 hours	Best Effort
Early EOM (KSC)	> 3 hours	Full
Early EOM (KSC)	< 3 hours	Best Effort
Early EOM (SLS)	< 48 hours	Best Effort

4.7.7.1 Post Landing Runway Requirements

The contractor shall develop and implement staffing, transportation, and logistics plans and procedures to satisfy landing requirements as identified below:

- Install and configure access through the Spacelab tunnel for SPACEHAB Module flights.
- Develop and conduct integrated procedures per approved requirements for powered payloads.

4.7.7.2 SLS Mate/Demate Facility Operations

The contractor shall access the orbiter, perform time-critical activities and prepare the payload for ferry flight back to KSC per approved requirements.

4.7.7.3 OPF Post Landing Operations

The contractor shall perform early access operations per mission requirements.

If payload/orbiter interface IFAs are not resolved on-orbit, the contractor shall conduct joint troubleshooting operations with SFOC to isolate the anomaly to the discrepant side of the interface, prior to deintegration from the orbiter.

The contractor shall conduct payload complement deintegration from the orbiter jointly with the SFOC contractor.

4.7.8 Payload De-Integration

The contractor shall de-integrate subassemblies from their carriers and return the hardware per approved requirements and disposition plans.

4.8 (Reserved)

(This page is included for formatting purposes only)