

Draft Request for Proposal (RFP)
Commercial Low Earth Orbit (LEO) Destination Contract (CLDC)

PART III – ATTACHMENTS
SECTION J – LIST OF ATTACHMENTS

ATTACHMENT J-02 DATA REQUIREMENTS DESCRIPTIONS (DRDs)

CONTRACT DATA REQUIREMENTS LIST

National Aeronautics and Space Administration
Johnson Space Center

1.0 INTRODUCTION

This document defines the requirements for contractual data to be delivered by the contractor to the Government. The data requirements are set forth in each Data Requirements Description (DRD) and shall govern that data required by the contract. The contractor shall furnish data defined by the DRDs as listed on the Contract Data Requirements List (CDRL) by category of data, attached hereto, and made a part of this contract. Such data shall be prepared, delivered, and maintained to NASA in accordance with the requirements set forth within this document.

This document sets forth the data requirements in each DRD and shall govern the data required under this contract. The Contractor shall furnish data defined by the DRDs listed by category of data. Such data shall be prepared, maintained, and delivered to National Aeronautics and Space Administration (NASA) in accordance with the requirements set forth herein. NASA-Owned/Contractor-Held records shall be managed by the Contractor in accordance with Title 36 of the Code of Federal Regulations, Chapter XII B. Records Management and NPD 1440.6, NASA Records Management. The records shall be organized in accordance with the instructions in NPR.1441.1, NASA Records Management Program Requirements as applicable. The Contractor shall disposition records and non-records in accordance with NPR 1441.1, which has been approved by NASA. All questions on records management issues shall be directed through the Contracting Officer or the Contracting Officer Representative.

2.0 ORGANIZATION OF CONTRACT DATA REQUIREMENTS LIST

Throughout the performance of the contract, the Contract Data Requirements List (CDRL) provides a listing by number, data type, title, and Office of Primary Responsibility (OPR). Each DRD included in this CDRL prescribes content, format, and submittal requirements.

2.1 DRD NUMBERING

For the purpose of classification and control, the individual data deliverables in the CDRL are grouped into the following categories:

- 0XX series DRDs applicable to all contract activities
- 1XX series DRDs applicable to Contract Line-Item Number (CLIN) 1 Initial Development, CLIN 2 CLDS Development, Demonstration, & Certification, Certification maintenance, and any re-Certification
- 2XX series DRDs applicable to CLIN 3 Mission Services

2.2 DATA TYPES

Each DRD is classified by data type as defined below:

TYPE	DESCRIPTION
1	That information and documentation which requires NASA approval prior to release. Approved Type 1 information and documentation shall be controlled, and deviations from or changes to the concepts, techniques, and/or requirements stated therein shall require NASA approval prior to implementation. All work under this contract covered by Type 1 documents shall be performed in accordance with those approved documents. The Contracting Officer's Representative has approval authority and signs the data prior to its release.

- Contractually binding documents shall only be implemented or revised via a contract modification.
- 2 That information and documentation for which NASA reserves a time-limited right to disapprove. Type 2 data shall be submitted to designated repository for review not less than 45 calendar days prior to its release for use or implementation. The Contractor shall clearly identify the target release date in the 'submitted for review' transmittal. If the Contractor has not received any comment prior to the target released date, the document may be released for appropriate use. Any NASA comment received shall be appropriately dispositioned and resubmitted prior to implementation, restarting the 45-day review period.
 - 3 That information and documentation which does not require formal NASA review and approval. Information in this category would include statuses, analyses, test results, handbooks and other designated lists, reports, etc. While type 3 deliverables do not require NASA approval, the deliverable must satisfy all applicable contractual requirements.

2.3 DATA FIDELITY

In addition to the required frequency for data deliverable submittals, the DRD also defines the level of readiness/fidelity, which applies to the submission of DRDs:

Draft (D) - A preliminary version of a delivery for NASA review. Draft versions may contain some To Be Determined (TBD) items.

Baseline (B) - The Contractor's internally approved version of the product. It must be of sufficient fidelity to permit NASA disposition in accordance with the DRD Type. Baseline submittals may contain some To Be Determined (TBD) items but are of higher fidelity than a Draft version.

Final (F) - A Final version of a delivery shall reflect the Contractor's internally approved final version of the product and is ready for NASA disposition in accordance with the DRD Type. No TBDs may be included.

3.0 STATEMENT OF GENERAL REQUIREMENTS

3.1 SUBCONTRACTOR DATA REQUIREMENT

The prime contractor is responsible for flowing down any specific data requirements that apply to subcontracts and vendor agreements.

Reference to subcontractor data in the contractor's responses is permissible and a copy of the referenced subcontractor data must be supplied with the response document at time of delivery to NASA.

3.2 DATA DISTRIBUTION AND TRANSMITTAL

For DRD types 1, 2, and 3, the contractor shall electronically deliver DRDs to the CDO Program Authorized Repository as identified by the Contracting Officer. The contractor shall notify the distribution recipients when DRDs have been submitted to the CDO Program Authorized Repository. Distribution recipients are identified within each DRD Section 11.

For each DRD, the transmittal package shall include:

1. Contract number
2. Task Order number (if applicable)
3. DRD number
4. DRD data type
5. Submission date
6. Milestone being satisfied (if applicable)
7. Document number, date and revision
8. Document title
9. File names of all files being delivered; file naming convention shall clearly identify the document being delivered; multiple files per document must be clearly related to the document
10. Distribution (Notification list as defined by the DRD distribution field)
11. Targeted release date

All Type 1 documentation shall be marked “PRELIMINARY PENDING NASA APPROVAL,” and once approved shall be reissued with “APPROVED BY NASA” and the date and approval authority annotated on the cover.

3.3 DATA FORMAT

Existing Contractor internal documents may be used to meet the data requirements of the DRD to the extent practicable. The DRDs will call out any special format requirements if they are required.

The Contractor’s submittal in response to the DRDs shall be provided in an electronic format that meets four basic requirements: “Readable,” “Printable,” “Searchable,” and “Downloadable” by NASA utilizing publicly available off-the-shelf software. If the electronic format is not supported by publicly available off-the-shelf software, the Contractor shall provide NASA with the necessary software and approach to support the four basic requirements

3.4 DATA RESTRICTION DETERMINATION AND MARKING REQUIREMENTS

The contractor shall properly mark data in accordance with the data rights clause(s) included in the contract. The contractor shall mark data deliverable sections with appropriate data restrictions and export classifications. The contractor shall not apply the most restrictive classification to the entire data delivery if only applicable to one section. If NASA does not agree with the contractor applied data restriction, the CO shall request supporting rationale for applied data restrictions. If NASA does not agree with the rationale, the CO shall return the data to the contractor, cancel the markings, or ignore the markings consistent with the procedures set forth in the "data rights" clause(s) contained in the contract and per U.S. export laws.

The contractor shall ensure all Controlled but Unclassified Information (CUI) is marked in accordance with NASA Procedural Requirements (NPR) 2810.7, *Controlled Unclassified Information* and ITS-HBK-CUI, *Controlled Unclassified Information Handbook*.

If data delivered under this contract is subject to the International Traffic in Arms Regulations (ITAR), the data shall contain an “ITAR Notice” as follows:

International Traffic in Arms Regulations (ITAR) Notice

This document contains information which falls under the purview of the United States (U.S.) Munitions List (USML), as defined in the International Traffic in Arms Regulations (ITAR), 22 CFR 120-130, and is export controlled. It shall not be transferred to foreign nationals, in the U.S. or abroad, without specific approval of a knowledgeable NASA export control official, and/or unless an export license/license exemption is obtained/available from the United States Department of State. Violations of these regulations are punishable by fine, imprisonment, or both.

If data delivered under this contract is subject to the Export Administration Regulations (EAR), the data shall contain the “EAR Notice” as follows:

Export Administration Regulations (EAR) Notice

This document contains information within the purview of the Export Administration Regulations (EAR), 15 CFR 730-774, and is export controlled. It may not be transferred to foreign nationals in the U.S. or abroad without specific approval of a knowledgeable NASA export control official, and/or unless an export license/license exception is obtained/available from the Bureau of Industry and Security, United States Department of Commerce. Violations of these regulations are punishable by fine, imprisonment, or both.

Insert Destination Control Statement that includes export classification and corresponding export authority.

4.0 DRD MAINTENANCE PROCEDURES

4.1 CONFIGURATION MANAGEMENT OF DRDs

The Contractor shall employ a system for organizing, identifying, and tracking all submittals of DRDs, to include any changes or revisions. Updates to DRDs shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

If the DRD is a type 1 DRD, DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

4.2 CDRL OR DRD CHANGE PROCEDURES

Revisions to the CDRL or DRDs will be identified by NASA in the Document Change Log. The date of the revision, DRD number, title, and revision description will be annotated in the Document Change Log.

Revision descriptions will include the modification number, which implements the change, and a brief description of the portions of the CDRL and/or DRD affected within the “Revision” column of the Document Change Log.

5.0 REFERENCE TO OTHER DOCUMENTS AND DATA DELIVERABLES IN DATA SUBMITTALS

The Contractor’s submittal of a DRD deliverable may refer to other documents and/or other DRD deliverables. At the time of submission of the DRD deliverable, any referenced document within the DRD deliverable shall be made available to NASA. The Contractor shall provide NASA with access to any referenced document and the location of that data within the referenced document. Any reference made to data associated with another DRD deliverable that is required separately by the contract, shall include the DRD number of and location of the data within the referenced DRD deliverable.

[illegible]

DRD #	DRD Title	Type	OPR	Proposal	Delivery/Update Frequency																		Notes: D=Draft B = Baseline F = Final CA = Contract Award * = Whichever occurs earlier m=months; w=weeks; d=days
					Contract Award	CBR	PDR (if proposed)	CDR	MTRR	SSR	SIR	APR	DCR	SCR	MBR/VBR (L-18m)	MIR (L-12m)	UIR (L-6m)	FOUR (L-4m)	CIR (L-3m)	MCR (L-3m)	ORR (L-1m)	FRR (L-1w)	
CLDC-115	Safety & Mission Assurance (SMA) Plan	1	CDO																				
CLDC-115.1	Destination SMA Plan	1	CDO	D		B	F*	F*															
CLDC-115.2	Crew Visiting Vehicle (CVV) SMA Plan	1	CDO										F										
CLDC-115.3	Cargo Visiting Vehicle (CaVV) SMA Plan	1	CDO										F										
CLDC-116	Risk Management Plan	1	CDO	D		B	F*	F*															
CLDC-117	Mishap Preparedness and Contingency Plan (MPCP)	1	CDO				B*	B*					F										
CLDC-118	Safety Data Package	1	CDO		Thirty (30) days prior to each Safety Review																		
CLDC-119	Micrometeoroid Orbital Debris (MMOD) Report	1	CDO																				
CLDC-119.1	Destination MMOD Report	1	CDO					B^					F									^ Baseline six months prior to CDR; UAR at CDR	
CLDC-119.2	CVV MMOD Report	1	CDO					B^					F									^ Baseline six months prior to CDR; UAR at CDR	
CLDC-119.3	CaVV MMOD Report	1	CDO					B^					F									^ Baseline six months prior to CDR; UAR at CDR	
CLDC-120	Jettison Plan	2	CDO				B						F										
CLDC-121	Nonconformity (NC) Reporting and Review Board Status	3	CDO		CA+ 90d	Quarterly																	Contract Award +90 days; Quarterly thereafter
CLDC-122	Supply Chain Visibility (SCV) Reporting	3	CDO		CA+ 30d	Every 6 months thereafter																	
CLDC-123	Destination Disposal Plan	1	CDO				B	F															
CLDC-124	Utilization Integration Plan	1	CDO	D			B*	B*					F										
CLDC-125	Payload Users Guide	3	CDO					B						F									
CLDC-126	Science Data Management Plan	1	CDO										B	F									
CLDC-127	Mission Systems Plan	1	CDO				B	F															
CLDC-128	Operations and Training Plan	1	CDO					B	Final due one year prior to start of crew training of first mission														
CLDC-129	Crew Code of Conduct	1	CDO	D			B	F															
CLDC-130	Crew Selection and Evaluation Plan	1	CDO				B	F															
CLDC-131	Pre-Launch and Post-Landing Operations	1	CDO					B								F							
CLDC-132	Vehicle Interface Definition Document (IDD)	3	CDO																				
CLDC-132.1	Destination Vehicle IDD	3	CDO					B					F										
CLDC-132.2	Crew Visiting Vehicle (CVV) IDD	3	CDO											B	F								
CLDC-132.3	Cargo Visiting Vehicle (CaVV) IDD	3	CDO											B	F								
CLDC-133	Integrated Maintenance and Logistics Support	1/3	CDO																				
CLDC-133.1	IMLS Plan	1	CDO			B	F*	F*															
CLDC-133.2	IMLS Data	3	CDO				B	F															
CLDC-201	Mission Integration and Operations Management Plan (MIOMP)	2	CDO																				
CLDC-201.1	Destination Mission Integration and Operations Plan	2	CDO					B							F								
CLDC-201.2	Crew Transportation MIOMP	2	CDO					B							F								
CLDC-201.3	Cargo Transportation MIOMP	2	CDO					B							F								

DRD #	DRD Title	Type	OPR	Proposal	Delivery/Update Frequency																			Notes: D=Draft B = Baseline F = Final CA = Contract Award * = Whichever occurs earlier m=months; w=weeks; d=days
					Contract Award	CBR	PDR (if proposed)	CDR	MTRR	SSR	SIR	APR	DCR	SCR	MBR/VBR (L-18m)	MIR (L-12m)	UIR (L-6m)	FOUR (L-4m)	CIR (L-3m)	MCR (L-3m)	ORR (L-1m)	FRR (L-1w)		
CLDC-202	Mission Resource Allocation Document (MRAD)	2/3	CDO																					
CLDC-202.1	Crew Visiting Vehicle MRAD	2/3	CDO		See DRD																			See DRD for addtl deliveries
CLDC-202.2	Cargo Visiting Vehicle MRAD	2/3	CDO		See DRD																			
CLDC-203	Tactical Increment Execution Report (TIER)	2/3	CDO												B				F					
CLDC-204	Imagery Plan	2/3	CDO				B	F																
CLDC-205	Post Increment Report	2	CDO		Baseline 14d after Increment; Final 45d after Increment																			
CLDC-206	Visiting Vehicle Post Flight Report	2	CDO																					
CLDC-206.1	CTS Post Flight Report	2	CDO		See DRD																			
CLDC-206.2	CaTS Post Flight Report	2	CDO		See DRD																			
CLDC-207	Utilization Feasibility Assessment	2	CDO																					
CLDC-207.1	Individual Payload Feasibility Assessment	2	CDO												F								B: See DRD	
CLDC-207.2	Payload Complement Feasibility Assessment	2	CDO												B				F					
CLDC-208	Payloads Interface Requirements Document (IRD)	1	CDO																					
CLDC-208.1	Payloads/Destination Interface Requirements Document	1	CDO					B					F				F						B Applicability Matrix 6 weeks after payload kickoff meeting	
CLDC-208.2	Payloads/CSV Interface Requirements Document	1	CDO					B					F				F						B Applicability Matrix 6 weeks after payload kickoff meeting	
CLDC-208.3	Payloads/CaVV Interface Requirements Document	1	CDO					B					F				F						B Applicability Matrix 6 weeks after payload kickoff meeting	
CLDC-209	Unique Payload Interface Control Document (ICD)	1	CDO																					
CLDC-209.1	[Unique Payload] to [Destination] Interface Control Document (ICD)	1	CDO												F								Baseline ICD 3 mo. after the payload kickoff meeting; Final at MIR	
CLDC-209.2	[Unique Payload] to Crew Visiting Vehicle (CVV) Interface Control Document (ICD)	1	CDO												F								Baseline ICD 3 mo. after the payload kickoff meeting; Final at MIR	
CLDC-209.3	[Unique Payload] to Cargo Visiting Vehicle (CaVV) Interface Control Document (ICD)	1	CDO												F								Baseline ICD 3 mo. after the payload kickoff meeting; Final at MIR	
CLDC-210	Crew Specific Activities	2/3	CDO																					
CLDC-210.1	Crew Selection Evaluation	2	CDO		See DRD																			
CLDC-210.2	Crew Mission Evaluation	2	CDO																					
CLDC-210.3	Signed Crew Code of Conduct and Informed Consent	3	CDO																					
CLDC-211	Destination to Visiting Vehicle (VV) Integration (DVVI) Documentation	1	CDO																					
CLDC-211.1	DVVI Plan	1	CDO				B	F																
CLDC-211.2	DVVI Interface Requirements Document (IRD)	1	CDO			B	F*	F*																
CLDC-211.3	DVVI Data Set	1	CDO		To be negotiated																			
CLDC-211.4	DVVI Interface Control Document (ICD)	1	CDO				B	F																
CLDC-212	Crew Accommodations Plan	1	CDO											B	F									

1. DRD Title: Integrated Master Schedule (IMS)		
2. DRD No.: CLDC-001	3. Data Type: 3	4. OPR: CDO
5. Solicitation No.: 80JSC025R001	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☐ Administrative ☒ S&MA ☐
10. Description/Use: To provide NASA the Contractor's integrated program schedules using established standard processes, data structures and reporting conventions to plan, manage, and report the work required in the performance of this contract.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: The Draft IMS shall be due at proposal with the contents below: • Native Schedule File, referred to as Integrated Master Schedule (IMS) through the full period of performance • Native Schedule File Data Dictionary • Schedule Assumptions • Summary Master Schedule • Schedule Risk Assessment (SRA) Submission Frequency: <u>The Integration Master Schedule (IMS)</u> shall be delivered monthly and no later than the 5 th Government working day of the month. An updated Native Schedule Data Dictionary and Schedule Assumptions are required for any change following the initial submission due with the first affected IMS deliverable. Subsequent SRA shall be delivered: • Semi-annually, in April/October, with the delivery covering the prior month-end data • As part of Certification milestones Format: Native Schedule File and the Schedule Risk Assessment shall be delivered in Microsoft Project format and/or NASA approved format. For other data item deliverables, the Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment. Interrelationship: Statement Of Work (SOW) Section 2.4 Schedule Management Applicable Documents: • Government Accountability Office (GAO) Schedule Assessment Guide ◦ https://www.gao.gov/assets/690/687052.pdf • Integrated Program Management Data Analysis Report (IPMDAR) Implementation & Tailoring Guide		

Scope: The Integrated Master Schedule data contains:

1. Schedule: Integrated Master Schedule (IMS)
2. Native Schedule File Data Dictionary - Lists all defined fields, definitions, and code structures used within the Native Schedule File
3. Schedule Assumptions – Lists all major assumptions used to develop the IMS
4. Summary Master Schedule - A one-page, top level, Gantt-type schedule chart traceable to the IMS that summarizes the contracted effort including major milestones, critical path, and schedule margin
5. Schedule Risk Assessment (SRA) - Provides probability of meeting contractual delivery dates

Contents:1. Schedule:

- a. The IMS is an integrated, logically driven, network-based schedule that is vertically and horizontally traceable. Tasks should be at a level of detail to allow for discrete progress measurement and shall include visibility into the overall development flow which typically includes design, fabrication, assembly, integration, test, and delivery phase of each end item delivery. (Note – Task/milestone titles should be clear, concise, and reflect the scope and output (i.e., deliverable) so that the task content can be understood as standalone data without its associated summary level task also being shown.) Expectation for schedule quality is to follow GAO schedule best practices and schedule health checks.
- b. Tasks and milestones from subcontractors and the commercial launch vehicle providers shall be included within the prime contractor's IMS with sufficient detail to develop a realistic critical path. Their data shall be consistent, statused monthly, and based on the same cutoff date to enable a realistic critical path.
- c. The IMS shall have traceability to a Contractor specified Work Breakdown Structure (WBS) (or equivalent), subcontractor activity, and the Performance Work Statement. This traceability should be accomplished by using data fields provided within the scheduling tool.
- d. Custom/User-Defined Fields: Contractor shall reserve 7 schedule fields for the purpose of helping the Government navigate, analyze, and health-check the IMS. Fields shall include Schedule Margin, Lifecycle Review, Payment Milestones, Government Task Agreements (GTA)/Government Furnished Equipment (GFE), Critical Path, Mission Critical items (as defined by NASA), and Major Supplier Activity.
- e. The IMS shall clearly identify tasks or activities which have a dependency on a NASA delivery or approval (for example, delivery of a GFE), and the availability of a NASA facility.
- f. If schedule margin is included in the IMS, it shall be as a defined task and clearly labeled as "Schedule Margin" or "Contingency". (Note - Schedule margin is a determined amount of time that has been added to the schedule by the management team and is to be used and controlled by the project manager to buffer against future impacts that are impossible to predict.)
- g. The IMS should contain Level of Effort (LOE) identification. If LOE tasks (i.e., management, miscellaneous support, monitoring, etc.) are included within the IMS they should be clearly labeled as such. If LOE tasks are included, they shall be added in a manner that does not impact discrete tasks/milestones.
- h. Critical Path: The schedule tool shall automatically calculate the longest path in the Native Schedule File. If multiple critical paths are identified, the primary, secondary,

and tertiary critical paths should be identified using a custom field for Critical Path.

- i. Constraints: The IMS should use minimal constraints. However, if constraints are used, the IMS shall identify the constraints (including any deadlines) applied to tasks. Provide justification for all constraints external to the Native Schedule file.
- j. Leads/Lags: The IMS should minimize use of leads/lags duration. However, if leads/lags are used, the IMS shall provide justification.
- k. Fixed Unique Identifiers (UIDs) for activities (Text field if needed) shall be traceable from month to month; UIDs should not change or be reused for another activity.
- l. Maximum activity durations should not exceed 60 days. If an activity exceeds 60 days, provide justification.

2. Schedule Risk Assessment (SRA)

Report shall include:

- a. The SRA shall be accomplished using a standard probabilistic management tool with Monte-Carlo functionality. The results of the SRA must include the probability of meeting contractual deliveries and milestones in histogram/S-curve formats.
- b. The SRA results should include rank order “tornado diagrams” of both the risks and tasks affecting the completion of contractual milestones and deliverables.
- c. Reference Integrated Program Management Data Analysis Report (IPMDAR)
Implementation & Tailoring Guide Section 2.4.2.21

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

1. DRD Title: Commercialization Plan		
2. DRD No.: CLDC-002	3. Data Type: 3	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☐ Administrative ☒ S&MA ☐
10. Description/Use: The purpose of the Commercialization Plan is to describe the approach the Contractor plans, if any, to engage with commercial entities in partnerships for the purposes of creating additional revenue streams for the completion of the Commercial Low Earth Orbit (LEO) Destination Contract (CLDC). Additionally, the plan intends to better understand the Contractor's overall financial health and business plan. NASA is interested in being one of many customers for the Commercial Low Earth Orbit (LEO) Destination (CLD) System, and the CLDC Commercialization Plan will provide details necessary to ensure the proposed plan and financial status is reasonable and is in line with the proposed mission cost and cost levied to NASA.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline with Proposal. Submission Frequency: Quarterly Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment. Interrelationship: Statement Of Work (SOW) Section 2.1 Applicable Documents: None Scope: The Commercialization Plan describes the Contractors' financial status, CLD Market Opportunities, the financial assumptions/requirements, how the contractor is going to provide the service to the Market Opportunities and the revenue forecast from non-NASA entities. Contents: The Commercialization Plan establishes measurable performance goals and metrics measured against the contractors overall commercial segment business plan and defines the following: 1. Finance Plan that executes the scope of the CLDC contract in addition to payments made by NASA under the CLDC contract. Includes: a. Explanation of financial goals or fund raising (venture capital, partnerships, etc.) b. Sources of planned funding, including breakdowns of planned debt and equity sources, and details on the level of commitment(s), if any, obtained from these sources. c. Explanation of risks assumed by this financing plan and the planned approach to mitigating these		

risks to ensure continued successful performance under the contract.

- d. Finance Plan Milestones and schedule of milestone completion
- e. Company Ownership Structure

2. Financial Due Diligence documentation (provided quarterly):
 - a. Certified balance sheets, income and cash flow statements, changes in equity
 - b. Capital expenditures plans and performance to plan
 - c. Liquidity runway to outline available cash and monthly burn rate/(24-month outlook)
 - d. Workforce Overview
 - i. Staffing plan vs. actuals, by quantity and discipline/skill mix mapped to each major system and CLIN
3. Performance-to-plan for stated goals and metrics as defined by actual performance to plan which includes supplier and investor commitments, contracts, revenue, investments, financing, expenditures, and obligations. This should contain monthly and cum-to-date performance.
4. Variance analysis, including narrative explanation for major contributors, for planned vs. actual performance.
5. Forecasted plan for the next year, including expected supplier and investor commitments, contracts, revenue, investments, financing, expenditures, obligations, and variance recovery plans. Forecasts shall map to and explain how they are in alignment with the IMS. The forecast shall have the functionality to be mapped by module (if using a multi module architecture).
6. Revenue Forecast for 10 years
 - a. Revenue Generation Forecast for CLD Commercialization Opportunities (non-NASA)
 - i. Including secured, probable and at risk/speculative revenue
 - b. Correlation between Revenue Generation Forecast and Finance Plan
 - i. To fully understand its risk posture, NASA needs to understand the correlation between the Revenue Generation Forecast and the fund raising/financial goals of the CLD Contractor.
7. Year-end financial report (format provided to investors/shareholders).
8. Significant or impacting updates, changes, and risks to life-cycle planning, including finances, schedule, vendor selection, revenue strategy, major expenditures, etc.
9. Portfolio of products and services to be demonstrated and offered, including timing, and pricing strategy (if updated)
10. Business Development progress in capturing non-NASA markets including a status of commercial opportunities. Status should include information on signed contracts, Letters of intent, etc.
11. List of all major subcontractors, vendors, suppliers and partners describing scope and status of signed contracts and agreements with each, as well as Subcontracting and Partnership forward plans.
12. Report common commercial pricing model used to derive the common commercial value for services (seats, cargo, Destination services) and report the values and the details of the negotiated agreements or barter with sovereign nations and third parties in accordance with the American Taxpayer Clause.

Remarks: None.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes

shall be incorporated by complete reissue with a change log in the front matter of the document,

1. DRD Title: Organizational Conflicts of Interest (OCI) Plan		
2. DRD No.: CLDC-003	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <i>To be filled in by CO at contract award</i>	8. Date Revised: <i>To be filled in by CO at first revision of this DRD after contract award</i>	9. DRD Category: Technical ☐ Administrative ☒ S&MA ☐
10. Description/Use: The OCI Plan will communicate the Contractor's approach to identify and resolve OCIs. The Contractor will be held accountable for identifying, dispositioning, and reporting OCIs during contract performance.		
11. Distribution: One (1) electronic copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline Plan shall be submitted with the initial proposal. Submission Frequency: Final Plan shall be delivered 30 days after Contract Award. Subsequently, the plan shall be reviewed annually or submitted earlier if updates are required to reflect changes to the plan. If no changes to the plan are required, the Contractor shall submit a Program Authorized Repository Delivery Notice indicating this. Update when contractor teaming arrangements change and when new or potential OCI issues occur. Respond to CO with each Task Order Proposal whether update to the plan is required. Updated when requested by CO. Format: The Contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment. Interrelationship: • Statement Of Work (SOW) Section 2.1 • Clause NFS 1852.209-71, Limitation of Future Contracting • Clause NFS 1852.237-72, Access to Sensitive Information • Clause NFS 1852.237-73, Release of Sensitive Information • Clause FAR 52.203-13, Contractor Code of Business Ethics and Conduct Applicable Documents: • Federal Acquisition Regulation (FAR) Subpart 9.5, Organizational and Consultant Conflicts of Interest • NASA FAR Supplement (NFS) 1809.500, Organizational and Consultant Conflicts of Interest.		

Scope: The OCI Plan describes the contractor's comprehensive approach to identify, avoid, mitigate, neutralize, and report potential OCI issues, including conflicts described in the solicitation and those discovered during contract performance.

Contents: The Organizational Conflicts of Interest (OCI) Plan shall meet the requirements of FAR Subpart 9.5, Organizational and Consultant Conflicts of Interest and include the following:

1. Point of contact for OCI issues and reports.
2. Demonstrate an understanding of (1) OCI principles and (2) the full breadth of OCI issues and the types of harm that can result. The Plan at a minimum addresses the three primary types of OCIs (i.e., biased ground rules, unequal access to information, and impaired objectivity).
3. Define company roles, responsibilities, and procedures for (1) screening (i.e., identifying/recognizing, analyzing/evaluating, resolving, and reporting) existing and new business opportunities for actual/potential OCIs and (2) monitoring and reporting all potential/actual OCIs that arise, resolving conflicts, and reporting previously unidentified OCIs or potential OCIs to the Government.
4. Describe how employees are notified of the Plan's requirements and how this notification will be documented. Describe the training to be provided to Contractor and subcontractor personnel regarding potential OCIs on this contract. Establish and require entrance training for new employees, refresher training for existing employees, and exit training for departing employees. Describe how completion of this training will be documented, including a copy of any training certification template that the contractor will use to document that its employees have completed training.
5. Describe how the contractor will report breaches of the protective measures in the Plan to the Contracting CO. Describe what processes the contractor will implement following any breach and indicate that final resolution of the corrective action must be approved by the CO.
6. Identify any affiliated companies/entities (e.g., a parent company or a wholly owned subsidiary) and procedures for coordinating OCIs with such affiliated companies/entities.
7. Address the process for reporting all potential/actual OCIs that arise during performance of the contract to the CO. An OCI report shall include:
 - a. a description of the conflict,
 - b. the plan for resolving the conflict, and
 - c. the benefits/risks to contract performance associated with plan approval/acceptance.
8. Specific resolution strategies shall be appended to the Plan upon approval by the CO.
9. Explain how the contractor will flow down the provisions of this Plan to any subcontractor that may have a conflict with regard to performing the requirements of this contract. Discuss affected subcontractors' OCI program as it relates to this contract and specifically explain how affected subcontractors will identify, resolve, and report actual/potential OCIs associated with this contract.
10. Define organizational and employee sanctions for violations of established OCI procedures/requirements/guidelines.

11. Include an assertion from the Contractor that to the best of their knowledge no OCIs exist currently, if applicable. Provide a list of all the prime and subcontractor's current contracts and subcontracts (NASA and non-NASA) with a description of the work performed, which would provide the CO a better understanding of other work performed by the Offeror that may give rise to an actual or potential conflict. For each prime contract and subcontract listed, the offeror shall: (1) identify the contract number; (2) describe the scope of work in sufficient detail to ascertain the likelihood of a conflict with performance of this contract; and (3) discuss any conflicts that may arise from performance of the listed contracts and award of this contract.
12. For financial or other interests or relationships beyond Federal contracts or subcontracts that may give rise to an OCI, the offeror shall (1) address the nature and extent of the interest(s) or relationship(s); (2) list any entity or entities involved in the interest(s) or relationship(s) and award of this contract.
13. The Contractor shall address how it will avoid, neutralize, or mitigate each potential OCI listed above. Sufficient information must be provided to allow a meaningful evaluation of the potential effect of the interest on the performance of the SOW.
14. Include a requirement to update this plan as necessary to address specific OCIs. All updates to the plan must be approved by the contracting officer and the updates/changes must be incorporated in the contract to be effective.
15. Require periodic self-audits to ensure compliance with established OCI procedures/requirements/guidelines.
16. Define records related to the OCI plan (e.g., training and audit records) that will be made available to the Government upon request. Note: The OCI Plan as outlined in this DRD is not for the purpose of addressing other very important contractual obligations such as (1) the contractor's obligation to protect sensitive information in accordance with NFS 1852.237-72, Access to Sensitive Information, (2) the contractor's obligation to conduct business in an ethical manner in accordance with FAR 52.203-13, contractor's Code of Business Ethics and Conduct, and (3) the contractor's obligation to prevent personal conflicts of interest in accordance with FAR 52.203-16, Preventing Personal Conflicts of Interest.
17. In an appendix to the OCI Plan identify the strategy (e.g., mitigation, limitation on future contracting) for resolving each OCI that is either identified in the solicitation or created by the requirements of the solicitation/contract and explain the effect of such strategy on performance of the contract. If using a firewall, explain how these actions will operate to successfully address the conflict without adversely affecting performance of the contract. (Note: Specific plans to limit future competition are reflected in the clause at NFS 1852.209-71, Limitation of Future Contracting.)

Remarks: The final plan, as approved, shall be incorporated in the contract as Attachment J-07, Organizational Conflicts of Interest (OCI) Plan.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated and 2) Redlined version showing the updates made since the last submittal.

1. DRD Title: Information Technology Security Plans (ITSP)		
2. DRD No.: CLDC-004	3. Data Type: 2	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: These plans provide the Government insight into the Contractor's methodology for managing all aspects of information security and ensures critical components are addressed for IT resources developed, processed, or used under this contract. The Information Technology Security Management Plan (ITSMP) provides the approach for managing personnel and processes whereas the Information Technology Security Plan (ITSP) provides the specific reporting requirements for all Information Technology (IT) systems utilized during work associated with this contract and necessary training requirements. Both plans will follow Clause NFS 1852.240-76, Security Requirements for Unclassified Information Technology Resources latest revision.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline ITSMP – At Contract Award Baseline ITSP - for Contractor-owned systems, within thirty (30) working days after Contract Start. Initial submission not required for existing, approved plans for Government-owned and Contractor-managed systems. For new Federal Information Systems, due with the delivery of the system. Non-Federal System Certification: Prior to any transfer of NASA non-public information to the contractor, the contractor shall provide documentation of the certification of the non-federal system to the security officer of the CDO Program Planning & Control Information Technology Manager and to the CDO (COR) Submission Frequency: ITSMP - Annual revalidation or resubmittal of ITSMP contents No Later Than (NLT) September 30th each year. ITSP(s) - Annual revalidation or resubmittal of ITSP contents NLT September 30th each year. Format: The Contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment Interrelationship: Statement Of Work (SOW) Section 2.7 Information Technology (IT) Applicable Documents: Most current versions of the following:		

- FAR 52.204-21, Basic Safeguarding of Covered Contractor Information Systems
- FAR 52.204-30, Federal Acquisition Supply Chain Security Act Orders-Prohibition
- FISMA 2014, Federal Information Security Modernization Act 2014
- NFS 1852.240-76, Security Requirements for Unclassified IT Resources
- NFS 1852.223-75, Major Breach of Safety or Security
- NFS 1852.237-72, Access to Sensitive Information
- NFS 1852.237-73, Release of Sensitive Information
- NIST SP 800-171, Protecting Controlled Unclassified Information in Nonfederal Systems and Organizations
- NIST SP 800-53, Security and Privacy Controls for Information Systems and Organizations
- NIST SP 800-161, Cybersecurity Supply Chain Risk Management Practices for Systems and Organizations
- NPR 1382.1, NASA Privacy Procedural Requirements
- NPD 2810.1, NASA Information Security Policy
- NPR 2810.1, Security of Information and Information Systems
- NPR 2810.7, Controlled Unclassified Information
- NPR 7120.7, NASA Information Technology Program and Project Management Requirements
- OMB Circular A-130, Management of Federal Information Resources

Scope: All contracts that purchase, lease, network to, or otherwise utilize Government- funded IT (as defined by the Clinger-Cohen Act of 1996 and referenced by Office of Management and Budget (OMB) Circular A-130 must comply with NASA IT Security Requirements.

An ITSP is specific to a system or group of systems, while an ITSMP is defined as the elements a contractor has outlined to meet the IT Security requirements for interfacing with other contractors and NASA, training requirements and meeting the requirements in NPR 2810.1(series), NASA Information Security Policy.

Contents:

The Federal Information Security Modernization Act (FISMA) and Executive Branch policy require external providers that process, store, or transmit federal information or operate information systems on behalf of the federal government to meet the same security and privacy requirements as federal agencies.

Information Technology Security Management Plan (ITSMP)

The Contractor shall submit an ITSMP for its unclassified technology information resources. This plan shall describe the policy, processes, and procedures that will be followed to ensure appropriate security of Information Technology (IT) resources that are developed, processed, or used under this contract. The Contractor's ITSMP shall be compliant with the IT security requirements in accordance with Federal and NASA policies as referenced in OMB Circular A-130, Managing Information as a Strategic Resource and NPR 2810.1(series), NASA Information Security Policy.

The ITSMP shall include, at a minimum, the following:

1. Contractor's information security Points of Contact, including roles and responsibilities.
2. A description of policies, processes, and/or procedures for:
 - a. Meeting all applicable security assessment & authorization requirements, including but not limited to development and maintenance of ITSPs, including external IT systems, implementation and validation of security controls, security assessment, authorization, and continuous monitoring

- in accordance with NASA directives and guidance.
- b. Addressing all applicable information security requirements, including vulnerability scanning and mitigation, maintaining secure operating system configuration, patch/configuration management, contingency planning, and protection of sensitive data in transit and at rest.
- c. Information security, privacy, incident management and responses, including coordination with NASA Security Operations Center (SOC), Center Chief Information Security Officer (CISO), and Center Privacy Manager as required. The contractor shall immediately notify the NASA SOC, CO, and COR once an incident has been identified.
- d. Ensure the Contractor employees meet information security requirements, such as information security awareness, rules of behavior, and elevated privilege training as required. Users are knowledgeable of NASA information security policies and procedures when handling NASA data.

Information Technology Security Plan (ITSP)

The Contractor shall submit an ITSP for its unclassified technology information resources. This plan shall describe the data protections implemented to meet the requirements in NIST Special Publication 800-171 , “Protecting Controlled Unclassified Information in Nonfederal Systems and Organizations” at the revision number required at the issuance of the contract.

The ITSP shall include the following:

1. Information System Security Plan:
 - a. The Contractor shall have an Information Systems Security Officer who is responsible for the contractor’s system(s) in accordance with the definitions set forth in NASA Policy Directive 2810.1, “NASA Information Security Policy” and NASA Procedural Requirement (NPR) 2810.1, “Security of Information and Information Systems.” The ITSP shall be kept up to date as changes to the baseline configuration of the system occur and shall be documented in the IT Security Plan.
2. Non-Federal System Security Certification:
 - a. When the contractor will receive, process, store or transmit NASA non-public information, especially Controlled Unclassified Information (CUI) including Personally Identifiable Information (PII) on a non-federal system (e.g., the contractor’s corporate system) the system must meet the requirements for data protections detailed in NIST Special Publication 800-171, “Protecting Controlled Unclassified Information in Nonfederal Systems and Organizations.”
 - b. This documentation may take the form of:
 - i. A third-party review/audit certifying that the non-federal system meets the requirements of NIST SP 800-171 or equivalent standard of information protection, such as the ISO 27001 standard.
 - ii. A certification from another federal agency such as the DOD Cybersecurity Maturity Model Certification (CMMC) Level 2.
3. Incident Notification:
 - a. The contractor shall report immediately upon notification any incident involving NASA information on nonfederal (contractor) systems to SOC@nasa.gov.
4. IT Security Point of Contact:
 - a. The contractor shall identify a point of contact that NASA may reach in its attempt to address IT and cybersecurity issues. The point of contact shall have the authority to ensure the immediate notification of the NASA Security Operations Center of any incident involving NASA information.

5. IT Security Awareness Training:
 - a. Contractor employees subject to this contract, defined as those requiring physical access to NASA facilities or electronic access to NASA systems, shall complete the NASA approved IT Security Awareness Training annually. NASA Cybersecurity and Privacy Awareness training is available through the SATERN online system and must be completed prior to access to NASA information and systems. Completion of the training is tracked automatically by NASA and must recur each year by the anniversary of the initial training as a condition of continued access. Cybersecurity and Privacy training is updated throughout the year as needed, so there is no defined training period.
6. IT Security Role Based Training:
 - a. Contractor employees subject to this contract shall complete NASA's Foundational IT Security Training in SATERN related to the following role-based functions prior to performing the role:
 - i. IT Security Manager
 - ii. Information System Owner (ISO)
 - iii. Information Systems Security Officer (ISSO)
 - iv. Information System Security Engineer (ISSE)

It is highly recommended, but not required, that Contractor employees complete advanced role-based training every other year following completion of the initial training provided by NASA. This training is also provided by NASA but may be fulfilled externally. If fulfilled externally, the Contractor shall provide the "External Role- Based Training Validation Form" to the center CISO. The process for completing this form and receiving credit may be found at: External RBT Validation Form (sharepoint.com).
7. Information On Employees in Sensitive Position(s)/Assignments Report:
 - a. The Information on Employees is Sensitive. IT Security (ITS) Positions/Assignments Report shall provide information annually for personnel screening as required by NPR 2810.1(series), and NPR 1600.1 on position risk.

Remarks: None

Maintenance:

Updates to these documents shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

1. DRD Title: Export Control Plan		
2. DRD No.: CLDC-005	3. Data Type: 2	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☐ Administrative ☒ S&MA ☐
10. Description/Use: Describes the Contractor's approach for Export Control activities that involve the transfer of commodities, software, technical data, technology, defense services, and/or technical assistance to foreign entities related to the performance of contract requirements. Export Control transactions are regulated by export control laws to protect U.S. national security interests and to further U.S. foreign policy objectives. These are primarily codified in the International Traffic in Arms Regulations (ITAR) 22 CFR pts. 120-130 and the Export Administration Regulations (EAR), 15 CFR pts. 730-774, that are administered by the Departments of State and Commerce, respectively. This plan will be in compliance with Clauses NFS 1825.1103-70 Export Control and NFS 1852.225-70 Export Licenses		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline due thirty (30) calendar days after contract award Submission Frequency: The plan shall be reviewed annually for currency and submitted by September 30th if updates are required to reflect changes to the plan. If no changes to the plan are required, the Contractor shall submit a delivery Notice to indicating this. Format: The Contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment Interrelationship: Statement Of Work (SOW) 2.7 Export Control Management Applicable Documents: • NPR 2190.1, NASA Export Control Program • NPD 2190.1, NASA Export Control Program • NAII 2190.1, NASA Advisory Implementing Instruction NASA Export Control Program Operations Manual • JWI 2190.1, JSC Work Instruction JSC Export Compliance • JAII 2190.1, JSC Advisory Implementing Instruction, Export Services Team (EST) Operations Manual Scope: The plan shall describe export control activities related to performance of contract requirements. Contents:		

The Contractor shall prepare and submit an Export Control Plan (ECP), describing the Contractor's planned approach for accomplishing contract functions while adhering to export laws, regulations, and directives, including International Traffic in Arms Regulations (ITAR) and Export Administration Regulations (EAR). The plan shall include an explanation of expected exports, approval process and authorities used, and managing of foreign nationals in complying with export control laws.

The ECP shall address these elements of their export control program:

Element 1: MANAGEMENT COMMITMENT

Element 2: RISK ASSESSMENT

Element 3: EXPORT AUTHORIZATION

Element 4: RECORDKEEPING

Element 5: TRAINING

Element 6: AUDITS

Element 7: HANDLING EXPORT VIOLATIONS & TAKING CORRECTIVE ACTIONS

Remarks: None

Maintenance:

Updates to these documents shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

1. DRD Title: Configuration Management Plan		
2. DRD No.: CLDC-006	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☐ Administrative ☒ S&MA ☐
10. Description/Use: This plan shall describe the assignment of responsibility organizationally and the procedures used in the accomplishment of the specific Configuration Management (CM) requirements, processes, and procedures, as stated in the Statement Of Work (SOW).		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline (B) at Certification Baseline Review (CBR) Submission Frequency: Final (F) at Critical Design Review (CDR). Update as required to reflect changes that affect CM implementation. Format: The contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment Interrelationship: Statement Of Work (SOW) Section 2.8 Configuration Management Applicable Documents: • SAE-EIA-649-2, Configuration Management Acquisition Requirements for Aeronautics and Space and • AS9100, Quality Management System Requirements for Aviation, Space and Defense Organizations Scope: The CM Plan defines the requirements, responsibilities, and processes and procedures for the Contractor's CM system pursuant to SAE-EIA-649-2, Configuration Management Acquisition Requirements for Aeronautics and Space and AS9100, Quality Management System Requirements for Aviation, Space and Defense Organizations. The CM plan shall describe in relation to the elements below to the Contractor's CM organization, policies, procedures, implementation approach, and control systems that are to be used to ensure proper performance of CM activities. The CM plan shall also describe the configuration management activities, policies, and systems to be employed to support the NASA change evaluation and control process for the approval of program requirements as well as for the submission of Variances. Contents: The Configuration Management (CM) Plan shall address, at a minimum, the following: 1. Management Organization a. Responsibility and authority for CM including roles in configuration control boards and technical reviews.		

- b. Interface between contractor's CM organization and NASA, subcontractors, and other contractor's/contracts, including remote access for NASA and NASA support contractors.

2. Configuration Identification

- a. Selection of Configuration Items (CIs) (hardware, Computer Software Configuration Items [CSCIs], and firmware).
- b. Establishment of the functional, allocated, and product baselines for hardware and software.
- c. Assignment of configuration identifiers including serial numbers, part numbers, lot codes, software, and firmware identifiers.

3. Configuration Control

- a. Establishment of internal configuration and contractual baselines.
- b. Implementation of internal configuration control.
- c. Establishment of configuration control boards and processes.
- d. Identification of processes to control changes, and variances to program baselines.

4. Configuration Status Accounting

- a. Hardware/Software configuration Status Accounting processes and provisions for reports and/or access to Configuration Status Accounting data.
- b. Description and methods of processes and tools to provide:
 - i. Identification of current approved configuration documentation and configuration identifiers associated with each CI.
 - ii. Status of proposed engineering changes from initiation to implementation.
 - iii. Variance status and processing.
 - iv. Results of configuration audits; status and disposition of discrepancies.
 - v. Traceability of changes and confirmation of change incorporation.
 - vi. Methods of access to information.
- c. Retention of historical data.
- d. Systems and tools (including data elements).

5. Configuration Verification/Audits

- a. Audit conduct, policies, procedures, documentation, access, and support.
- b. Processes, plans, schedules for internal CM audits and subcontractor CM audits.

6. Data Management

- a. Development, approval, release, and submittal of configuration data/documentation (including drawings) in relation to program and contractual events (DRDs, technical reviews, Certification of Flight Readiness, etc.).
- b. Plan for subcontractor data management deliveries/control access.
- c. Establishment and operation of Engineering Release Unit and CM receipt desk.
- d. Process for documentation control (i.e., Document change notice).
- e. Retention of historical data.

f. Systems and tools.

7. Requirements and Verification Management

1. Description of how CM hardware requirements and verification will be managed.
2. Approach for documenting verification and variance approvals from NASA.

8. Engineering Drawing Management

1. Description of any institutional Computer-Aided Design (CAD) modeling, schematic generation, and drawing systems
2. Description of how CAD models, schematics, and drawings are to be reviewed and released; revised; number assignment and control.

9. Data and Records Management

- a. The plan shall define the scope and depth of the Contractor's efforts including management, organization, planning, and implementation. The plan shall include the following elements:
 - i. data and records identification
 - ii. data and records control
 - iii. data and records status accounting
 - iv. data and records acquisition
 - v. data and records management and verification
 - vi. data and records management organization
 - vii. data and records storage and retrieval procedures
 - viii. subcontractor procedures
 - ix. special restrictions
 - x. process to transition data and records at contract end

Remarks: None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and redlined version showing the updates made since the last submittal.

1. DRD Title: Environmental Compliance Reports		
2. DRD No.: CLDC-007	3. Data Type: 3	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>To be filled in by CO at award</i>
7. Date Issued: <u>Insert date the baseline was issued</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☐ Administrative ☒ S&MA ☐
10. Description/Use: Used to compile environmental compliance data for programs oversight and accurate reporting in accordance with state and federal regulatory agencies, Executive Orders, NASA HQ, and JSC environmental compliance programs requirements. The reports include, but are not limited to, waste generation/reduction, ozone depleting substances, and sustainable acquisitions. This DRD is only applicable if the contractor is performing work at Johnson Space Center under this contract in accordance with Clause JSC 52.223-94 JSC ENVIRONMENTAL COMPLIANCE (FEB 2025).		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR 3. JSC Environmental Management Office/JE111 Initial Submission: If applicable – Baseline due December 1 st following contract award. Submission Frequency: If applicable – Annually, delivered No Later Than (NLT) December 1 of each year to the Johnson Space Center (JSC) Environmental Office Format: Contractor's format is acceptable, unless information in the sections below outline a specific format, and shall be in accordance with Data Format section at the beginning of this attachment Interrelationship: 1. Statement Of Work (SOW) Section 2.1, Program Management 2. Clause JSC 52.223-94 JSC ENVIRONMENTAL COMPLIANCE (FEB 2025) Applicable Documents: 1. JPR 8550.1, JSC Environmental Compliance Procedural Requirements 2. JPR 8553.1, JSC Environmental Management System Manual Scope: The reports outlined below shall be submitted at the frequency and format specified. Fiscal year is defined as the period from October 1 through September 30. Reports shall not combine more than one fiscal year. If the contract is for only a portion of the fiscal year, the reports shall be submitted for that portion of the fiscal year. When a contract ends or is terminated prior to the end of a fiscal year, the Contractor shall provide reports for the activities performed during the period of performance that the contract was in effect and the final reports shall be submitted no later than 30 days of the contract end date. If upon concurrence from the JSC Environmental Management Office ("EMO") Chief and approval from the CO/COR, any report described herein is deemed not applicable and/or there is no data to report, the report to JSC EMO shall have a statement to that effect, including the Contractor certification that reporting will be		

initiated/resumed if the Contractor's (or subcontractor's) activities trigger any of the required reports. Because the Center Director compiles data and certifies environmental compliance reports, the Contractor shall include a certification statement within each required report, indicating that all the information provided is true, accurate and complete, and that the Contractor's representative is aware that there are civil and criminal penalties for submitting false information, including immediate contract termination

For Section I (Annual Sustainable Acquisition Report), where the Contractor does not purchase any designated product during the fiscal year, the report shall be a statement to that effect. For Section III (Ozone Depleting Substances Report), if the Contractor does not purchase, own, operate, maintain, or repair Ozone Depleting Substances (ODS) equipment on-site; or does not store, purchase or use ODS chemicals, the report shall be a statement to that effect.

Because the Center Director accepts liability for environmental reporting, the Contractor shall include a certification statement within each required report that all of the information provided is true, accurate and complete, and that the Contractor's representative is aware that there are civil/criminal penalties for submitting false information.

Contents:

1. Annual Sustainable Acquisition Report

The Contractor shall track and report each November 1 to the JSC EMO the following information regarding the purchase by the Contractor (including subcontracts) of all designated items* on the U. S. Environmental Protection Agency's Comprehensive Procurement Guideline (CPG) list and items on the U. S. Department of Agriculture Farm Bill Bio-Preferred list:

- a. For each designated item, the total amount of each designated item purchased during the previous fiscal year in \$ and quantity;
- b. For each designated item, the total amount of each designated item purchased during the previous fiscal year that met at least the minimum required percentages of recycled or biobased content in \$ and quantity;
- c. The number of waivers obtained/granted for each designated item during the previous fiscal year, using JF1121 (Request for Sustainable Acquisitions Waiver Form) or equivalent and their respective rationales**;
- d. The total amount purchased for each designated item that did not meet the minimum content requirements, but had an approved waiver during the previous fiscal year in \$ and quantity;
- e. A narrative explanation of any technical impediments or other barriers for purchasing designated items that did not meet sustainable acquisition content requirements during the previous fiscal year; and
- f. A list of any waivers granted and their respective rationales** for any designated energy-consuming items. All waiver requests for designated energy-consuming items for onsite use must be revised and approved by the JSC Energy Manager.
- g. Where the Contractor does not purchase any designated product during the fiscal year, the report shall be a statement to that effect.

* Designated items (products and services) and their requirements are listed on the General Services Administration's Green Procurement Compilation Tool, available at <https://sftool.gov/greenprocurement>.

** The only sustainable acquisitions waiver rationales currently acceptable at JSC (evidence shall be included with each waiver submitted for approval, in order to demonstrate the rationale presented) are:

- i. The use of minimum content standards would result in inadequate competition (items not available competitively from two or more sources);
- ii. The items meeting content requirements are only available at an unreasonable price (10% higher life-cycle cost than non-compliant products);
- iii. The items meeting content requirements do not meet quality/performance specifications or standards; or
- iv. The items meeting content requirements are not available within a reasonable time frame.

The JSC EMO will provide upon request an electronic spreadsheet for the Contractor to complete, in order to submit the Annual Sustainable Acquisition portion of this DRD. The Contractor shall contact the JSC Environmental Info Line at 281-483-6207 or send an email to JSC-Environmental-Office@nasa.gov within 15 days of contract award, to get a copy of the latest version of this spreadsheet and seek guidance on accurate recordkeeping and reporting.

2. Industrial and Hazardous Waste Minimization, Pollution Prevention, and Recycling

The Contractor shall implement and accurately document efforts to avoid the generation of industrial solid and hazardous waste requiring offsite disposal (e.g. incineration and landfilling). Construction and Demolition (C&D) waste disposal in landfills shall likewise be minimized, and efforts to divert C&D waste from landfills will be documented so as to achieve the JSC prescribed diversion rate goals. See section II.b, for additional requirements applicable to C&D activities or contracts. The Contractor shall actively participate in JSC and NASA sustainability program initiatives, including but not limited to energy and water use reduction, process equipment and supplies excessing through the JSC Redistribution and Utilization (R&U) Office, pollution prevention/waste reduction, composting and recycling programs (e.g. paper, cardboard, scrap metals, wood, plastic, etc).

a. Annual Report on Waste Reduction/Pollution Prevention Activities

The Contractor shall track and accurately report to JSC EMO, each November 1, any new process improvements or programs undertaken by the Contractor (or subcontractors) that have contributed to pollution prevention or waste reduction (hazardous and non-hazardous) during the previous fiscal year. Waste reduction means preventing or decreasing the amount of waste that would normally go to the landfill (trash) being generated through waste prevention***, reuse, recycling****, or purchasing recycled and environmentally preferable products. The information will be included in JSC's annual report to NASA HQ on waste generation and reduction activities. Limit responses to one page or less per item. The response should include a description of the activity, the materials or wastes generated, reduced, an estimated volume or weight of reduction for each line item, whether onsite recycling or reuse programs were utilized, and a contact name and phone number for a person knowledgeable about the reduction activity. Additional information may be required in accordance with regulatory, Agency or Center-specific requirements. The Contractor shall contact the JSC Environmental Info Line at (281) 483-6207 or send an email to JSC-Environmental-Office@nasa.gov within 15 days of contract award and annually thereafter, to inquire about reports format changes and obtain a copy of any applicable report spreadsheet or report template forms and seek guidance on accurate recordkeeping and reporting.

*** Waste prevention means any change in the design, manufacturing, purchase, or use of materials or products (including packaging) to reduce their amount or hazardous nature before they are discarded.

**** Recycling means the series of activities, including collection, separation, and processing, by which products or other materials are recovered from the solid waste stream for use as raw materials in the manufacture of products, other than fuel for producing heat or power by

combustion.

b. For Construction/Demolition/Facility Modification Activities Only

If the Contractor engages in activities associated with construction, facility modification, or demolition projects, the Contractor shall track and report to JSC EMO the total weight (in pounds) of material generated, sent to incineration or landfill, and materials diverted from landfill/incineration by media (e.g. scrap metal, wood, concrete, soil, building materials, steel, tiles, carpet, glass, furniture, etc), any recycling revenues/proceeds obtained and if those proceeds went to the JSC Recycling funds or not. This report shall also include activities performed by subcontractors working under the Contractor's purview. The Contractor shall note any shipments or waste streams managed by the JSC EMO or any others onsite program to avoid double counting. The report shall not combine more than one fiscal year and is due within 30 days of completion of all waste generating and recycling activities and final waste shipments associated with the project (or project end), and in no case shall the submittal be later than November 1. The Contractor shall include with the report submission to JSC EMO, copies of the waste/materials shipment document (e.g. Bill of Ladings) and recycling receipts (rebates). The Contractor shall use JF 845, Construction and Demolition Recycling Record, or an approved equivalent format, to report this data.

c. Monthly Recycling/Waste Diversion Report – For Non-Construction or Demolition Activities Only

If the Contractor, or subcontractors working under the Contractor's purview, engage in waste generation activities (other than Construction and Demolition covered in section II.b) associated with the collection, management, and sale of recyclable materials/equipment and diverts those materials/equipment wastes from landfill or incineration, the Contractor shall track and report the monthly amounts and types of waste/material generated/recycled (or diverted from landfill or incineration), any associated costs and the proceeds from the sale of the recyclable materials managed by the contract. Recyclables materials that the contractor may be managing in the performance of the contract include, but would not be limited to: mixed paper, cardboard, plastic/glass bottles, aluminum cans, organic material diverted to onsite/offsite composting, pallets (wooden/plastic), scrap metal, aluminum, glass and wood products, concrete, soil/dirt, office supplies, electronics, excess property for sales/donations/recycling/reuse or reconditioning, recyclable resins/catalysts sent for reuse or reconditioning, and other recyclable materials/products including authorized industrial solid wastes such lamps, batteries and spent tires. . The report shall be submitted to the JSC EMO by the 15th of each calendar month. Data reported shall include pounds generated and shipped for each type of waste/material, revenue received, and recycling/disposal costs for each type of waste or recyclable material for the previous calendar month. If data is not available at that time, the report shall note the unavailable data and provide it with the next available month's submission, specifying when the amounts are for the previous month.

The Contractor shall ensure that the destination facilities and haulers have all the necessary permits, licenses, or registrations to operate, and have been approved by the JSC EMO prior to use. The contractor shall also ensure that that any associated haulers record their entry and exit weights on the log sheets at the scales at JSC Building 420 for every waste/material pickup. If the B420 scale is not functional or inaccessible, weights shall be tracked through weight tickets or haul tickets. The Contractor shall segregate data in the report based on the site the shipment/hauls were sent from, (e.g. JSC, Ellington Field, SCTF, or El Paso Forward Operating Location). As applicable, the Contractor shall include with the report submission, copies of the waste/materials shipment document (e.g. Bill of Ladings) and recycling receipts (rebates) to JSC EMO. The

Contractor shall also indicate in the report the specific amount of proceeds going to the JSC Recycling Fund. The Contractor shall reach out to the JSC EMO upon contract award (email: JSC-Environmental-Office@nasa.gov), or at least 30 calendar days prior to starting any waste/materials shipment or diverting activity to obtain an updated report spreadsheet addressing regulatory or NASA-specific reporting requirements and confirm that the destination facilities/haulers to be used have been approved by EMO. If the JSC recycling or waste disposal program changes, the Contractor must immediately alter their reporting to be consistent with the changes to ensure that the Government has a complete and accurate picture of the recycling programs. If data is not available at that time, the report shall note the unavailable data and provide it with the next available month's submission, noting what the amounts are for the previous month.

Additional Requirement for Custodial Activities Only, as applicable

In addition to the information above, the report shall also include the number of hauls/relocations, cost per haul, fuel fees, rental fees, franchise fees, relocation fees, and any additional fees associated with disposal/recycling and recycling receipts (rebates). Weights shall be segregated by waste type, site and location (e.g. building).

3. Ozone Depleting Substances Reports

The Contractor shall track and accurately report each November 1 to the JSC EMO, the following information for the previous fiscal year, related to ODS equipment that the contractor purchases, owns, operates, maintains, or repairs on-site:

- a. A list of the names of all EPA-Certified service technicians employed and their certification dates;
- b. A list of any ODS recovery/recycling equipment that will be used and copy of the 40 CFR 82.162 EPA registration;
- c. A list of any refrigeration/air conditioning units with a full charge of more than 50 pounds, not previously reported, including:
 - i. Any identifying equipment numbers,
 - ii. The location of the equipment (building/room),
 - iii. The owning organization or contract name and number,
 - iv. A narrative description of the equipment, and
 - v. Refrigeration or air conditioning equipment with a full charge of > 50 pounds, permanently removed from service during the year; and
- d. For each ODS chemical stored, purchased, or used, track and report each December 1 for the previous fiscal year:
 - i. ODS Chemical Name,
 - ii. Quantity stored (pounds),
 - iii. Quantity purchased (pounds), and
 - iv. Quantity used (pounds).

The reports may be submitted, preferably electronically, in a format determined by the Contractor as long as all required elements are addressed or included. Where the Contractor does not purchase, own, operate, maintain, or repair onsite equipment containing ODS or does not store, purchase, or use listed ODS chemicals, the annual ODS report shall be a statement to that effect.

4. Quarterly/Annual Hazardous Material Inventory Reports

The contractor shall keep an inventory and report on the hazardous materials (defined by the JSC Environmental Clause 52.223-94) used and accumulated onsite, using the prescribed methods and forms described, and at the frequency specified in Chapter 9 of JPR 1700.1 and the JPR 8550.1. The data are collected and submitted electronically; consequently, a simple acknowledgement that the Contractor's information has been uploaded is sufficient for

reporting purposes.

5. Associated Contractor Agreements (ACA)

During the contract phase-in period and no later than 90 days of contract start, the Contractor shall develop, maintain, and update, as necessary, an Associated Contractor Agreement (ACA) with the EMO Environmental Support Services Contractor (ESSC), specifying the nature of the required reports, frequencies, and expectations for timely, accurate, and complete documentation and overall compliance with JSC applicable environmental compliance requirements. The Contractor shall send notification to the CO, COR and EMO, within 15 days of ACA execution or updates/changes, as applicable, specifying the nature of the ACA requirements and applicable changes made. Within 90 days of contract start, the Contractor shall notify the CO, COR and EMO on the status of the ACA negotiations (unless the ACA is executed prior to this date) or submit data supporting that this requirement should be waived. Note that the Contractor may voluntarily submit to the CO, COR and EMO Office, a copy of the referenced ACA.

6. Other Environmental Documentation

Depending upon the contractor's activities, the Contractor shall provide the applicable environmental reports and documentation (e.g., recordkeeping forms or logs) identified in JPR 8550.1 in the form or formats specified and at the frequencies indicated. As applicable and per JPR 8550.1, the Contractor will utilize specified NASA forms available through the NASA Electronic Forms portal (NEF) or other authorized systems, for reporting purposes. The Contractor shall keep relevant complete and accurate documentation, including calculations, supporting the information reported and made them available to NASA or its designees upon request.

If any report described in this Environmental Compliance Report DRD is deemed not applicable, the Contractor shall seek and obtain written concurrence from the CO, COR, and the Chief of the JSC Environmental Management Office (EMO), in order to obtain a waiver. Waived reports to the JSC EMO shall have a statement to that effect, including a Certification from the Contractor stating that the required reports will be initiated/resumed if the contractor's or its onsite subcontractor's activities trigger the waived reporting requirements.

7. White Sands Test Facility (WSTF)

Contractors performing work activities at the White Sand Test Facility located in Las Cruces, New Mexico, shall meet WSTF operational and environmental compliance reporting requirements, which may be different and more stringent than those applicable to the JSC facilities located in the state of Texas. Therefore, contractors shall seek timely guidance from the WSTF environmental office on accurate and complete reporting and recordkeeping requirements.

Remarks: None

Maintenance:

Updates to these documents shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

1. DRD Title: Small Business Subcontracting Plan and Reports		
2. DRD No.: CLDC-008	3. Data Type: 1	4. OPR: CDO & Office of Small Business Programs (BA)
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: January 2026	9. DRD Category: Technical ☐ Administrative ☒ S&MA ☐
10. Description/Use: To describe the Contractor's planned approach to Small Business Subcontracting and their reporting against this plan.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Final Subcontracting Plan with Proposal Submission Frequency: 1. Subcontracting Plan: a. Approval – Prior to contract award. b. Frequency –To be updated in accordance with FAR 19.302-1(d) or 90 days prior to expiration date of existing subcontracting plan 2. Reports: a. The contractor shall submit subcontracting data semi-annually and at contract completion to the Subcontracting Plan Reports (SPR). b. All contractors are required to register and file both types of subcontracting reports using the SPR system. through <u>SAM.gov</u>. c. Per FAR 52.219-9(d)(10)(ii), the contractor shall submit an Annual Progress Report to the Contracting Officer to address the extent of compliance with the Small Business Subcontracting Plan. The Annual Progress Report is due within 15 days at the end of each contract year. Format: The Contractor's format is acceptable for the plan shall be in accordance with Data Format section at the beginning of this attachment. Reporting shall be in compliance with NFS 1852.219-75, Individual Subcontracting Reports. and FAR 52.219-9(d)(10)(ii). Interrelationship: • Statement Of Work (SOW) 2.1 Program Management • Clause L.15.3 Mission Suitability Factor – Volume II (Subfactor 3. Small Business Utilization) • L-15.3.3, Small Business Subcontracting Table • Attachment J-08 Small Business Subcontracting Plan and Reports		

Applicable Documents:

- FAR 52.219-8 Utilization of Small Business Concerns
- FAR 52.219-9 Small Business Subcontracting Plan
- NFS 1852.219-75 Individual Subcontracting Reports

Scope:

The Small Business Subcontracting Plan shall be in compliance with FAR 52.219-9, Small Business Subcontracting Plan. The Small Business Subcontracting Reporting shall be in compliance with NFS 1852.219-75, Individual Subcontracting Reports and FAR 52.219-9(d)(10)(ii). Upon approval, the Small Business Subcontracting Plan will become a part of the contract as Attachment J-08, Small Business Subcontracting Plan.

Contents:

1. Small Business Subcontracting Plan

- a. Provide the required content of FAR 52.219-9, Small Business Subcontracting Plan.
- b. All plans shall provide information demonstrating the ***Extent of Commitment*** to utilize small business concerns and to support their development. The information provided must include a brief description of established or planned procedures and organizational structure for Small Business outreach, assistance, counseling, market research and Small Business identification, and relevant purchasing procedures. For Other than Small Business (Large Business), this information shall conform to applicable portions of the submitted Small Business Subcontracting Plan.
 - i. The plan shall include participation in the NASA Mentor Protégé Program and any planned commitment to enter into a NASA Mentor-Protégé agreement to provide appropriate developmental assistance to enhance the protégé's ability to perform successfully under contracts and/or subcontracts.
 - ii. The plan shall include the approach the Contractor intends to use to meet the proposed subcontracting goals through the duration of the contract. Subcontractors whose bid is part of this proposal shall be identified. For each subcontractor, the percentage of the proposal and any small or small business subcategory classification shall be identified.
 - iii. If the subcontractor(s) is known, the plan must connect the work to the subcontractor and specify the extent of commitment to use the subcontractor (s) (enforceable vs. non-enforceable commitments).
 - iv. The plan shall outline proactive measures to be implemented during contract performance to increase participation among small businesses and across all designated small business subcategories.
 - v. The plan shall describe the management approach to subcontracting with small, small disadvantaged (SDB), 8(a), Women-owned (WOSB), HUBZone, Veteran owned (VOSB), and Service-disabled veteran owned (SDVOSB) and HBCU/MSI (Historically Black Colleges & Universities/Minority Institutions).
 - vi. The plan shall identify any work to be subcontracted that is considered "high technology." High Technology is defined as research and development efforts that are within or advance the state-of-the-art in technology discipline and are performed primarily by engineers,

scientists, and highly skilled and trained technicians or specialists.

- vii. The plan shall include the Small Business Subcontracting Tables 1 and 2 below, which provides a breakdown of the subcontracting goals, by small business category, expressed in terms of both a percentage of TOTAL CONTRACT VALUE and a percent of TOTAL PLANNED SUBCONTRACTS.

Offerors shall modify these tables to show the subcontracting goals for the basic contract requirement (IDIQ work during base contract period of performance) and any contract option separately. In addition, the plan shall show the phased approach by contract year to meet the overall contract total small business goals by end of the contract (separate tables for basic contract requirement and any options shown separately). This shall be expressed in terms of small business percentage goals by category and planned dollars spent by the end of each contract year (total dollars spent at contract level and total dollars spent by each small business categories). This shall be consistent with the proposed technical and schedule approach (see example table below).

TABLE 1: GOALS AS PERCENT OF CONTRACT VALUE AND AS PERCENT OF SUBCONTRACTING

Total Contract Value		SXX	
	Column A	Column B	Column C
Business Category	Dollar Value to be subcontracted per Category	Goal as Percent of Subcontracting Value	Goal as Percent of Total Contract Value
Small Business Concerns			
Large Business Concerns			
Total Dollars to be Subcontracted			
Subcategories of Small Business Concerns			
Women Owned Small Business			
Small Disadvantaged Business			
Veteran Owned Small Business			

Service-Disabled Veteran- Owned Small Business			
HUBZone Small Business			
Historically Black Colleges and Universities and Other Minority Institutions (HBCU/MI)			

TABLE 2: LIST OF SMALL BUSINESS SUBCONTRACTORS

Company Name	UEI/Cage Code	Type of Business	NAICS	SOW Ref.	Dollar Value
Total					

EXAMPLE CONTRACT \$100M WITH ESTIMATED SUBCONTRACTS OF \$50M

Total Contract Value		\$100,000,000	
	Column A	Column B	Column C
Business Category	Dollar Value to be subcontracted per Category	Goal as Percent of Subcontracting Value	Goal as Percent of Total Contract Value
Small Business Concerns	\$25,000,000	50 percent	25 percent
Large Business Concerns	\$25,000,000	50 percent	n/a
Total Dollars to be Subcontracted	\$50,000,000	100 percent*	n/a
Subcategories of Small Business Concerns			
Women Owned	\$9,000,000	18 percent	9 percent

Small Business			
Small Disadvantaged Business	\$5,500,000	11 percent	5 percent
Veteran Owned Small Business	\$2,500,000	5 percent	2.5 percent
Service-Disabled Veteran-Owned Small Business	\$1,500,000	3 percent	1.5 percent
HUBZone Small Business	\$1,500,000	3 percent	1.5 percent
Historically Black Colleges and Universities and Other Minority Institutions (HBCU/MI)	\$1,500,000	3 percent	1.5 percent

*Shall be 100% if any dollars are subcontracted.

**Zero percent does not constitute a goal. Omit any categories where a goal is not established and provide rationale why.

***The small business subcategories do not necessarily add up to the percentage and dollar amount in the “Small Business Concerns” category above, since some small businesses do not fall into any of the subcategories below, while others will fall into more than one subcategory below. It is recommended that Offerors first complete Column B by entering the dollar amount the Offeror proposes to subcontract to each business category and subcategory. To complete Column A, divide the dollar amount in Column B by the total offered price of the proposal (that is, total contract value). In the example above, Column A for Veteran Owned Small Business = \$2,500,000 divided by \$100,000,000, or 2.5%. To complete column C, divide the corresponding amount in Column B by the amount in the “Total Dollars to be Subcontracted” cell in Column B. In the example above, Column C for Veteran Owned Small Business = \$2,500,000 divided by \$50,000,000, or 5%.

2. Small Business Subcontracting Reports:

- a. All reports shall be submitted in accordance with FAR clause 52.219-9, Small Business Subcontracting Plan and NFS clause 1852.219-75, Individual Subcontracting Reports.
- b. Per FAR 52.219-9(d)(10)(ii) contractor shall submit annual Progress Reports to the Contracting Officer to address the extent of compliance with the Small Business Subcontracting Plan.

Remarks:

All changes to this plan must be coordinated and approved by the NASA Contracting Officer and Office of Small Business Programs prior to the updated plan being resubmitted as a DRD deliverable.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document. The contractor to provide 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates

made since the last submittal.

1. DRD Title: Commercial Activities Management Plan (CAMP)		
2. DRD No.: CLDC-009	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>(Insert contract number)</i>
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: Describe the contractors' plan for management, coordination and approval of commercial activities which require the use of Government personnel, hardware/software, insignia or other assets and resources, when the subject activity is for advertisement or promotional purposes for each mission service Task Order (TO).		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline at CBR Submission Frequency: Final at Preliminary Design Review (PDR) (if PDR is required) or Critical Design Review (whichever occurs earlier), and updates as necessary thereafter. Format: The Contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment Interrelationship: • Data Requirements Description (DRD) Commercial Low Earth Orbit (LEO) Contract (CLDC)-203 Tactical Increment Execution Report • Statement Of Work (SOW) Section 2.22 Commercial Activity Coordination • SOW Section 2.16.6 Rules of Operation • Clause Commercial Activity Guidance • Clause Communications Applicable Documents: N/A Scope: The Commercial Activities Management Plan (CAMP) shall describe to NASA the contractor's approach for NASA to review and approve commercial activities that require the use of Government personnel, hardware/software, insignia or other assets and resources, when the subject activity is for advertisement or promotional purposes. Contents: The CAMP shall: 1. Describe the process for the contractor to request NASA's review and approval of commercial activities that require use of Government personnel, hardware/software, insignia or other assets and resources for each mission service TO. a. The process shall include the contractor's timeline or mission milestones to; submit requests, complete coordination; and receive final NASA approval to support the subject activities.		

2. The plan shall include an attached template for requests, which shall include a minimum of:
 - a. Purpose of the activity
 - b. Rationale for the need of Government personnel, hardware/software, insignia or other assets and resources.
 - c. Describe how any impacts to NASA's crew, cargo, hardware/software, insignia or other assets will be mitigated.
 - i. Examples of impacts may include, but are not limited to: safety, workload of the crew, branding considerations, wear and tear of hardware/software, etc.

Remarks: None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and redlined version showing the updates made since the last submittal.

1. DRD Title: Government Property Management Plan		
2. DRD No.: CLDC-010	3. Data Type: 2	4. OPR: CDO & JB3
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: 5/16/2024	9. DRD Category: Technical ☐ Administrative ☒ S&MA ☐
10. Description/Use: To describe the method of administering and controlling Government personal property and submitting proposed property manager qualifications.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: If Government property is identified submit final plan at Contract Award + 30 days. Submission Frequency: Submit once and revisions as needed. Format: The Contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment Interrelationship: SOW 2.19.2 Government-Furnished Property (GFP) Integration Applicable Documents: Federal Acquisition Regulation (FAR) 52.245-1 Scope: The Government Property Management Plan defines the Contractor's use, maintenance, repair, protection, and preservation of Government personal property. It shall describe the Contractor's approach to receiving, handling, stocking, maintaining, protecting, and issuing Government property (equipment and material). The Plan should include interaction and Department/ Office responsibilities. The Contractor shall submit detailed property procedures, which are separate from the Property Management Plan, within 60 days after the contract start date. Contents: This plan shall reference those policies and procedures which are part of the Contractor's Property Management System and shall include at a minimum, but not limited to, the following functions/outcomes/activities: 1. Property Management a. Voluntary consensus standards, industry-leading practices and standards, customary commercial practices b. Periodic internal reviews, surveillances, self-assessments, and audits c. Written procedures 2. Acquisition of Property		

- a. Acquisition authority
 - b. Classification of property
3. Receipt of Government Property
 - a. Receiving
 - b. Identification
 - c. Discrepant Shipments
 - d. On-Orbit property transfers
4. Records of Government Property
5. Physical Inventory
6. Subcontractor Control
 - a. Flow down of property clauses to subcontractors
 - b. Oversight and surveillance
7. Reports
 - a. Loss, Theft, Damage, Destruction reports
 - b. Physical Inventory reports
 - c. Audits and self-assessment reports
 - d. Corrective Action reports
8. Relief of Stewardship Responsibility and Liability
 - a. Loss, Theft, Damage, Destruction of property
 - b. Consumed property
 - c. Delivered property
 - d. Contractor Inventory Disposal of property
 - i. In-house screening of excess
 - ii. Disclosure of excess
 - e. Abandonment of Government property (if directed by the Government)
9. Utilizing Government Property
 - a. Utilization
 - b. Consumption
 - c. Movement
 - d. Storage
10. Maintenance
 - a. Preventive maintenance
 - b. Rehabilitation
 - c. Calibration
11. Property Closeout
 - a. Screening for further use
 - b. Final physical inventory
 - c. Transfers off the contract
 - d. Final NASA Form 1018
12. Reconcile Contractor Records with NASA Financial Property Records. (NASA Form 1018 and the Contractor-Held Asset Tracking System (CHATS) if applicable.)

13. JSC-Unique Considerations (as they arise or known)

Remarks: The Government Property Management Plan shall become a part of the contract as Attachment J-16.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

1. DRD Title: Financial Reporting Contractor-Held Property		
2. DRD No.: CLDC-011	3. Data Type: 2	4. OPR: CDO and OCFO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <i>Insert the date the baseline was issued.</i>	8. Date Revised: <i>To be filled in by CO following first revision after award</i>	9. DRD Category: Technical ☐ Administrative ☒ S&MA ☐
10. Description/Use: Report NASA Property in the Custody of Contractors on both an annual and monthly basis, as required.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Annual Property Report: October 31 Monthly Property Financial Report: 21 st of every month except the month of October Submission Frequency: <u>Annual Property Report:</u> Annually, via NASA Form (NF) 1018 NASA Property in the Custody of Contractors, due October 31 reflecting data from October 1 the previous year to September 30 the current year <u>Monthly Property Financial Report:</u> Monthly, due the 21st day after the close of the previous month, except for the month of October which is due the 10th day, beginning at the first month after contract start. Example due dates for the monthly submission are as follows: - August 21 for the month ending July 31 - September 21 for the month ending August 31 - October 10 for the month ending September 30 Format: • Annual Property NF 1018 Reports shall be submitted using the NF 1018 Electronic Submission System (NESS) (https://ness.nasa.gov/) or another format supplied by NASA. • Monthly Property Financial Reports shall be submitted using the <i>Contractor Held Asset Tracking System (CHATS)</i> (https://chats.nasa.gov) in the format described in the CHATS user's manual. Interrelationship: Government Property Management Plan Applicable Documents: NFS 1852.245-73 Scope: The NF 1018 report provides annual summary-level property management and financial data on Government-furnished and contractor-acquired NASA property. Contents:		

1. NF 1018 Reports

- a. The NF 1018 report provides annual summary-level property management and financial data on Government-furnished and contractor-acquired NASA property.
- b. The NF 1018 shall be completed in accordance with NFS Subpart 1845.7101, NFS 1852.245-73, and any supplemental guidance provided by NASA.
- c. Contractors shall report all NASA-owned property in US dollars, regardless of location.
- d. Negative or zero reports are required.
- e. Adjustments to the NF 1018 shall be thoroughly explained in the NF 1018 "Comments" section and must be approved by the JSC Industrial Property Officer (IPO) prior to submittal of the report, after first being coordinated with the cognizant Government Property Administrator (GPA).
- f. Entries in Type of Deletion 21 "h. OTHER" must be explained in detail in the "Comments" section.
- g. Entries should not be placed in Type of Deletion 21 "d" or "e" since they should be reflected in "c".
- h. The NF 1018 report consists of two pages; a Summary first page and a Deletions second page. Both must be accurately completed for submittal.

2. Monthly Property Financial Reports

- a. The Contractor shall request that the JSC Contractor Held Property Accountant in LF/Property, Cost, and Reporting Branch add contracts meeting the requirement for monthly property financial reporting to the CHATS. The contractor shall also request access to the CHATS via the NASA Account Management System (NAMS).
- b. Monthly Property Financial Reports are required with item level supporting data. This data shall be submitted for all items with an acquisition cost of \$1,000,000 or more, in the contractor's and its subcontractors' possession, in the following classifications: real property, equipment, special test equipment, special tooling, and agency peculiar property (if applicable). Monthly reporting is not required for property in the above classifications with an acquisition cost under \$1,000,000. Monthly data shall also be submitted for items of any acquisition cost in the classifications of materials and contract work-in-process (WIP). Itemized monthly data is required for material line items of \$1,000,000 and over. Itemized monthly line-item data is required for WIP. Summary monthly data is required for material items under \$1,000,000. Other software (not integrated into a piece of Government property that is necessary to operate that item) shall be considered an individual reporting item if the acquisition cost is \$1,000,000 or more and expected to have a useful life of 2 years or more.
- c. Acquisition costs shall be developed in accordance with NFS 1845.7101-3 using actual costs to the greatest extent possible, especially costs directly related to fabrication such as labor and materials. Supporting documentation shall be maintained and available for all amounts reported, including any amounts developed using estimating techniques.

All Adjustments shall be thoroughly explained and directly related to a specific fiscal year. If the fiscal year cannot be determined, the default shall be the previous fiscal year. Adjustments to the monthly report must be coordinated with JSC Finance.

Remarks:

The Monthly Property Financial Reports shall be completed in accordance with the CHATS user manual

(<https://epss.nasa.gov/gm/folder-1.11.1123762?mode=EU&primaryCSH=chats>) and any supplemental guidance provided by NASA.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

Revisions to the NF 1018 data shall be coordinated with the cognizant Government PA. Revisions to the Monthly Property Financial Reports shall be coordinated with the JSC Contractor Held Property Accountant in LF/Property, Cost, and Reporting Branch.

1. DRD Title Information Technology (IT) Capital Planning and Investment Control (CPIC)		
2. DRD No.: CLDC-012	3. Data Type: 2	4. OPR: CDO & OCIO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: 2/8/2024	8. Date Revised: N/A	9. DRD Category: Technical ☐ Administrative ☒ S&MA ☐
10. Description/Use: To document the Contractor's compliance with Federal and NASA IT CPIC Planning and Reporting regulations and reporting requirements.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR 3. Contracting Organization's OCSO, and Center CISO Initial Submission: With the first CPIC reporting cycle after contract award. The Center Investment Manager (CIM) will provide the annual CPIC reporting schedule based on Office of Management and Budget (OMB) direction. Submission Frequency: As required by Government, but at a minimum once annually to support Government budget formulation and IT reporting activities. The date may vary by Center and organization, but typically will occur in late January/early February so that the data is available to support budget formulation activities and data collection for CPIC reporting requirements. The CIM will provide the annual CPIC reporting schedule based on OMB direction. Format: Unless otherwise directed, the data requested in this DRD shall be delivered to the Government in soft-copy via an electronic transfer mechanism (e.g., electronic mail, flash drive, or file transfer protocol) in a format readable by a Government device utilizing the standards in NASA-STD-2804, Minimum Interoperability Software Suite. Interrelationship: SOW 2.7 Information Technology (IT) Applicable Documents: OMB Circular A-11 and A-130 Scope: Information Technology (as defined in the Clinger-Cohen Act) is subject to certain scrutiny and reporting requirements as set forth in Legislative actions, and Executive and Agency mandates and directives. The passing of the Federal Information Technology Reform Act (FITARA) of 2014 expanded on Clinger Cohen and the requirements for agencies to assess and report their information technology (IT) investment portfolios. The Office of Management and Budget (OMB) Circular A-130 establishes the policies that govern Federal IT in order to implement statutory IT requirements, and includes IT Investment management, planning, and control (i.e., CPIC). The annual OMB Circular A-11 establishes the guidelines		

and requirements for IT investment reporting to the Executive Branch and Congress as part of the annual Federal budget cycle.

The Contractor shall prepare a report of all IT expenditures consistent with the Agency's guidelines and policies regarding the management and reporting of IT resources, to include the annual CPIC data in support of the agency's budget formulation process. Any additional reporting requirements associated with CPIC reporting and data collection process will be covered by this DRD.

In conformance with IT management and reporting processes, to include CPIC, Contractors shall participate in data collection and reporting efforts. Contractors shall furnish the data needed for the Agency to comply with statutory and OMB requirements including but not limited to those documented in OMB Circular A-11. Accurate and complete data submissions are to be made in a manner consistent with the reporting structure, and within the timeframes established for the Center.

The contractor may reach out to the CIM for questions regarding CPIC reporting.

Contents: All Contractors shall submit their Fiscal Year spending plans for review and approval to the cognizant Center Chief Information Officer (CIO), or designee, prior to the beginning of the Fiscal Year (October). Changes to spending plans during the Fiscal Year shall be approved by the CIO, or designee, before implementation. Formats and reporting processes and procedures will be provided annually based upon Center and Agency requirements.

Examples of documentation, formats, processes, procedures, and structures will be provided annually in support of the data call. The attached Excel Spreadsheet, entitled "CPIC DRD Template for IT Portfolio PPM Data Collection," is a sample template for Year 1 of the Contract. This is a dynamic process, and formats, processes, procedures, and structures are subject to change. The reporting requirement is defined by OMB annually. Each year, OMB may request varying levels of reporting across varying levels of technologies and labor, depending on their focus.

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Remarks: None

Maintenance: Updated with Annual Submission

1. DRD Title: Commercial IT Authorization Report		
2. DRD No.: CLDC-013	3. Data Type: 3	4. OPR: CDO & OCIO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: 12/01/2023	8. Date Revised: N/A	9. DRD Category: Technical ☐ Administrative ☒ S&MA ☐
10. Description/Use: The purpose of this DRD is to document and report, in accordance with OCIO policy, purchases authorized through the OCIO Commercial IT Request (CITR) Application.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Within 90 days of contract start Submission Frequency: Monthly on the 15 th of each month or the next business day. Final Submission at end of contract for contract closeout. Format: Contractor shall use the CITAR Template. Contractor may not alter the template. Each report shall be cumulative from contract start. Interrelationship: SOW 2.7 Information Technology (IT) Applicable Documents: OMB Memorandum M-15-14, Management and Oversight of Federal Information Technology. OMB Memorandum M-16-02, Category Management Policy 15-1: Improving the Acquisition and Management of Common Information Technology: Laptops and Desktops. OMB Memorandum M-16-12, Category Management Policy 16-1: Improving the Acquisition and Management of Common Information Technology: Software Licensing. OMB Memorandum M-16-20, Category Management Policy 16-3: Improving the Acquisition and Management of Common Information Technology: Mobile Devices and Services. Scope: Complete the CITAR Template Contents: See CITAR Template  Remarks: See "Instructions" Tab on the CITAR Report Template. Negative responses are not required.		

Maintenance: N/A

1. DRD Title: Security Requirements for Unclassified IT Resources		
2. DRD No.: CLDC-014	3. Data Type: 1	4. OPR: CDO & OCIO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>(Insert contract number)</i>
7. Date Issued: 12/10/2025	8. Date Revised: N/A	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: To ensure that IT security requirements, including training, and Cyber Supply Chain Risk Management (C-SCRM), are met during performance of this contract.		
11. Distribution: All deliverables required by this DRD, except for the C-SCRM plan, shall be submitted electronically to the CO, COR, and NASA Organization's Information System Security Officer (ISSO) (i.e., Security Officer). Approval will be provided by the ISSO. If the organization does not have an ISSO, approval will be provided by the NASA Information Owner. C-SCRM plans shall be submitted to and approved by the ICT/C-SCRM Service Element Lead at agency-dl-ocio-cys-cp-scrm@mail.nasa.gov . Initial Submission: Information System Security and C-SCRM Plan(s): For contractor-owned systems, due at the start of phase-in. Initial submission not required for existing, approved plans for Government-owned and Contractor-managed systems. For new Federal Information Systems, due with the delivery of the system. Non-Federal System Certification: Prior to any transfer of NASA non-public information to the contractor, the contractor shall provide documentation of the certification of the non-federal system to the security officer of the NASA organization that owns the information (typically the organization responsible for the contract). If the organization does not have an ISSO, the attestation shall be provided to the NASA Information Owner. Information on Employees in Sensitive Positions/Assignments Report: At the start of phase-in IT Security Point of Contact: At the start of phase-in IT Security Awareness Training: Training required prior to access to NASA information and systems. IT Security Role Based Training: Foundational training is provided prior to performance of assigned role. Initial evidence showing completion due at the end of phase-in. Submission Frequency: Information System Security Plan(s) and C-SCRM Plan: As Required Non-Federal System Certification: Annually		

Information on Employees in Sensitive Positions/Assignments Report: Annually

IT Security Point of Contact: As Required

IT Security Awareness Training: Annual on anniversary date of initial training

IT Security Role Based Training: Annual on anniversary date of initial training. Evidence of completion due annually.

Format: Unless otherwise directed, the data requested in this DRD shall be delivered to the Government in soft-copy via an electronic transfer mechanism (e.g., electronic mail, flash drive, or file transfer protocol) in a format readable by a Government device utilizing the standards in NASA-STD-2804, "Minimum Interoperability Software Suite."

Interrelationship: SOW 2.7 Information Technology (IT)

Applicable Documents: Most current versions of the following:

FAR 52.240-91, Security Prohibitions and Exclusions

FAR 52.240-93, Basic Safeguarding of Covered Contractor Information Systems

FISMA 2014, Federal Information Security Modernization Act 2014

NFS 1852.240-76, Security Requirements for Unclassified IT Resources

NFS 1852.223-75, Major Breach of Safety or Security

NFS 1852.237-72, Access to Sensitive Information

NFS 1852.237-73, Release of Sensitive Information

NIST SP 800-171, Protecting Controlled Unclassified Information in Nonfederal Systems and Organizations

NIST SP 800-53, Security and Privacy Controls for Information Systems and Organizations

NIST SP 800-161, Cybersecurity Supply Chain Risk Management Practices for Systems and Organizations NPR 1382.1, NASA Privacy Procedural Requirements

NPD 2810.1, Information Security Policy

NPR 2810.1, Security of Information and Information Systems

NPR 2810.7, Controlled Unclassified Information

NPR 7120.7, NASA Information Technology Program and Project Management

Requirements OMB Circular A-130, Management of Federal Information Resources

Scope: All contracts that purchase, lease, network to, or otherwise utilize covered articles, which includes Government-funded IT (as defined by the [FAR](#)) must comply with NASA IT Security and C-SCRM Requirements.

Contents: The Federal Information Security Modernization Act (FISMA) and Executive Branch policy require external providers that process, store, or transmit federal information or operate information systems on behalf of the federal government to meet the same security and privacy requirements as federal agencies.

Information System Security Plan (i.e., System Security Plan, IT Security Plan, or Security Plan):

When the contractor is operating a Federal Information System (FIS) on behalf of NASA or is providing a FIS in the execution of this contract, that system must have an Information System Security Plan in accordance with NIST Special Publication (SP) 800-53, "Security and Privacy Controls for Information Systems and Organizations" at the revision number required at the issuance of the contract. This plan and

supporting documents shall be entered into the NASA cybersecurity system of record pursuant to Authorization to Operate (ATO) requirements set forth in NASA Policy Directive 2810.1, "NASA Information Security Policy" and NASA Procedural Requirement (NPR) 2810.1, "Security of Information and Information Systems." The FIS security plan and ATO must be in place before any system may operate in the NASA environment.

NON-FEDERAL SYSTEM SECURITY CERTIFICATION

When the contractor will receive, process, store or transmit NASA non-public information, especially Controlled Unclassified Information (CUI) including Personally Identifiable Information (PII) on a non-federal system (e.g., the contractor's corporate system) the system must meet the requirements for data protections detailed in NIST Special Publication 800-171, "Protecting Controlled Unclassified Information in Nonfederal Systems and Organizations."

This documentation may take the form of:

- a. A third-party review/audit certifying that the non-federal system meets the requirements of NIST SP 800-171 or equivalent standard of information protection, such as the ISO 27001 standard, for example.
- b. A certification from another federal agency such as the DOD Cybersecurity Maturity Model Certification (CMMC) Level 2.

INCIDENT NOTIFICATION

The contractor shall report immediately upon notification any incident involving NASA information on nonfederal (contractor) systems to SOC@nasa.gov.

IT SECURITY POINT OF CONTACT:

The contractor shall identify a point of contact that NASA may reach in its attempt to address IT and cybersecurity issues. The point of contact shall have the authority to ensure the immediate notification of the NASA Security Operations Center of any incident involving NASA information.

IT SECURITY AWARENESS TRAINING:

Contractor employees subject to this contract, defined as those requiring physical access to NASA facilities or electronic access to NASA systems, shall complete the NASA approved IT Security Awareness Training annually. NASA Cybersecurity and Privacy Awareness training is available through the SATERN online system and must be completed prior to access to NASA information and systems. Completion of the training is tracked automatically by NASA and must recur each year by the anniversary of the initial training as a condition of continued access. Cybersecurity and Privacy training is updated throughout the year as needed, so there is no defined training period.

CYBERSECURITY AND PRIVACY ROLE BASED TRAINING:

Contractor employees subject to this contract shall complete NASA's Cybersecurity and Privacy Role-Based Security Training in SATERN related to the following role-based functions prior to performing the role:

- Information System Owner (ISO)
- Information Systems Security Officer (ISSO)
- Information System Security Engineer (ISSE)

NAMS access to these roles in the Risk Information Security Compliance System (RISCS) will be restricted to those that have completed the role-based training within a year of the previous training. Only the training specified in SATERN will be valid for the purpose of fulfilling the training requirement and those who do not take the training annually may be suspended from RISCS access.

INFORMATION ON EMPLOYEES IN SENSITIVE POSITION(S)/ASSIGNMENTS REPORT:

The Information on Employees is Sensitive. IT Security (ITS) Positions/Assignments Report shall provide information annually for personnel screening as required by NPR 2810.1(series), and NPR 1600.1 on position risk.

CYBER SUPPLY CHAIN RISK MANAGEMENT (C-SCRM) PLAN:

NIST defines C-SCRM as a systematic process for managing exposure to cybersecurity risks throughout the supply chain and developing appropriate response strategies, policies, process, and procedures. A C-SCRM plan addressing contractor systems that will be used in performance of the contract, shall be delivered prior to the processing, transmission, or storage of non-public NASA information on these contractor systems. The C-SCRM plan shall be consistent with the template in NIST SP 800-161, "ICT SCRM Plan Template," or the attached, optional questionnaire.

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Remarks: None

Maintenance:

Information System Security Plan(s) shall be kept up to date as changes to the baseline configuration of the system(s) occur.

Non-Federal System Certifications shall be maintained annually or per the certifying body's standard.

Information on Employees in Sensitive Positions/Assignments Report shall be maintained annually.

IT Security Point of Contact shall be kept up to date as changes occur.

Completion of Cybersecurity and Privacy Role Based Training is due annually in SATERN and will be tracked by NASA.

C-SCRM plans shall be kept up to date as changes occur to organizational C-SCRM processes, policies, and procedures, and/or, new components are introduced.

1. DRD Title: Program Management Plan		
2. DRD No.: CLDC-015	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R00021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: Describes the CLDC Contractor' s organization philosophy for managing contractual, project, technical, operations, and interfaces with respect to their internal business unit, subcontractors, and associate Contractors. Allows for re-calibration of the NASA - Contractor interface points during the period of performance		
11. Distribution: 1 Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA CO 2. NASA CDO COR and Alternate COR Initial Submission: Final due at CBR. Submission Frequency: Updates as required to maintain currency. Format: The Contractor' s format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment. Applicable Documents: NFS 1852.223-74 Scope: The plan shall describe the CLDC Contractor' s approach to managing the contract scope, including management approach, management controls, schedule and margin management, performance management, teaming, communication, strategies, policies, processes for work planning, work prioritization, subcontractor management, supply chain management, Associate Contractor Agreements, facilities, operating locations, use of Government provided services, and any efficiencies planned. Contents: The plan shall include the following descriptions (but not limited to): 1. Identify personnel, products, key infrastructure facilities, and equipment required to build, integrate, launch, operate, maintain, and sustain a human presence and research capability in LEO. Include approach to identifying, resolving, and prioritizing conflicts between CLDC contract performance and CLD Contractor' s work in support of other Government and commercial customers. 2. Provide a contract-specific organization chart, including subcontractors and teaming partner[s], as applicable, and rationale for the approach selected. Define the direct lines of control and accountability, responsibilities, functional relationships, and authority between the CLD project management and the CLD Contractor' s other organizational elements, corporate management; and subcontractors/teaming partners. If there is a subcontracting or teaming arrangement, include specific details on how the subcontractor or teaming partner is managed, how their performance is incentivized, the business size of each company, the relative amount of work to be performed by each, and if there are discreet tasks to be performed by each or whether there is co-mingling of personnel and resources. Discuss how the organization and teaming arrangement will change over		

the life of the CLD contract. Discuss acquisition plans for any proprietary technologies.

3. Describe the process for marking and delivering all data deliverables in accordance with SOW 2.1 Program Management
4. Describe the CLD Contractor's approach to vetting subcontractor assertions of limited rights data and ensuring all data delivered to the Government is delivered with appropriate contractual markings.
5. Describe the CLD Contractor's approach for staffing location, including lease arrangements, for the Contractor's off-site facilities including a discussion of the government on-site and off-site approach (if needed).
6. Describe the CLD Contractor's approach to provide a flexible logistics and supply chain management strategy that accommodates redundant suppliers and mitigates obsolescence.
7. Describe the CLD Contractor's approach to key interfaces between the CLD Contractor and the Government; describe the CLD Contractor's plan to create an efficient and effective interface to the Government in the management, performance, communication, operations, and data transmission required to complete the contract requirements. Discuss management approach to obtaining and maintaining key local, state, federal, licenses, permits, and agreements required in the performance of the contract.
8. Describe the CLD Contractor's approach to make decisions about the management, operations, and design of the CLD System that ensures NASA requirements are met. Describe the CLD Contractor's approach to handling dissenting opinions (operational and non-operational).
9. Identify the specific Associate Contractor Agreements and purpose which are required to conduct the CLD contractual obligations.
10. Describe the CLD Contractor's approach to Sensitive Positions (NFS1852.223-74) for this contract.
11. Describe the methods and plans to identify and correct deficiencies. Describe the CLD Contractor's approach to identifying and resolving Corrective Actions and the Government's role when applicable.
12. Identify the CLD Contractor's controls applicable to tasks, activities and projects exceeding established schedule baselines and discuss the CLD Contractor's approach and methods to recover, while ensuring the full scope of contracted effort is delivered in accordance with contractual obligations.
13. Describe the CLD Contractor's Systems Engineering approach, processes and tools used to implement the contracted technical effort and document the overall technical approach, maintain integrity between NASA and Contractor requirements to the Contractor verification plans, and to transition the products through the lifecycle (for both Contractor and subcontractor efforts). Describe the CLD Contractor's approach to developing and managing requirements, system architecture definition and design, system technical baseline definition and maintenance, system maturation, design review process, engineering review process, change management, interface management, risk management, issue management, requirement verifications, capability validation, and performance margins. Address the CLD Contractor's approach for technical discipline expertise, independent assessment, engineering analysis, technical insight, technology assessment and development, overview of testing strategy and programmatic support, as required to deliver the highest degree of technical accuracy and quality.
14. Describe the CLD Contractor's approach to staffing, maintaining, and augmenting a qualified workforce to meet contract needs in a timely manner.
15. Describe the CLD Contractor's approach to deliver required CLD services to NASA, while concurrently providing commercial CLD services to other clients.
16. Identify any interfaces, agreements both within and outside this contract that are required with the Government and approximate schedule for those agreement.
17. Describe the CLD Contractor's approach to conducting Design and Certification reviews. Additionally describe the process for collecting NASA feedback from these reviews as well as dispositioning actions (e.g.

Review Item Discrepancies, Requests For Action, etc.) and other NASA feedback.

18. Describe the CLD Contractor's approach to limiting liability, including through implementing waivers of claims with its related entities.

Remarks: The final, as approved, shall be incorporated in the contract as Attachment J-06 *Program Management Plan*

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing updates made since the last submittal.

1. DRD Title: Systems Engineering Management Plan (SEMP)		
2. DRD No.: CLDC-101	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>Insert contract number</i>	
7. Date of Issue: <u>Insert date the baseline was issued</u>	8. Date of Revision: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The System Engineering Management Plan (SEMP) defines the Contractor's approach to technically managing the engineering and integration processes and products throughout the project life cycles and completion of the contract.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline at Certification Baseline Review (CBR). Submission Frequency: Final due sixty-plus (+60) days after CBR. Updates as required if content changes. Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment. Interrelationship: Statement Of Work (SOW) Section 2.10 Systems Engineering and Integration (SE&I) Applicable Documents: Scope: The SEMP defines the approach, methodology, and application to technically manage the system engineering and integration processes and products throughout the project life cycles and successful completion of the contract. It also includes a description of the process and tools used. Contents: The Contractor's plan shall describe the system engineering process and products generated that describe the technical management. The SEMP shall describe, at a minimum: 19. The system engineering and integration approach used to implement the technical effort and document the overall technical approach. 20. The overall lifecycle. 21. The system engineering process, including managing/integrating with subcontract's, vender's, and partner's processes and practices. 22. The margin management plan including mass, power, thermal, and other limited resources. 23. The evaluation, decision-making, and corrective-action (as required) processes to be used by the Contractor when resolving technical issues. 24. The process to continuously evaluate real-time operations to maintain Commercial LEO Destination		

System (CLDS) design and certification.

25. Trade study methodology, processes, and documentation.
26. The requirement development and management process(s), including defining, analyzing, and approving requirements as part of the Contractor's functional derivation, definition, and allocation of Contractor specification requirements. The process shall document management of requirement flow down to subcontractors and partners.
27. The organization, processes, and products used maintain integrity between NASA and Contractor requirements to the Contractor verification plans, and to transition the products throughout the lifecycle.
28. The validated tools, models and simulations, methodologies, and approaches used to develop, sustain, and manage the design solutions and technical data products needed.
29. The systems engineering approach to manage the implementation and plans for on-orbit integration of elements and systems, testing, design changes, and reconfiguration.
30. The processes for supporting certification, mission integration and operations (including anomaly resolutions), and processes supporting technical activities for Ground Systems (GS), Mission Systems (MS), Training Systems (TS), and on-orbit sustainment.
31. How the systems engineering process, technical integration, decision-making process supports the Program Management approach regarding board authority including dissenting opinions and review board processes.
32. The Contractors approach to supporting NASA's technical management processes including alternate standards adjudication, requirement variance, and verification closure.
33. Process for assessing technology maturity.
34. For a multi-element CLDS design, any processes and activities required to ensure successful on-orbit assembly; including unique design engineering required and multi-element testing.

Remarks: No special instructions.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and redlined version showing the updates made since the last submittal.

1. DRD Title: Verification, Validation, and Certification Plan (VVCP)		
2. DRD No.: CLDC-102	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC025R001	6. Contract No.: <i>Insert Contract Number</i>	
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date of Revision: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The plan describes the Contractor's verification/validation/certification approach, activities, and organizations necessary to define and execute the Contractor's certification program and assert certification of the Contractor's Commercial Low Earth Orbit (LEO) System (CLDS). The plan will contain a complete description of how the Contractor plans to implement CLDP-PLN-2000, CLDP Certification Plan, and meet NASA requirements in SOW 1.3 CLDS Requirements and Standards, and certify the CLDS in support of NASA end to end services. The Plan will also document the planned On-Orbit Demonstration activities necessary to support certification of the CLDS.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline at Certification Baseline Review (CBR) Submission Frequency: Final at CBR + sixty (60) days. Update as required. Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment Interrelationship: SOW 1.3 CLDS Requirements and Standards Applicable Documents: • CLDP-REQ-1130, Requirement and Standards for the Commercial Low-Earth Orbit Development Program • CLDP-PLN-2000, CLDP Certification Plan Scope: The Verification, Validation, and Certification Plan (VVCP) shall provide a detail description of the Contractor's verification, validation, and certification methodology and processes to satisfy NASA CLDS requirements per SOW 1.3 CLDS Requirements and Standards, including any verifications and validations to be completed via the On-orbit Demonstration. The VVCP is consist of 3 major components (verification and validation, certification, and on-orbit demonstration) and the separate Annex. The verification and validation (V&V) component shall provide a detail description of the Contractor's verification and validation approach for implementing the verification and validation program, as well as a detail description of the planned verification and validation requirements and methods. The Contractor shall		

document the detailed verification and validation activities needed to comply with NASA's requirements per SOW 1.3 CLDS Requirements and Standards.

The certification component provides a detailed description of the Contractor's certification approach implementing CLDP-PLN-2000, CLDP Certification Plan, and asserting that the CLDS meets NASA requirements per SOW 1.3 CLDS Requirements and Standards.

The on-orbit demonstration component shall provide a detailed description of the Contractors approach for validating the system by conducting on-orbit demonstrations consisting of uncrewed and crewed phases, including planned usage of the ground and flight support equipment, software, facilities, and tooling necessary to execute the certification activities.

Contents:

The verification and validation component shall contain, at a minimum:

1. Overview of the Contractors verification and validation methodology and process (e.g., qualification and acceptance testing, integrated and joint testing, reverification, and revalidation plans) including incorporation of external entities (e.g. transportation, communication, launch vehicle)
2. Verification planning matrix that includes a description of all associated verification and validation activities (i.e., tests, analyses, inspections, etc.) to be performed based on the identified verification and validation requirements, including as a minimum:
 - a. Any prerequisites, constraints, and objectives for all the verification/validation activities
 - b. Decomposition of CLDS requirements to the Contractor subsystem requirements, including decomposition to Subcontractors, Partners, and Suppliers
 - c. Identification of validation activities at intermediate levels of assembly such as hardware-software integration testing, subsystem and/or assembly functional validation testing and analysis
 - d. The identification of any joint verification activities between the Destination and external entities (e.g. Transportation, Communication, Launch Vehicle).
 - e. Summary description of test configurations, analytical model pedigree, etc.
 - f. Any associated hazard controls (cross references to Safety Review Process documentation), ICDs, Variances, and/or alternative/tailored standards
3. Identification of hardware, software, models, emulators, or simulators needed to verify and validate the CLDS meets all technical requirements.
4. Identification of any nonconformance(s) (e.g., deviation or waiver) approved by NASA in lieu of successful verification.
5. Description of the Contractor's Verification Closure Notice (VCN) development and closure process for each NASA requirement, including but not limited to:
 - a. Approach to submit a VCN for each NASA requirement for NASA review and approval (consistent with verification planning matrix)
 - b. Approach to aligning VCN submittal with the Contractor's Design, Development Test and Evaluate (DDT&E) milestones (i.e., incremental submits to NASA that ensures 100% NASA closure prior to final mission readiness review), including coordination with NASA to provide submittal status and resolution of issues.
 - c. Approach to provide interfaces/related Information Technology (IT) access requirements for NASA personnel to review and approve VCNs.
 - d. Approach to provide NASA with access to verification artifacts and other supporting compliance data specific to the requirement the VCN closes (e.g., excerpts from test reports instead of an entire test report) and that is consistent with the planning developed with NASA under the Verification Planning Matrix.
 - e. Description of the Contractor's design change process as it relates to V&V planning updates as well as recurring mission-to-mission re-opening of previously NASA approved Verification

Closure Notices (VCNs).

6. The approach for making reports made available to NASA upon request with the following roll-up data: VCN number, requirement number, title, subsystem, NASA and Contractor prime Point of Contacts (POCs), closure status, estimated/actual closure date, critical path items, and any NASA assistance needed.

The certification component shall contain, at a minimum:

1. Description of the Contractor's CLDS certification program including, alignment with CLDP-PLN-2000 and approach to incorporating certification of external entities (e.g. transportation, communication, launch vehicle)
2. Description of all certification activities including verification and validation of requirements, verification of hazard controls, element/system/subsystem qualification and acceptance tests, joint tests (i.e. Destination and Transportation, communication, utilization), on-orbit demonstration, analyses, and inspections
3. Describe the approach to certify the tools and processes required to plan, train, and fly missions, including use of any government and/or industry standards.
4. Describe the Contractor's certification milestone review process including description of participant roles, responsibilities, and expectations; timeline of activities (product release, meetings, review period); and identification of any tools and/or IT systems used to house material and collect/manage comments.
5. Description the functional structure for implementing the certification program (i.e., organizations involved in component/subsystem/system tests, review and signoff authority for certification approval data).
6. Describe the process for maintaining CLDS configuration and certification baseline, including how NASA is notified of changes and how the Contractor plans to manage update of the certification with NASA approval. This will include how impacts of design, test, manufacturing, and operational changes are controlled and how the Contractor will provide NASA with access to design and configuration data.
7. For a CLDS design approach that utilizes an incremental build-up of capabilities to achieve certification, describe how each mission contributes to the overall certification, including any associated on-orbit demonstration activities.
8. Description of the approach for review input including comments, disposition process, actions, action recording and tracking, configuration management and minutes.

The On-Orbit demonstration component shall contain, at a minimum:

1. Description of all missions and phases comprising the complete the On-Orbit Demonstration, including any interdependency of missions, phases and reconfigurations of the Destination.
2. Description of all objectives and checkout activities to be completed with success criteria and any conditions or constraints for each objective. Objectives shall be specific, measurable, achievable, relevant, and time-bound.
3. Methods, tools, processes, procedures, resources, and timeline required for conducting and evaluation of each objective.
4. Identification of any United States Government (USG) resources, including personnel, necessary to successfully satisfy the objective.
5. Identification of any NASA requirements to be closed as a result of the On-Orbit demonstration.

Remarks: None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

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1. DRD Title: NASA Standards and Specifications Compliance and Tailoring Plan		
2. DRD No.: CLDC-103	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: This plan describes the approach to identify the standards, specifications, and tailoring used for the development of the destination, its elements, and associated transportation systems, as well as the corresponding equivalency of these standards and specifications relative to meeting or exceeding a NASA-provided reference-set of design and construction standards. It includes the data required for understanding and assessing the risk associated with the use of nonequivalent industry standards and specifications.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Draft (Sections 1-5 only) at Proposal; Baseline at Certification Baseline Review (CBR) Submission Frequency: Final at Preliminary Design Review (PDR) (if PDR is required) or Critical Design Review (whichever occurs earlier), and updates as necessary thereafter. Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment. Content Item numbers 1 through 5 shall be in Microsoft Word or Excel format. Interrelationship: • Statement Of Work (SOW) Section 1.3 CLDS Requirements and Standards • SOW Section 2.10.6 Adjudication of Standards • SOW Section 2.13 Certification • Data Requirements Description (DRD) CLDC-101 Systems Engineering Management Plan Applicable Documents: • CLDP-PLN-2000 CLDP Certification Plan • CLDP-REQ-1130 Requirement and Standards for the CLDP Scope: Provide a description of the approach to the identification and application of design and construction standards and specifications to be used for the development of the commercial destination, including the transportation elements (if the transportation is not Government furnished).		

Contents:

Specific content includes:

1. The Provider shall identify in Table 1 of this DRD CLDC-103 the desired method of addressing each standard listed therein. Either adopting the NASA referenced standard as listed (i.e. denote “Adopt”), or use of a proposed alternate standard relative to meeting or exceeding one of the NASA standards (i.e. “Meets Intent”), and then provide the proposed alternate standard, specification, approach, and justification and rationale that the Contractor proposes to follow instead. Table 1 of this DRD needs to be completed to define the accepted Government and proposed Contractor standards and specifications to be applied to the development of the Commercial Destination and its transportation.
2. A summary of the Contractor’s standards and specification philosophy to include the following:
 - a. Descriptions of the heritage of the standards and specifications the Contractor uses
 - b. The process of adopting and/or tailoring government and industry standards for Contractor usage
 - c. The process for creating and maintaining internal company standards.
3. A description of the Contractor’s technical decision-making process describing the review and approval process and level of authority required for deviations and waivers against the Contractor’s applicable design and construction standards and specifications.
4. An assessment of the equivalency of the Contractor’s application of design and construction standards to meet or exceed the NASA standards in Table 1 of this DRD.
5. For each standard, justification for the suitability of using alternate standards and specifications to meet or exceed the NASA standard including relevant data on past usage and other supplemental information that allows NASA to adequately assess the risk associated with their usage. To further assist NASA’s risk assessment, the Contractor shall identify key difference between the NASA standard and the alternate, and when use of alternate standards and specifications will enable the Contractor to use flight-proven components and subsystems in the Commercial Destination and its transportation design, and provide associated rationale.
6. Copies of the Contractor’s design and construction standards and specifications not found in the public domain, even if not listed in Table 1 of DRD CLDC-103 (i.e. this Plan), *Reference List of NASA Design and Construction Standards and Specifications*, shall be provided electronically.
7. With the final submittal of this DRD, the Contractor will identify and provide all deviations and waivers against the Contractor’s applicable design and construction standards.

For any NASA prescribed standard that the contractor desires relief (partial, in-full, or an alternate), the contractor shall submit an alternate standard request to NASA for adjudication. The contractor is encouraged to initiate the process as early as possible, potentially upon contract kickoff, in advance of CBR, with an initial planning step where the commercial provider submits a list of standards, identifies their intended alternates, and engages with NASA in planning the adjudication of each potential alternate standard. For each alternate standard the Contractor shall submit a request that includes:

1. The need or motivation for using the Contractor proposed standard/tailoring, versus adopting the NASA standard
2. Technical overview of the alternate standard
3. An assessment of past and current efforts to meet the intent of the standard with proposed alternate and/or tailored standards (i.e. heritage usage summary, for instance)
4. An assessment of the estimated schedule, technical, and risk impacts associated with implementing the NASA standard as prescribed.
5. Rational for how the proposed alternate “Meet/Exceed” NASA’s prescribed standard.

6. Impact(s) if the tailoring or alternate standard is not used.
7. Associated Verification approach when utilizing the tailored or contractor proposed alternate standard.

The Contractor shall develop a decisional package and present at a NASA Control Board.

After PDR, all deviations and waivers and/or proposed updates are required to be submitted within 30 calendar days of identification by the Contractor, as a formal DRD re-submit, per Maintenance requirements listed below.

Remarks: None

Maintenance:

Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

Table 1
APPLICABLE LIST OF NASA DESIGN AND CONSTRUCTION
STANDARDS AND SPECIFICATIONS

*A complete list of NASA-recommended standards and specifications are given below
(to be addressed in Contractor's response).*

Document Number, Unique Identifier	Document Title	Document Revision	Denote Subject Area that Standard or Specification applies to	Denote Contractor Acceptance, or proposed alternate standard. (Include ample justification of suitability)
THESE ARE SPECIFICALLY ENCOMPASSING OF THE APPLICABLE DOCUMENTS IN THE CLDP-REQ-1130 Rev.A (and subsequent).				
683-95293	Coupling Assy, IMV	B 3/12/2015		
ACGIH TLVs and BEIs	ACGIH TLVs and BEIs	Basic 2023		
ANSI S1.43-1997	Specifications for Integrating-Averaging Sound Level Meters	Basic 2007		
ANSI/AIAA-S-080	Space Systems - Metallic Pressure Vessels, Pressurized Structures and Pressurized Components	A 2018		
ANSI/AIAA-S-081	Space Systems - Composite Overwrapped Pressure Vessels	B 2018		
ANSI/ASA S3.2-2020	American National Standard Method for Measuring The Intelligibility Of Speech Over Communication Systems	Basic 9 December 2020		
ANSI/ESD S20.20	Protection of Electrical and Electronic Parts	2021		

Document Number, Unique Identifier	Document Title	Document Revision	Denote Subject Area that Standard or Specification applies to	Denote Contractor Acceptance, or proposed alternate standard. (Include ample justification of suitability)
ANSI S1.43-1997	Specifications for Integrating-Averaging Sound Level Meters	Basic		
ANSI X9.52	Triple Data Encryption Algorithm Modes of Operation	Basic		
ANSI Z136.1	American National Standard for Safe Use of Lasers	2022		
CLDP-STD-3102	Hazard Analysis and Safety Process Standards	A		
CLDP-STD-1101	CLDP Docking System Specification	Basic		
CLDP-STD-1102	CLDP Payload Interface Standard for Heritage Hardware	Basic		
CLD-STD-1106	CLDP Utilization Capabilities Standard	A		
CLDP-STD-1123	Commercial Low-Earth Orbit Development Program Medical Standards and Capabilities	CLDP-STD-1123		
CLDP-STD-1140	CLDP Technical Standards Design Evaluation	A		
CLDP-STD-1150	CLDP Operations Standards	B		
FIPS Publication 140-3	Security Requirements for Cryptographic Modules	Basic May 22, 2019		
FIPS Publication 197	Advanced Encryption Standard (AES)	Basic 11-2001		
GEIA-STD-0005-1	Performance Standard for Aerospace and High-Performance Electronic Systems Containing Lead-free Solder	A 2012-03-01		
GEIA-STD-0005-2	Standard for Mitigating the Effects of Tin Whiskers in Aerospace and High-	A		

Document Number, Unique Identifier	Document Title	Document Revision	Denote Subject Area that Standard or Specification applies to	Denote Contractor Acceptance, or proposed alternate standard. (Include ample justification of suitability)
	Performance Electronic Systems	1 May 2012		
ICES-2019-58	The Impacts of Cabin Atmosphere Quality Standards and Control Loads on Atmosphere Revitalization Process Design	Basic		
IEC 61672-1	Electroacoustics - Sound level meters - Part 1: Specifications	Basic		
IEST-STD-CC1246	PRODUCT CLEANLINESS LEVELS – APPLICATIONS, REQUIREMENTS, AND DETERMINATION	Basic		
IPC-2152	Standard for Determining Current Carrying Capacity in Printed circuit Board Design	August 2009 August 2009		
IPC-2220 series Performance Class 3.	IPC Design Standards Family of Printed Board Design Documents IPC-2221, IPC-2222, IPC-2223, IPC-2224, IPC-2225, IPC-2226 & IPC-2227	Basic		
IPC-2221	Generic Standard on Printed Board Design	B 11/20/2012		
IPC-2222	Sectional Design Standard for Rigid Organic Printed Boards	B 10/15/2020		
IPC-2223	Sectional Design Standard for Flexible/Rigid-Flexible Printed Boards	E 01/31/2020		
IPC-2225	Sectional Design Standard for Organic Multichip Modules (MCM-L) and MCM-L Assemblies	Basic		

Document Number, Unique Identifier	Document Title	Document Revision	Denote Subject Area that Standard or Specification applies to	Denote Contractor Acceptance, or proposed alternate standard. (Include ample justification of suitability)
IPC-2226	Sectional Design Standard for High Density Interconnect (HDI) Printed Boards	A 10/12/2017		
IPC-2228	Sectional Design Standard for High Frequency (RF/Microwave) Printed Boards	Basic 10/17/2022		
IPC-6010 Series	Family of Board Performance Requirements	N/A		
IPC-6011	Generic Performance Specification for Rigid Printed Boards	Basic 07/01/1996		
IPC-6012	Qualification and Performance Specification for Rigid Printed Boards	E 02/25/2020		
IPC-6012FS	Space and Military Avionics Applications Addendum to IPC-6012F, Qualification and Performance Specification for Rigid Printed Boards	E 02/01/2024		
IPC-6013	Qualification and Performance Specification for Flexible/Rigid-Flexible Printed Boards	E 09/16/2021		
IPC-6015	Qualification & Performance Specification for Organic Multichip Module (MCM-L) Mounting & Interconnecting Structures	Basic 02/01/1998		
IPC-6017	Qualification and Performance Specification for Printed Boards Containing Embedded Active and Passive Circuitry	A 09/16/2021		
IPC-6018	Qualification and Performance Specification for High Frequency (Microwave) Printed Boards	D 03/01/2022		
IPC-6018DS	Space and Military Avionics Applications Addendum to IPC-6018D, Qualification and	D 08/01/2022		

Document Number, Unique Identifier	Document Title	Document Revision	Denote Subject Area that Standard or Specification applies to	Denote Contractor Acceptance, or proposed alternate standard. (Include ample justification of suitability)
	Performance Specification for High Frequency (Microwave) Printed Boards			
IPC-CM-770	Guidelines for Printed Board Component Mounting	E		
IPC/WHMA-A-620	Requirements and Acceptance for Cable and Wire Harness Assemblies	E 10/2023		
IPC/WHMA-A-620 -S	Space Applications Electronic Hardware Addendum to IPC/WHMA-A-620E	E 10/2023		
IPC J-STD-001	Requirements for Soldered Electrical and Electronic Assemblies	G Change 1 October 2017		
IPC J-STD-001 Addendum	Space and Military Applications Electronic Hardware Addendum to IPC J-STD-001 Requirements for Soldered Electrical and Electronic Assemblies	GS March 2018		
ISBN 0875530478	American Public Health Association, Standard Methods for Examination of Water & Wastewater	Basic		
ISO 2631-1:1997	Mechanical Vibration and Shock - Evaluation of Human Exposure to Whole-Body Vibration	2 1997-06		
ISO 3382	Acoustics — Measurement of Room Acoustic Parameters	Basic		
ISO 7731:2003	Ergonomics - Danger Signals for Public and Work Areas - Auditory Danger Signals	Basic		
ISO 14644-1	Cleanrooms and Associated Controlled Environments	Basic 2021		

Document Number, Unique Identifier	Document Title	Document Revision	Denote Subject Area that Standard or Specification applies to	Denote Contractor Acceptance, or proposed alternate standard. (Include ample justification of suitability)
	Part 1: Classification of Air Cleanliness by Particle Concentration			
ISO 20283-5:2016	Mechanical vibration — Measurement of vibration on ships Part 5: Guidelines for measurement, evaluation and reporting of vibration with regard to habitability on passenger and merchant ships	Basic		
JSC 20584	Spacecraft Maximum Allowable Concentrations for Airborne Contaminants	B 11/30/2022		
JSC 20793	Crewed Space Vehicle Battery Safety Requirements	D 03/08/2017		
JSC 26895	Guidelines for Assessing the Toxic Hazard of Spacecraft Chemicals and Test Materials	A		
JSC 62809	Human Rated Spacecraft Pyrotechnic Specification	G 11/08/2024		
JSC 65828	Structural Design Requirements and Factors of Safety for Spaceflight Hardware	B 07/15/2014		
JSC 65829	Loads and Structural Dynamics Requirements for Spaceflight Hardware	B Change 3 March 2024		

Document Number, Unique Identifier	Document Title	Document Revision	Denote Subject Area that Standard or Specification applies to	Denote Contractor Acceptance, or proposed alternate standard. (Include ample justification of suitability)
JSC 65985	Requirements for Human Spaceflight for the Trailing Deployable Aerodynamic Decelerator (TDAD)	A		
JSC 67721	Certification Guidelines for Crewed Inflatable Softgood Structures	A 5/22/2025		
JSC 67723	Standard for the Control of Catastrophic Hazards in Human-Rated Spacecraft Propulsion Systems	Basic [August 2025 in industry review.]		
MSFC-SPEC-521D	Electromagnetic Compatibility Requirements for Equipment and Subsystems	Rev.C to D [Apr. 2025 planned]		
MSFC-STD-3790	Electromagnetic Environmental Effects (E3) Systems level Requirements for Crewed Vehicles	Basic [June 10, 2025]		
MIL-STD-981	Department of Defense Standard Practice: Design, Manufacturing and Quality Standards for Custom Electromagnetic Devices for Space Applications	C 05-2020		
MSFC-SPEC-3746	Flow-Induced Vibration Assessment Requirements for Metal Bellows and Flexhoses	Basic 04/16/2020		

Document Number, Unique Identifier	Document Title	Document Revision	Denote Subject Area that Standard or Specification applies to	Denote Contractor Acceptance, or proposed alternate standard. (Include ample justification of suitability)
NASA-STD-1006	Space System Protection Standard	A 07/15/2022		
NASA-STD-3001 Vol. 2	NASA Space Flight Human System Standard Volume 2: Human Factors, Habitability, and Environmental Health	D 09/15/2023		
NASA-STD-5012	Strength and Life Assessment Requirements for Liquid-Fueled Space Propulsion System Engine	B 06/16/2016		
NASA-STD-5017	Design and Development Requirements for Mechanisms	B 12/06/2022		
NASA-STD-5018	Strength Design and Verification Criteria for Glass, Ceramics, and Windows in Human Spaceflight Applications	Basic Change 1 11/27/2017		
NASA-STD-5019	Fracture Control Requirements for Spaceflight Hardware, for hardware structures of the integrated vehicle	A Change 7/29/2024		
NASA-STD-5020	Requirements for Threaded Fastening Systems in Spaceflight Hardware	B 08/06/2021		
NASA-STD-5021	Thermal Protection System Design Standard for Crewed Spacecraft	Basic 08-06-2019		

Document Number, Unique Identifier	Document Title	Document Revision	Denote Subject Area that Standard or Specification applies to	Denote Contractor Acceptance, or proposed alternate standard. (Include ample justification of suitability)
NASA-STD-6001	Flammability, Offgassing, and Compatibility Requirements and Test Procedures	B Change 2 4/21/2016		
NASA-STD-6016	Standard Materials and Processes Requirements for Spacecraft	C Change 1 11/15/2023		
NASA-STD-7009	Program Modeling and Simulation	A 12/07/2016		
NASA-STD-7012	Leak Test Requirements	A 02/22/2023		
NASA-STD-8739.1	Workmanship Standard for Polymeric Application on Electronic Assemblies	B 10/04/2021		
NASA-STD-8739.8	Software Assurance and Software Safety Standard	B 9/8/2022		
NASA-STD-8739.10	Electrical, Electronic, And Electromechanical (EEE) Parts Assurance Standard	Basic 06/13/2017		
NASA/TM-2013-217380	Application of the Brinkley Dynamic Response Criterion to Spacecraft Transient Dynamic Events	1 March 1, 2017		
NASA/TP-2015-218570	Life Support Baseline Values and Assumptions Document	2 February 2022		
NPR 7150.2	NASA Software Engineering Requirements	D		

Document Number, Unique Identifier	Document Title	Document Revision	Denote Subject Area that Standard or Specification applies to	Denote Contractor Acceptance, or proposed alternate standard. (Include ample justification of suitability)
		March 08, 2022		
NPR 8705.2	Human-Rating Requirements for Space Systems	C July 10, 2017		
Privacy Act of 1974	Privacy Act of 1974	Basic Latest		
SAE-AS-50881	Wiring, Aerospace Vehicle	H 2023-01-13		
SMC-S-010	Space and Missile Systems Center Standard: Technical Requirements for Electronic Parts, Materials, and Processes used in Space Vehicles.	2013 04/12/2013		
SMC-S-011	Materials and Processes Control Program for Expendable Launch Vehicles	B 2015 07/31/2015		
SMC-S-016	AFSC Space and Missile Systems Center Standard: Test Requirements for Launch, Upper-Stage, and Space Vehicles	2014 5 September 2014		
SMC-S-025	Evaluation and Test Requirements for Liquid Rocket Engines	Basic 26 July 2017		

Document Number, Unique Identifier	Document Title	Document Revision	Denote Subject Area that Standard or Specification applies to	Denote Contractor Acceptance, or proposed alternate standard. (Include ample justification of suitability)
CLDP-STD-1170	Common Communications for Commercial Destinations in Low Earth Orbit (C3DL) Radio Frequency (RF) Interface Standard	Baseline (boarded July 2025)		
HEOMD-003-04	International Space Power System Interoperability Standards (ISPSIS)	A July 2022		
IPC A-640	Acceptance Requirements for Optical Fiber, Optical Cable, and Hybrid Wiring Harness Assemblies	A April 2022		
JSC 35228	Conjunction Assessment and Collision Avoidance Standard for Commercial LEO	Basic September 2025		
JSC 63414	Spacecraft Water Exposure Guidelines (SWEGs)	A November 2023		
JSC 66320	Optical Property Requirements for Glasses, Ceramics, and Plastics in Spacecraft Window Systems	B		
JSC 67035	Best Practices and Guidelines (BP&G) for Thin Wall Pressure Boundaries (TWPB) for Human Spaceflight Applications	A		
NASA-STD-5005	Standard for the Design and Fabrication of Ground Support Equipment	D Change 9/30/2024		

Document Number, Unique Identifier	Document Title	Document Revision	Denote Subject Area that Standard or Specification applies to	Denote Contractor Acceptance, or proposed alternate standard. (Include ample justification of suitability)
NASA-STD-6030	Additive Manufacturing Requirements for Spaceflight Systems	Basic 4/21/2021		
NASA-STD-8719.14	Process for Limiting Orbital Debris	C 11/5/2021		
NASA/TM-2020-20205001486	Guidance for Human Error Analysis (HEA)	Basic 11/21/2019		
NASA/TM-2020-220555	NASA Meteoroid Engineering Model (MEM) Version 3	3 January 2020		
NASA/TP-2014-218556	Human Integration Design Processes (HIDP)	Basic		
NIOSH (42 CFR Part 84)	Approval of Respiratory Protective Devices			

1. DRD Title: Insight and Collaboration Implementation Plan		
2. DRD No.: CLDC-104	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: NASA will utilize the Contractor's Insight Implementation Plan to ensure NASA can perform their insight as defined in Clause H.15, Government Insight, and consistent with CLDP-PLN-3016 CLDP Insight Management Plan.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: - NASA Contracting Officer (CO) - NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline at Proposal. Submission Frequency: Final due at Certification Baseline Review (CBR). Updates as necessary. Format: The Contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment. Interrelationship: - Clause Use of Government Resources - Clause Government Insight - Statement Of Work (SOW) 2.3 Government Insight Applicable Documents: CLDP-PLN-3016 CLDP Insight Management Plan Scope: The Insight Implementation Plan describes the Contractor's plan for providing NASA insight throughout the contract. In addition to the Systems developed by the contractor, insight is required to ensure United States Government (USG) crew safety and NASA's mission success. Contents: The Insight Implementation Plan shall establish a cooperative environment that ensures an effective working relationship between NASA and the Contractor dedicated to a successful Commercial LEO Destination Contract (CLDC) performance. This includes the approach to accommodating NASA insight of technical and programmatic performance, including safety and mission assurance while still allowing the Contractor to maintain the efficiencies and effectiveness of their normal commercial processes. The Insight Implementation Plan shall address the following: - How the Contractor proposes accommodating NASA's timely and open access, including membership on technical and programmatic review boards, into activities and data used for addressing mutual risks and achieving successful NASA approval of deliverables and milestones,		

Commercial LEO Destination System (CLDS) certification, an endorsement of flight readiness, mission planning, and successful operation of the CLDS.

2. How the Contractor proposes accommodating NASA's timely and open access to data, both remotely and on-site, in a useable and readable format; and provide NASA the ability to locate and review all data used in performance of this contract, to include technical data, mission planning data, operational data, Risk Based Assessments (RBA) data, supporting data/information, configuration management/control data, to include analytical models and administrative and management information with the exception of financial information.
3. How the Contractor proposes accommodating NASA's observation of key development and verification tests both at the system/subsystem level and integrated level (i.e. CLD to Visiting Vehicle)
4. How the Contractor proposes accommodating NASA's participation in Safety processes (i.e. Safety Review Board) and development of review products (i.e. Hazard Reports, Safety Data Packages,)
5. How the Contractor proposes accommodating NASA's insight and surveillance into quality processes and products (i.e. nonconformance management, supply chain management etc.)
6. How the Contractor proposes accommodating NASA's insight into reliability, maintainability, logistics and supportability processes and products (i.e. FMEA/CILs)
7. How the Contractor proposes accommodating NASA's insight into Human System Integration (i.e. Human in the Loop (HITL), worksite analyses, human error analysis)
8. How the Contractor proposes accommodating NASA's insight into medical operations, products, and processes (i.e. medical certification, medical capability, health stabilization plan)
9. How the Contractor proposes accommodating NASA's insight into CLD operations processes, products, facilities including observation of representative crew training events, operations personnel simulations (including transportation), and connectivity to Contractor's mission control center
10. How the Contractor proposes accommodating NASA's insight into payload facilities, products, processes, integration, and operations
11. How the Contractor proposes to ensure that insight data is clearly differentiated from data delivered under the contract
12. The timeframe in which the Contractor will notify NASA of meetings, control boards, reviews, ground processing, operations, demonstrations and tests will be reasonable to permit meaningful NASA participation through the entire event.
13. How the Contractor will enable a cooperative environment between NASA and the Contractor dedicated to successful CLDS certification, endorsement of flight readiness, mission planning, and operations.
14. How the Contractor will capture and address concerns and issues identified by NASA's insight effort
15. How the Contractor proposes accommodating NASA's insight and surveillance into all subcontractors, suppliers, sub-tier vendors, or other third parties performing or supporting any work or handling or creating data required to certify any portion of the CLDS associated with this contract. This data may include engineering data, hazard reports, variances and other data
16. How the Contractor will accommodate NASA insight into data, reports and lessons learned associated with non-NASA CLDS missions. This includes items associated with failure and problem resolution.
17. How the Contractor will accommodate NASA access to and participation in Contractor led crew activities. This includes pre-mission and real-time and post-mission activities.
18. How the Contractor will accommodate NASA access to Contractor hardware/software development, testing and processing facilities.
19. NASA Collaboration: Describe the Contractor and subcontractor's implementation approach for leveraging NASA expertise in "Collaboration" designated roles, up to twenty (20) FTE of civil service personnel, who may have an increased level of access in order to help provide advice, guidance, and collaboration with Contractor performance (in accordance with H.3 Use of

Government Resources).

Remarks: The Insight & Collaboration Implementation Plan shall become a part of the contract as Attachment J-10.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

1. DRD Title: Integrated Performance Analysis and Integrated Testing Plan (IPAITP)		
2. DRD No.: CLDC-105	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date of Revision: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Integrated Performance Analysis and Integrated Test Plan (IPAITP) describes the Contractor's approach to integrated system performance analysis, integrated system testing, joint integrated testing, and element integrated testing.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: - NASA Contracting Officer (CO) - NASA CLDP Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline at Preliminary Design Review (PDR) (if PDR is required) or Final at Critical Design Review (CDR), and updates as necessary thereafter. Submission Frequency: Final at CDR. Update as required. Format: The Contractor's format is acceptable and shall be in accordance with the data format section at the beginning of this attachment Interrelationship: Statement Of Work (SOW) Section 2.10.4 Integrated Performance Analysis and Integrated Test Plan (IPAITP) Applicable Documents: N/A Scope: The IPAITP shall describe the Contractor's approaches to planning and executing testing, analysis, and demonstration of the Commercial Low Earth Orbit Destination System (CLDS) at multiple levels of assembly in order to support overall system verification, validation, demonstration, and certification. Contents: The Plan shall provide an overview of the Contractor's integrated performance analysis and integrated testing program. This includes summarizing the overall associated requirements, objectives, and strategy to support verification and validation. This should include: - Overall approach to qualification and acceptance testing per identified standards. - Component and lower-level assembly test plans - Time sequencing and interrelationships between tests (precursors and successors). - Process for ensuring that lower-level assemblies, resources, and facilities are ready for integration with the test-setup. - Overarching approach to pre-requisite tests and analyses, leading up to the highest assembly level test. This includes integrated hardware and software testing when appropriate. The Plan shall provide descriptions of the following areas of scope (see Remarks section for guidance):		

1. Integrated system testing: The plan shall outline the contractor's approach to incremental testing and validation of the system build-up.

2. Joint integrated verification testing:

The plan shall identify:

- a. Overall joint integrated test program requirements, objectives, and strategy to support the contractor-built system interfaces with partner, subcontractor, and vendor developed, owned and operated systems.
- b. Nominal and off-nominal test cases to demonstrate adequate or robust margins.
- c. Process for development, review and approval of "as planned" and review of "as run" joint test procedures. This includes the roles and responsibilities of stakeholders.
- d. Post-test results evaluation methodology to ensure that planned test objectives were met, and whether repeat testing is required or new joint tests
- e. Report or documentation plan for testing outcomes.

3. Element integration testing:

The plan shall identify:

- a. Overall requirements, objectives, and strategy to support testing of interfaces between new elements and systems and pre-existing on-orbit elements and systems prior to launch of the new element(s) and/or system.
- b. Nominal and off-nominal test cases to demonstrate adequate or robust margins.
- c. Process for development, review and approval of "as planned" and review of "as run" test procedures. This includes the roles and responsibilities of stakeholders.
- d. Post-test results evaluation methodology to ensure that planned test objectives were met, and whether repeat testing are required or new tests.
- e. Report or documentation plan for testing outcomes.

4. Integrated system performance analysis:

The plan shall identify integrated system performance analysis to be conducted for the CLDS lifecycle. The plan shall define how the Contractor analysis will determine appropriate performance margins during nominal and off-nominal scenarios related to crew safety (Pre-launch, launch, transit, landing, post-landing, on-orbit) and account for degradation of vehicles, elements, and systems over their lifetime. NASA recommends at a minimum the following analysis:

- a. Thermal analysis at a system and component level to ensure adequate thermal control during all mission phases.
- b. Power balance analysis for all mission phases.
- c. Mass properties analysis throughout all mission configurations.
- d. Communications coverage and link margin analyses.
- e. Guidance, navigation, and control analysis.
- f. Structural analysis.
- g. Loads and dynamics assessments.
- h. Electromagnetic interference/compatibility (Electromagnetic Interference (EMI)/Electromagnetic Compatibility (EMC)) analysis.
- i. Attitude determination and navigation state accuracy analysis.
- j. Ionizing and non-ionizing radiation assessments.

- k. Natural and induced environments (including launch, landing, and on-orbit operations). This includes induced thruster plume loads (force and thermal) from free-flying visiting vehicles onto the Destination, and onto any attached visiting vehicles; and induced thruster plume loads from the Destination onto free-flying visiting vehicles.
- l. Computer resource and usage analyses with margins.
- m. Consumables analysis including margins, as applicable.
- n. Flammability, toxic off-gassing, and materials compatibility analyses.
- o. Failure modes and effects analysis.
- p. Venting analysis.
- q. Cabin airflow carbon dioxide washout Computational Fluid Dynamics (CFD) analysis (including clogged return plenum filter effects and sleep station air flow adjustability)
- r. Crew exercise equipment vibration dampening and vehicle GNC effects analysis
- s. Propulsion system degradation analysis (including 2 phase flow, water hammer effects CFD, valve corrosion & purging analysis, seal leakage)
- t. Fire detection and suppression systems analysis
- u. Emergency egress & equipment accessibility timeline analysis
- v. Emergency communications analysis (audible & visual)

Remarks: Integrated system testing (e.g., propulsion, communications, power, etc.) is essential for assessing whether the system components, including software, operates as expected. Integrated system testing is crucial for finding issues early, such as unintended behaviors, sensitivity of components to the performance, workmanship, or environments induced by other components, interface mismatches, or overall performance margins. It helps detect interface issues early, ensures component compatibility, improves software quality, reduces the risk of system failures, and facilitates easier issue resolution. By validating how different system elements work together, integrated systems testing ensure that the multi-element integrated system performs as intended to meet the appropriate requirements. Integrated system testing focuses on verifying that different systems and their components function correctly together, ensuring appropriate, safe, and efficient interactions in both nominal and off-nominal scenarios. In Integrated system testing, individual elements or components are first tested separately and then tested again once they are combined into a single system.

Joint integrated verification tests are conducted to verify and validate the interfaces (e.g., Hardware (HW), Software (SW), Radio Frequency (RF)) between the Contractor developed and operated Destination systems and systems developed and operated by external (e.g., partner, subcontractor, vendor) providers. These tests address the end-to-end functionality of the system's interface ensuring that the different systems and their components interact correctly.

Element integration tests are ground based element-to-element integrated tests bringing together hardware representing multiple elements to ensure that they can be successfully integrated and operate correctly on-orbit. The purpose of these tests is to ensure element-element compatibility, systems end-to-end functionality and operability, and exercising on-orbit procedures including space and ground control. Test configurations to be defined need to include the testing of specific interfaces or demonstrating functionality. These tests develop operational confidence in the element-to-element interfaces and identify major problems on the ground to avoid on-orbit anomalies that could compromise crew safety, mission success, element survivability or assembly activities. Example scenarios include: a) Integration and operations of Element B (new) systems to Element A (on-orbit) systems, b) systems launched to outfit an on-orbit element, and/or c) major system upgrades to a Destination.

Integrated system performance analysis provides the equivalent design and analysis confirmation that the design closes to meet the performance requirements as specified for the systems in development. Iterative integrated performance analysis may be performed to characterize the margins of the design's key performance parameters through design cycles as the design matures throughout the development life cycle.

NASA's experience has shown that:

1. Qualification and Acceptance of components is critical not only to establish that components will function, but also to anchor mathematical models used in analysis of integrated system functions to establish capability and margins of the overall system.
2. Testing at intermediate levels of assembly in nominal and off-nominal mission scenarios and environments is essential to identify unintended interactions among components, assemblies, subsystems, and elements; and mitigate any adverse consequences of those unintended behaviors.
3. Testing of the system at the highest achievable levels of assembly will reveal characteristics and behaviors not seen in lower-level testing.
4. Shortcomings in the testing approach creates an uncertainty in both the undertested components or functions *and* system functional and performance margins derived by analysis from that testing. The resulting uncertainty drives risk and has, in previous programs, driven late re-design, expensive additional testing, and schedule delays in order to establish a safe risk posture for crewed operations.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

1. DRD Title: Verification Closure Notice		
2. DRD No.: CLDC-106	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>(Insert Contract number)</i>
7. Date Issued: <u>Insert the date baseline was issued</u>	8. Date Revised: <u>(Include the revision date (if this DRD has been revised))</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: Provide evidence of closure for each technical requirement defined in the documents listed in CLDP-REQ-1130 Requirements and Standards for the Commercial Low Earth Orbit (LEO) Development Program		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: - NASA Contracting Officer (CO) - NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Final at Design Certification Review (DCR) or Mission Certification Review (MCR), as applicable, in accordance with the approved Data Requirements Description (DRD) CLDC-102 Verification, Validation and Certification Plan (VVCP). Submission Frequency: Update required for currency if the content changes or development of mission unique evidence throughout contract execution. Partial early submission is encouraged, and the Contractor shall identify open work associated with the verification activity and identify as partial submittal in the Verification Closure Notice (VCN). Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment If the Contractor proposes to use an internal system, the system shall: - Allow NASA to have full and open access to all supporting evidence. - Allow NASA to provide comments to and final signature of the VCN. - Allow for configuration control of approved VCNs. - Notify NASA of any changes to the VCN data or supporting evidence that may invalidate an approved VCN. Interrelationship: - SOW 2.10 Systems Engineering and Integration - SOW 1.3 CLDS Requirements and Standards - DRD CLDC-101 System Engineering Management Plan - DRD CLDC-102 Verification, Validation and Certification Plan (VVCP) Applicable Documents: CLDP-REQ-1130 Requirements and Standards for Commercial Low-Earth Orbit Development Program Scope: The Contractor shall provide verification evidence for each CLDS requirement as identified in		

CLDP-REQ-1130 Requirements and Standards for the Commercial Low Earth Orbit (LEO) Development Program in accordance with the approved DRD CLDC-102 Verification, Validation and Certification Plan (VVCP).

Contents:

For each VCN, the Contractor shall provide data for the following areas:

1. One (1) VCN per CLDS requirement as identified in CLDP-REQ-1130 Requirements and Standards for the Commercial Low Earth Orbit (LEO) Development Program.
2. With NASA's approval, the Contractor may submit one VCN for multiple requirements that have similar characteristics.
3. Final submittals shall be made only after dependent verifications are completed and submitted.
4. Partial early submission is encouraged, and the Contractor shall identify open work associated with the verification activity and identify as partial (dated) submittal in the VCN.

The VCN shall provide the decomposition of the requirement and associated verification CLDS requirement as identified in CLDP-REQ-1130 Requirements and Standards for the Commercial Low Earth Orbit (LEO) Development Program to the Contractor's subsystem requirements and verification.

1. The VCN closure rationale shall provide specific description and/or reference to specific evidence to verify and validate compliance to the CLDS requirement as identified in CLDP-REQ-1130 Requirements and Standards for the Commercial Low Earth Orbit (LEO) Development Program.
2. Each VCN shall have the unique requirement number identifier associated with each "shall" statement in the CLDS requirement as identified in the CLDP-REQ-1130 Requirements and Standards for the Commercial Low Earth Orbit (LEO) Development Program requirement it closes.
3. The VCN shall include the requirement statement, detailed verification and validation method (analysis, inspection, test, or demonstration), objectives, and success criteria.
4. VCN closure shall not be considered complete until the lower-level decomposed requirements are satisfied and NASA has concurred with the evidence presented.

The VCN evidence of closure submittal shall include references to the approved configuration-managed analysis, tests, demonstration, or inspection reports. The evidence shall provide:

1. A concise summary of the results and references to the location of clear evidence for verifying the requirement
2. The test configuration and any differences from the flight configuration
3. Identify models used in analysis performed to demonstrate closure
4. A copy of the as-run procedure (as appropriate)

Any relevant NASA approved requirements variances to the CLDS requirement as identified in CLDP-REQ-1130 Requirements and Standards for the Commercial Low Earth Orbit (LEO) Development Program shall be identified in the VCN.

The contractor shall resubmit any VCN when changes to design or operations invalidates the originally approved VCN.

The VCN shall include a NASA and Contractor signature blocks.

The VCN status shall be designated as Partial, Draft (dated), or as Final in the closure field.

The VCN shall indicate the element, flight, or mission effectivity, as applicable.

The contractor shall provide NASA access to any associated reference or supporting data during the contract

period of performance.

For any NASA requirement that the contractor desires relief (full or partial), the contractor shall submit a requirement variance request and decisional package to NASA for adjudication in accordance with CLDP-PLN-2000, *CLDS Certification Plan*.

1. The variance request shall include the following:
 - a. The requirement(s) impacted by the variance
 - b. Description of noncompliance including a detailed overview of the system, subsystem and specific component(s)/processes affected -- include
 - i. Schematics/graphics for context
 - ii. Legacy hardware identification
 - iii. Fault detection and isolation response
 - iv. Failure modes of the system associated with the variance.
 - c. Description of the issue with levied requirements
 - d. Detailed rationale and supporting data for the proposed approach.
 - e. Technical/Programmatic impact assessment if the variance is not approved
 - f. Risk assessment if variance approved including mitigations and controls, if any.
 - g. Effectivity.
2. The Contractor shall develop a decisional package and present at a NASA Control Board.

Remarks: None.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

1. DRD Title: Software Management Plan (SMP)		
2. DRD No.: CLDC-107	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>(Insert contract number)</i>
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: This plan describes the approach for managing and conducting the software development effort and the sustaining engineering of the Commercial LEO Destination System (CLDS) software, ground software, utilization software, and software systems from development through on-orbit sustainment of the CLDS and including software systems for the provider's transportation systems for crew and cargo delivery.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline at Certification Baseline Review (CBR) or Preliminary Design Review (PDR) (if PDR is required). Submission Frequency: Final at Critical Design Review (CDR), and updates as required. Format: The Contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment. Interrelationship: • Statement Of Work (SOW) Section 2.10.3 Software Management • SOW Section 2.10.5 Verification and Validation • SOW Section 2.15 Utilization • SOW Section 2.16 Mission Operations • CLDP-PLN-3017 Utilization Integration Plan Applicable Documents: • NASA-STD-8739.8B Software Assurance and Software Safety Standard • NPR 7150.2D NASA Software Engineering Requirements. • NPR 8705.2C NASA Human-Rating Requirements for Space Systems, (particularly Sec. 2.4.5 on Software) (Note: NPR 8707.2C does not apply to utilization software (for payloads/facilities)). Scope: The SMP describes the approach for managing and conducting the software development effort and the sustaining engineering of the CLDS software, ground software, utilization software, and software systems from development through on-orbit sustaining engineering. This includes the use of Artificial Intelligence. The plan provides insight into and is a tool for monitoring the processes and methods to be followed for		

software development, maintenance, and sustaining, and the approach to be followed for each activity, based on project schedules, organization, and resources. This plan details the software systems, project documentation, project schedules, resource requirements and constraints, and general and detailed software management activities. Software development includes new development, modification, reuse, re-engineering, maintenance, and all other activities resulting in software products. Other entities with flight critical software scope are encompassed in this SMP, such as from all partners, or subcontractors, or government supplied software.

Payload and payload facility software (for utilization) are encompassed within the scope of this SMP per NPR 7150.2D classification. The endpoint for the utilization software could be either the standalone user-provided payload, or a CLD-provided system such as a CLD-provided laptop for use by payloads.

Sustaining engineering includes the methods, approaches, processes, and responsibilities for controlled release of the flight software, software systems, configuration data, and associated documentation as modifications occur as a result of discrepancy/problem reports and change requests. The SMP shall cover the complete software development life cycle for the CLDS, including software planning, development, testing, maintenance, retirement, operations, management, acquisition, and assurance activities.

This applies to all software created, acquired, or maintained by the project. Software is defined in NPR 7150.2D Appendix A, NASA Software Engineering Requirements, and includes software used in embedded devices such as programmable logic devices (including but not limited to Field-Programmable Gate Arrays (FPGAs), Firmware, Programmable Logic Devices, etc.).

Contents:

The Software Management Plan (SMP) shall contain:

1. System overview, including operational use concept, identification of software components, their functions and characteristics, and their interfaces, planning assumptions, and constraints
2. Software project organization and management showing authority and responsibility of each unit and relationships to organizational units outside of software (e.g., S&MA, Communication and Tracking (C&T), Command and Data Handling (C&DH), Avionics, Operations, Systems Engineering, etc.), and resource requirements and constraints.
3. Software configuration and change management for development through sustaining phases
 - a. Description of Software configuration management process
 - b. Description of Software change control process
 - c. Change management
 - d. Release management
4. Software lifecycle and development planning
 - a. Software life cycle model(s) to be used, including software development phases and their sequence.
 - b. System and software schedules and reviews of deliverables as specified in the Statement of Work (SOW) and where the reviews occur in the software life cycle model(s).
 - c. Key software deliveries and where they occur in the software life cycle model(s).
 - d. Software update/upgrade planning and release management
 - e. Software Retirement

5. Logic device re-programmability trade study showing that the full list of avionics including logic devices (firmware, FPGAs, etc.) has been assessed for mission suitability to ensure that each device's mission criticality, complexity, risk, and likely need for updates were taken into account to determine the device selection, architecture and method required for update.
6. Software test planning
 - a. Test philosophy
 - b. Overall approach for the effective and efficient removal of software defects, including levels of test and success criteria for progressing from one level to the next
7. Software risk management
8. Software security
9. Identification of any open source, Commercial-Off-The-Shelf (COTS) Software, and modified COTS software being used.
 - a. Approval required by regulations, required certifications, propriety, usage, ownership, warranty, and licensing rights.
 - b. Each entity involved in any part of the software development effort must either have their own SMP or be explicitly included in an over-arching SMP.
10. Software Maintenance section including:
 - a. Sustaining Engineering processes and procedures
 - b. Software upgrade content scheduling, implementation, and tracking
 - c. Discrepancy/Problem Report analysis, development, and certification plans
 - d. Proactive plan to review, assess, disposition, and if necessary, remediate "issues" (problems, bugs, security vulnerabilities, vendor-supplied patches, etc.) in software and impacted firmware including COTS components (such as platform, drivers, operating system, tools) using internal analysis and supplier issue notification systems (such as supplier errata, security notifications, patch notifications).
 - e. An approved plan for communicating relevant software issues, and their dispositions (such as fixes, workarounds, use as-is including impact, and flight rationale).
 - f. Equipment and facilities required for development and certification
 - g. An approach for providing NASA with the Software Version Description Data of released software products (e.g., revision number, licensing agreements).
11. Software Work Breakdown Structure (WBS)
12. Installation in the target environment including, but not limited to,
 - a. Flight System
 - b. Simulations and Emulators
 - c. Provider's Software Laboratory/Mission Build Facility
 - d. Mission Control Centers (MCCs)
 - e. Ground Operations Facilities
 - f. Training Facility
 - g. Remote CLD Payload/Facility users (for utilization)

13. Approval methods for software including communication and customer access plan for
 - a. Software release content
 - b. All software-related issues
 - i. Notification of late-breaking or on-orbit software issues
 - ii. Implemented changes (e.g., pre-planned, non-conformance, product improvement, etc.).
 - iii. Un-implemented changes (e.g., works-for-me, unexplained anomaly, simulation only, workarounds/user notes, use-as-is, meets-requirement-intent, withdrawn-by-originator, etc.)
 - c. Flight rationale, user notes, and workaround method for use as-is issues
14. Any customization or exceptions to this SMP for payloads/payload facilities (for utilization), as opposed to flight critical software
15. Identification and description of any use of Artificial Intelligence throughout the CLDS lifecycle, including safety-critical classification and a detailed risk assessment with impacts to hazard analysis. Any potential use in safety critical applications will require NASA approval.

Remarks:

The term 'software development' is meant to include new development, modification, reuse, re-engineering, maintenance, and all other activities resulting in software products. The information may be provided in one document, or separate documents, provided the elements are clearly identified in terms of location, mapping to DRD requirement, and that the same delivery and approval requirements apply to those documents.

Note that any proposed use of Artificial Intelligence is subject to the content of this SMP.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing updates made since the last submittal.

1. DRD Title: Human Systems Integration		
2. DRD No.: CLDC-108	3. Data Type: 1, 3	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>(Insert contract number)</i>
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Human Systems Integration (HSI) Plan describes the contractor's approach and processes for implementing human-centered design and human systems integration throughout the systems development lifecycle to ensure the human user capabilities and limitations are integrated into the Commercial LEO Destination System (CLDS). The contractor's task analysis and Summary Human-in-The-Loop (HITL) Reports are used to inform NASA assessment of human-rating. As this Data Requirements Description (DRD) consists of plans, specific analysis and reports, it is broken into multiple DRD sections with different Data Type, Contents and unique submittal frequencies. The DRD sections are as follows: DRD CLDC-108.1: Human System Integration (HSI) Plan (Data Type 1) DRD CLDC-108.2: Task Analysis (Data Type 3) DRD CLDC-108.3: HITL Summary Report (Data Type 3)		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR		
<u>DRD CLDC-108.1: Human System Integration (HSI) Plan (Data Type 1)</u> Initial Submission: Baseline at Preliminary Design Review (PDR) (if PDR is required) or Final at Critical Design Review (CDR), and updates as necessary thereafter. Submission Frequency Final at Critical Design Review (CDR), update for currency as necessary. Format: The contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment. Interrelationship: • Statement Of Work (SOW) Section 2.18 Human Health Medical and Performance • Data Requirements Description (DRD) CLDC-109 Human Error Analysis • DRD CLDC-102 Verification, Validation and Certification Plan • DRD CLDC-104 Insight and Collaboration Implementation Plan		

Applicable Documents:

- CLDP-REQ-1130 Requirement and Standards for the Commercial Low-Earth Orbit Development Program
- CLDP-PLN-2000 Commercial LEO Destination System (CLDS) Certification Plan
- CLDP-PLN-1108 Commercial Low-Earth Orbit Human Systems Integration Plan
- CLDP-PLN-3016 Commercial Low-Earth Orbit Development Program Insight Management Plan.
- JWI 1700.5 JSC Safety and Health Requirements: Non-IRB Human-In-The-Loop (NIRB-HITL) Testing

Scope: The HSI Plan describes the contractor's planning and on-going management of human-centered design and human system integration activities and products throughout the CLDS lifecycle that consider nominal and off-nominal crew operations, ground control operations, and ground processing operations with flight crew interfaces. The contractor's Task Analysis Approach and Strategic HITL Plan may be delivered separately or as part of the HSI Plan. The contractor's task analysis and Summary HITL Report are to be delivered separately from the HSI Plan.

Contents:

The Human System Integration (HSI) Plan describes the contractor's HSI approach, planning, management, and overall strategy for human-centered design and human system integration. This includes but is not limited to:

1. HSI Organization, Roles and Responsibilities
 - a. Description of contractor team HSI roles and responsibilities, including
 - i. Definition of authority for assigned HSI personnel and/or HSI Team, including identification of contractor organization with HSI decision-making authority.
 - ii. Interaction with subsystem teams, subcontractors, and teammates, especially as related to NASA HSI domains (Human Factors Engineering, Operations, Maintainability and Supportability, Habitability and Environments, Safety and Training).
 - b. Expectations and basis for planning technical interchange meetings, reviews, and evaluations (including NASA participation).
 - c. Description of planned participation of users, stakeholders, and discipline experts in HSI activities throughout CLDC period of performance.
 - d. Description of contractor working groups and/or technical forums that will be used to discuss HSI-related topics and issues, including forums for regular interaction with NASA. Include expected participants, meeting initiation and frequency, and decisional authority for each.
 - e. Approach to NASA insight and deliverables that is focused on path to successful verification, including process, format, content, data rights, and schedule of data sharing and communication between contractor and NASA.
2. HSI Approach
 - a. Steps that will be taken to understand how the user will fit into the mission and environment, including development, evaluation, and refinement of design solutions.
 - b. Methods to ensure human system integration across all elements and subsystems of CLDS.
 - c. Process to track CLDP-REQ-1130 Requirement and Standards for the Commercial Low-Earth Orbit Development Program, human-system requirement compliance progress and potential deviations, including how non-compliances will be communicated and resolved.
 - d. HSI risk management strategy.
 - e. Processes for deliberating and resolving human system design and evaluation issues and

determining design trades.

3. Descriptions of planned processes, activities, tools, and products that demonstrate the contractor will implement human-centered design and human system integration. Each description includes how the activity and/or results will be used, sequence of use as related to other HSI activities, and approach to NASA insight and deliverables that is focused on path to successful verification, including process, format, content, and schedule of data sharing between contractor and NASA. Description to include, but not be limited to:
 - a. Approach to requirements management and function allocation, including:
 - i. Identification of human systems requirements in CLDP-REQ-1130 Requirement and Standards for the Commercial Low-Earth Orbit Development Program to be managed by the contractor's HSI personnel.
 - ii. Allocation of functions based on user/operational needs to systems.
 - iii. Approach to determine the extent to which a given activity, task, function, or responsibility is to be automated or assigned to humans.
 - b. Approach to Crew Interfaces consistency - Inconsistency or conflicts in crew interfaces across elements (including the transportation vehicle and the Destination) can lead to error as a crew moves from one element to the next. The contractor's approach to designing for consistent crew interfaces includes but is not limited to:
 - i. Description of the process to identify the information needed by human crew and operators to perform mission functions, as determined through task analysis, for activities such as mission planning, mission operations, system maintenance, and system health and status monitoring.
 - ii. Description of the approach to implement logical flow, content, and presentation of information on labels and electronic displays to support crew tasks consistently.
 - c. Approach to Task Analysis – Task Analysis is a required analysis method for the verification of many CLDS requirements and is an important precept of human systems integration. It analyzes crew tasks and interactions at all levels of the system based on concept of operations, including nominal and off-nominal crew and ground control operations, and ground processing operations with flight crew interfaces. Task Analysis is used to drive design, scope HITL and verification efforts, and inform the development of Human Error Analysis, operational procedures, flight rules, and training. The contractor's approach to Task Analysis may be a standalone document and includes at a minimum:
 - i. Task analysis approach, relationship to CLDS concept of operations across all elements, and approach to maintaining and updating for currency.
 - ii. Method used to designate critical tasks.
 - iii. Methods, tools, and processes that will be used to correlate tasks to HITL planning.
 - iv. Methods, tools, and processes that will be used to correlate tasks to Human Error Analysis planning.
 - v. Methods, tools, and processes that will be used to correlate tasks to operational products and training.
 - d. Strategic HITL Plan that describes the overall programmatic strategy and process of how the contractor intends to use HITL testing. This includes iterative developmental HITL testing to identify and resolve issues related to human-systems interactions early in CLDS concept and design as well as for verification HITLs used to demonstrate compliance to requirements and provide evidence for certification. The Strategic HITL Plan may be a standalone document and includes at a minimum:

- i. Approach to identify applicable system-level requirements and sub-allocations.
- ii. Approach to establish and maintain a current schedule/timeline for all planned HITL testing (initial concept, developmental, final verification/certification) based on task analysis, including draft HITL plan/timeline with indication of potential use of NASA test subjects.
- iii. Descriptions of the contractor's planned use of test articles (prototypes/mockups and facilities), test events, test objectives, and methods of reporting for HITL testing.
- iv. Description of strategy and processes by which integrated human performance (including human error, system usability, and flight and ground crew workload) will be evaluated iteratively for the reference missions, and how the test results will inform design and operational updates.
- v. Description of methods, tools, and processes that will be used to plan and execute each HITL event and to analyze results, including pop analysis, anthropometric population analysis, modelling, and virtual/mixed reality environments.
- vi. The types of HITL test measures that the contractor will use, including task errors (number and type), usability ratings, test subject comments, cognitive workload for assessment.
- vii. Definition of content and format in Type 3 deliverables related to HITLs (HITL Plan/timeline and HITL reports).
- viii. Description of how the contractor will determine the need for NASA test subjects and how that will be indicated in the HITL plan/timeline.
- ix. Description of the contractor's approach to meet the intent of NASA safety processes for contractor test activities that will use NASA personnel or be performed at NASA facilities, including use of a joint CLD HITL Coordination WG. Safety and Test Readiness Review, medical monitoring, and human research exemptions are described in JPR 1700.1M JSC Safety and Health Requirements, sections 6.8 and 10.2.4, JWI 1700.5 JSC Safety and Health Requirements: Non-IRB Human-In-The-Loop (NIRB-HITL) Testing, and CK-WI-28 FOD Safety and Test Readiness Review Process for Ground Support and Test Readiness Review Process for Ground Support Activities at Non-NASA Facilities.

DRD CLDC-108.2: Task Analysis (Data Type 3)

Initial Submission: Baseline at Preliminary Design Review (PDR) or Critical Design Review (whichever occurs earlier), and updates as necessary thereafter.

Submission Frequency: Final at Design Certification Review (DCR), updates for currency as necessary.

Format: Excel preferred but format to be determined and approved as part of HSI Plan.

Interrelationship:

- Statement Of Work (SOW) Section 2.18 Human Health, Medical and Performance
- Data Requirements Description (DRD) CLDC-109 Human Error Analysis
- DRD CLDC-102 Verification, Validation and Certification Plan
- DRD CLDC-104 Insight and Collaboration Implementation Plan

Applicable Documents:

- CLDP-REQ-1130 Requirement and Standards for the Commercial Low-Earth Orbit Development Program
- CLDP-PLN-2000 Commercial LEO Destination System (CLDS) Certification Plan

- CLDP-PLN-1108 Commercial Low-Earth Orbit Human Systems Integration Plan
- CLDP-PLN-3016 Commercial Low-Earth Orbit Development Program Insight Management Plan.

Contents: The Task Analysis is implemented according to the Task Analysis approach in the approved DRD CLDC-108.1 Human Systems Integration Plan. Task Analysis includes all tasks that require human interactions to operate, monitor, or make decisions starting with pre-launch and continuing through flight, landing/docking, and post-flight. Task analysis data fields are defined and approved by NASA in the contractor's HSI Plan and are expected to include: mission phase, task/subtask name, system/subsystem, description of task, task steps, task type (e.g., nominal, contingency, emergency), task criticality, minimum number crew required, parallel or serial task, task dependencies, trigger to start task and trigger to end task, time constraint/time to effect, tool required, worksite, interface element, illumination needed, out-of-view controls, visual task, posture, restrained, constrained or obstructed reach, critical anthropometric dimension and value, critical strength motion and value, restraints and mobility aids needed, gravity environment, vibration environment, shock environment suit condition, crew demand (expected cognitive or physical workload).

DRD CLDC-108.3: HITL Summary Report (Data Type 3)

Initial Submission: Final at DCR

Submission Frequency: Updates for currency as necessary.

Format: The contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment.

Interrelationship:

- Statement Of Work (SOW) Section 2.18 Human Health Medical and Performance
- Data Requirements Description (DRD) CLDC-109 Human Error Analysis
- DRD CLDC-102 Verification, Validation and Certification Plan
- DRD CLDC-104 Insight and Collaboration Implementation Plan

Applicable Documents:

- CLDP-REQ-1130 Requirement and Standards for the Commercial Low-Earth Orbit Development Program
- CLDP-PLN-2000 Commercial LEO Destination System (CLDS) Certification Plan
- CLDP-PLN-1108 Commercial Low-Earth Orbit Human Systems Integration Plan
- CLDP-PLN-3016 Commercial Low-Earth Orbit Development Program Insight Management Plan.
- JWI 1700.5 JSC Safety and Health Requirements: Non-IRB Human-In-The-Loop (NIRB-HITL) Testing

Contents:

1. Summary of the human-in-the-loop usability evaluations for human- systems interfaces, and integrated human-system performance testing to date and how the results influenced the system design.
2. Description of how the crew and ground control workload is being validated for the mission, and how the contractor identified and implemented necessary mitigations to significant findings.

Remarks: Additional information can be found in NASA/SP-20210010952 NASA Human Systems Integration (HSI) Handbook, NASA/TP-2014-218556 Human Integration Design Processes, and HIDH.

NASA HITL safety processes are found in JPR 1700.1M JSC Safety and Health Requirements, sections 6.8 and 10.2.4, JWI 1700.5 JSC Safety and Health Requirements: Non-IRB Human-In-The-Loop (NIRB-HITL) Testing, and CK-WI-28 FOD Safety and Test Readiness Review Process for Ground Support and Test Readiness Review Process for Ground Support Activities at Non-NASA Facilities.

Maintenance:

Updates to the Data Type 1 HSI Plan shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document. The contractor to provide 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

Updates to the Data Type 3 Task Analysis and Data Type 3 HITL Summary Report: Updates shall be incorporated by resubmission of the document(s). Changes shall be incorporated by complete reissue with a change log in the front matter of each document.

1. DRD Title: Human Error Analysis		
2. DRD No.: CLDC-109	3. Data Type: 1, 3	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>(Insert contract number)</i>
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Human Error Analysis Plan documents the contractor's plans, methods, and processes for the Human Error Analysis (HEA) that is used throughout the lifecycle to identify and correct for potential human error for Commercial Low Earth Orbit (LEO) Destination System (CLDS). HEA is a key component of human rating a spacecraft and is used to understand and manage potential catastrophic hazards caused by the human; understand the relative risks and uncertainties within the system design; and influence decisions related to the system design, application of testing and operational use. HEA Results and Reports are delivered to show that the contractor is using HEA iteratively and effectively to make design decisions and inform risk trades. This Data Requirements Description (DRD) is broken into multiple DRD sections with different scope, contents, and unique submittal frequencies. The DRD sections are as follows: CLDC-109.1: HEA Plan (Type 1) CLDC-109.2: HEA Results and Reports (Type 3) 11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR		
<u>CLDC-109.1: HEA Plan (Data Type 1)</u> Initial Submission: Baseline at Preliminary Design Review (PDR) (if PDR is required) or Final at Critical Design Review (CDR), and updates as necessary thereafter. Submission Frequency: Final at Critical Design Review (CDR), updates for currency as necessary. Format: The Contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment. Interrelationship: • Statement Of Work (SOW) Section 2.18 Human Health Medical and Performance • Data Requirements Description (DRD) CLDC-108 Human Systems Integration • DRD CLDC-102 Verification, Validation and Certification Plan • DRD CLDC-104 Insight and Collaboration Implementation Plan Applicable Documents: • CLDP-REQ-1130 Requirement and Standards for the Commercial Low-Earth Orbit Development		

Program

- CLDP-PLN -2000 Commercial Low-Earth Orbit Development Program Certification Plan
- CLDP-PLN -3016 Commercial Low-Earth Orbit Development Program Insight Management Plan

Scope: The contractor's Human Error Analysis includes all nominal and contingency mission operations while the crew is interacting with the space system, including crew and mission control operations, pre-launch ground processing operations with flight crew interfaces, and recovery team operations with the spacecraft. This includes response to system failures and terminate/abort scenarios. An operator is defined as any human that commands or interfaces with the space system during the mission, including humans in the control centers and recovery teams.

Contents:

1. The Human Error Analysis Plan includes a description of the contractor's methods, processes and organizational approach that will be used to evaluate human actions, identify potential human error, model human performance, qualitatively characterize how human error affects the system and plan for incorporating those results into concept development, design and/or operations. Content includes but is not limited to:
 - a. Applicable CLDP-REQ-1130 requirements.
 - b. Description of contractor's methods, tools and processes used to identify human error potential and consequence (i.e. critical or catastrophic) based on tasks/subtasks, including response to system failures and aborts.
 - c. Definition of contractor's workflow and sequence of HEA activities (step-by-step outline of how the analysis will be conducted, including task analysis).
 - d. Description of contractor's methods, tools, and processes that will be used to address outputs of Human Error Analysis and Human-in-the-Loop (HITL) Reports as a part of an iterative design process that employs mitigations to reduce the frequency and negative effects of human error. Include prioritization and traceability.
 - e. Description of how HEA outputs will be incorporated into system development, including design review, requirements updates, and risk assessments. Include process for communicating HEA findings and mitigation recommendations to responsible organization (Safety, Mission Ops, Training) and how feedback loops are used to ensure closure of critical findings.
 - f. Description of how HEA results inform hazard controls and relation to contractor's system safety analysis.
 - g. Description of how the contractor will continue to evaluate human actions and mitigate human error throughout the operations phase.
 - h. Description of how the implementation of HEA mitigations will be tracked, verified, and validated within the contract lifecycle.
 - i. Approach to NASA insight and deliverables, including process, format, content, data rights, and schedule of data sharing, meetings, and other communication between contractor and NASA.

Remarks: Contractor may reference NASA/TM 2020-5001486 Guidance for Human Error Analysis (HEA), NASA/TP-2014-218556 Human Integration Design Processes (HIDP), and NASA/SP-20210010952 NASA Human Systems Integration (HSI) Handbook, for additional guidance.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document. The contractor to provide 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

CLDC-109.2: HEA Results and Reports (Data Type 3)

Initial Submission: Baseline at CDR

Submission Frequency: Baseline updates for currency, Final at Design Certification Review (DCR), updates for currency.

Format: For analysis results, Excel is preferred but format is to be determined and approved as part of HEA Plan. For reports, the Contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment.

Interrelationship:

- Statement Of Work (SOW) Section 2.18 Human Health Medical and Performance
- Data Requirements Description (DRD) CLDC-108 Human Systems Integration
- DRD CLDC-102 Verification, Validation and Certification Plan
- DRD CLDC-104 Insight and Collaboration Implementation Plan.

Applicable Documents:

- CLDP-REQ-1130 Requirement and Standards for the Commercial Low-Earth Orbit Development Program
- CLDP-PLN-2000 Commercial Low-Earth Orbit Development Program Certification Plan
- CLDP-PLN-3016 Commercial Low-Earth Orbit Development Program Insight Management Plan

Scope: The contractor's Human Error Analysis includes all nominal and contingency mission operations while the crew is interacting with the space system, including crew and mission control operations, pre-launch ground processing operations with flight crew interfaces, and recovery team operations with the spacecraft. This includes response to system failures and terminate/abort scenarios. An operator is defined as any human that commands or interfaces with the space system during the mission, including humans in the control centers and recovery teams.

Contents: Provide evidence that the contractor is using HEA iteratively and effectively to make design decisions and inform risk trades as described in the approved CLDC 109.1 HEA Plan. HEA Results and Reports are expected to be updated as HEA is conducted throughout the system lifecycle and include the following information for each HEA conducted:

1. HEA results
 - a. Applicable requirements and hazard reports.
 - b. Description of human error and correlation to crew tasks/subtasks.
 - c. Type/category identification (inadvertent operation, failure to act/failures of omission, etc.).
 - d. Consequence/impact on the system and on the crew.
 - e. Specific controls that will be employed to prevent (protect) or tolerate human error.
 - f. Verification method that will show the controls are adequate.
 - g. Assessment of residual risk
2. HEA reports
 - a. Purpose/overview
 - b. HEA methodology, assumptions, and/or tools that were used

c. Identification of areas that were not addressed and rationale for not addressing them

Remarks: Contractor may reference NASA/TM 2020-5001486 Guidance for Human Error Analysis (HEA), NASA/TP-2014-218556 Human Integration Design Processes (HIDP), and NASA/SP-20210010952 NASA Human Systems Integration (HSI) Handbook, for additional guidance.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

1. DRD Title: Acoustics Noise Control Plan (ANCP)		
2. DRD No.: CLDC-110	3. Data Type: 3	4. OPR: CDO
5. Solicitation No.: 80SJC025R0001	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Acoustics Noise Control Plan (ANCP) documents the contractor's approach to system design and development that ensures compliance with the Commercial Destination Office (CDO) acoustic requirements. The Acoustics Noise Control (ANC) Reports include the contractor's data and results from acoustic testing and acoustic analyses performed throughout the design lifecycle as well as a description of how the results are being used to inform design decisions for noise mitigation.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Final at Preliminary Design Review (PDR) or Critical Design Review (whichever occurs earlier), and updates as necessary thereafter. Submission Frequency: Updates for currency as necessary. Format: The Contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment. Interrelationship: • Statement Of Work (SOW) Section 2.18 Human Health, Medical, and Performance • Data Requirements Description (DRD) CLDC-108 Human Systems Integration Applicable Documents: • CLDP-REQ-1130 Requirement and Standards for the Commercial low-Earth Orbit Development Program • CLDP-PLN-2000 Commercial LEO Destination System (CLDS) Certification Plan Scope: The ANCP defines the processes, tools, products, and schedule that the Contractor will use to meet NASA requirements for noise limits throughout the contract period of performance. The ANC Reports include test data, analyses, and reports from the contractor's acoustics testing during design development. Contents: The ANCP includes, but is not limited to: 1. Acoustics Noise Control project schedule showing high-level project milestones, including but not limited to: a. Planned component, subsystem, and system-level acoustic tests and iteration for design selection. b. Development, validation, and maintenance/upgrade of a system-level integrated acoustic analysis method or model.		

- c. Delivery of Test data, analysis, and reports.
- d. Remedial efforts following acoustic tests.
- 2. Approach to NASA insight and deliverables that is focused on path to successful verification and operational compliance, including process, format, content, data rights, and frequency of data sharing and communication between contractor and NASA during design and during operations.
- 3. Identification of applicable acoustic requirements
 - a. System-level requirements
 - b. Sub-allocation of system-level requirements to subsystems (e.g. ECLSS), payloads, components (e.g., cabin fan), and integrated hardware (e.g., power supply)
- 4. Description of Contractor's iterative approach to noise control design that includes but is not limited to:
 - a. Development, refinement, maintenance and use of system-level analytical method or model to determine the effects of additional hardware, payloads, Orbital Replacement Units (ORUs), and microgravity effects on system noise levels.
 - b. Process for acoustic testing of components, payloads, subsystems, and system (procedures, use of prototypes and engineering units (components/hardware must be operated with flight-like load, e.g., backpressure on fans), use of results to identify remedial actions, method to determine necessary test iteration, and use of results to validate system-level integrated analysis model). Include definition of content to be delivered as part of Type 3 – Acoustics Noise Control Reports.
 - c. Process for acoustic analysis to assess integrated acoustic levels against system-level requirements as part of an iterative approach that includes noise control mitigations, re-testing, and updates to acoustics noise control project schedule and noise requirements sub-allocations. Include definition of content to be delivered as part of Type 3 – Acoustics Noise Control Reports.
 - d. Use of trade studies and rationale for selection including consideration of component level noise control mitigations (e.g., mufflers for fans, vibration isolation for pumps, etc.) and consideration of subsystem and system-level noise control mitigations (e.g., duct treatments, close-outs, etc.)
- 5. Definition of planned Acoustics Noise Control documentation - Early development testing and analyses is important for development of noise controls and contributes towards final verification closure of noise limit requirements in CLDP-REQ-1130 Requirement and Standards for the Commercial low-Earth Orbit Development Program. The Acoustics Noise Control documentation is expected to include at a minimum:
 - a. Test data from individual component/hardware testing of prototypes and engineering units (Components/hardware must be operated with flight-like load (e.g., backpressure on fans)),
 - b. Analysis data/results from acoustic analysis that is performed to determine integrated acoustic levels compared to system-level noise control mitigations.
 - c. Reports that are based on test and analyses results, including:
 - i. Identification of significant noise sources and challenges.
 - ii. Updates to sub-allocations of system-level requirements to subsystems (e.g. ECLSS), components (e.g., cabin fan), and integrated hardware (e.g., power supply) included in the approved CLDC-110 Acoustics Noise Control Plan, as needed.
 - iii. Description of trade studies performed, results of those trade studies to indicate quietest options for performance needs, and the contractor's rationale for selection.
 - iv. Component level noise control mitigations (e.g., mufflers for fans, vibration isolation for pumps, etc.) that will be incorporated.
 - v. Subsystem and system-level noise control mitigations (e.g., duct treatments, close-outs, etc.) that will be incorporated.
 - vi. Updates to planned iterative acoustic testing of components and subsystems with noise control mitigations (based on current test/analysis results), as needed.

Remarks:

Contractor may reference NASA/TP-2014-218556 Human Integration Design Processes (HIDP) for additional ANCP guidance.

Maintenance:

Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

1. DRD Title: Medical Operations Plan		
2. DRD No.: CLDC-111	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>(Insert contract number)</i>
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Medical Operations Plan describes the contractor's approach to monitoring and managing crew health on NASA missions, including expectations for how NASA medical personnel will participate.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline at Preliminary Design Review (PDR) or Critical Design Review (whichever occurs earlier), and updates as necessary thereafter. Submission Frequency: Final at Design Certification Review (DCR), updates for currency as necessary. DRD should be updated to maintain currency, if there are changes mission-to-mission or if there are changes in standard of care. Format: The Contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment. Interrelationship: • Statement Of Work (SOW) Section 2.18.4 Medical Operations • SOW 2.18.5 Health Stabilization Program • SOW 2.20.3 Mission Medical and Behavioral Health Certification • Data Requirements Description (DRD) CLDC-113 Health Stabilization Program Plan • DRD CLDC-114 Medical and Crew Health System Plan • DRD CLDC-210 Crew Specific Activities. Applicable Documents: • CLDP-PLN-1111 Commercial Low-Earth Orbit Development Program Crew Health Operations Concept (CHOC) Plan • CLDP-STD-1150 Commercial low-Earth Orbit Development Program Operations Standards • CLDP-REQ-1130 Requirement and Standards for the Commercial low-Earth Orbit Development Program, • CLDP-PLN-2000 Commercial LEO Destination System (CLDS) Certification Plan • CLDP-STD-1123 CLDP Medical Standards and Capabilities • Privacy Act of 1974 • JPR 1700.1 Space Systems and Test Safety		

- CK-WI-28 FOD
- NIST SP 800-122 Guide to Protecting the Confidentiality of Personally Identifiable Information (PII)

Scope: The Medical Operations Plan defines the contractor's approach, planning, management, and overall strategy for crew medical and behavioral support during pre-flight, in-flight, and post-flight mission phases for NASA missions.

Contents: The Medical Operations Plan includes but is not limited to:

1. Description of the contractor's Medical Operations team composition, roles and responsibilities, and personnel qualifications (education and planned training) that will be used to provide crew medical and behavioral health support throughout the contract, including but not limited to those who will:
 - a. Execute crew medical and behavioral health certification.
 - b. Conduct pharmacy operations.
 - c. Execute a Health Stabilization Program.
 - d. Provide medical monitoring of crew during hazardous ground activities.
 - e. Provide crew medical training.
 - f. Provide in-flight crew medical and behavioral health support.
 - g. Provide crew landing and recovery medical support.
2. Description of contractor's approach to NASA insight and deliverables related to this Plan, including process, format, content, data rights, and schedule of data sharing and regular interaction, towards certification and during mission operations.
3. Description of the contractor's process for NASA to delegate medical response authority for United States Government (USG) crew to the contractor for designated scenarios, including activities when NASA flight surgeon is not present or available to assist USG crew.
 - a. Identify scenarios when delegation of medical response authority may be needed, with rationale (reference examples in CLDP-PLN-1111 CHOC).
 - b. Identification of contractor and NASA flight surgeon physical location(s) and roles/responsibilities during the events in part 2a.
 - c. Description of communication plan between contractor and NASA flight surgeon in case of USG crew medical event during times when the contractor has been delegated medical response authority for USG crew.
4. Description of preflight medical and behavioral health support, including but not limited to:
 - a. Scope and schedule for preflight drug tolerance testing to assess for adverse effects of medications expected to be used in-mission.
 - b. Method to ensure that all crew achieve and maintain adequate preflight physical fitness levels to perform all required preflight, in-flight, and postflight activities.
 - c. Approach to providing medical support during hazardous crew training that involves USG crew, meeting the intent of JPR 1700.1 Space Systems and Test Safety, Section 6.8 and CK-WI-28 FOD Safety and Test Readiness Review Process for Ground Support and Test Readiness Review Process for Ground Support Activities at Non-NASA Facilities including but not limited to:
 - i. Process to identify activities that require medical support and how NASA will be included in the process.
 - ii. Contractor medical personnel staffing for hazardous training events.
 - iii. Medical response plans for potential contingency event during hazardous training events.

- iv. Required facility capabilities for response to medical contingencies and how the contractor will enable access to these capabilities if needed.
- v. Description of how NASA flight surgeon will participate in medical monitoring and/or medical response during hazardous training.
- d. Approach to execute launch and landing medical operations readiness review(s) for each mission (reference guidance in CLDP-PLN-1111 CHOC) including but not limited to:
 - i. Description of scope and agenda
 - ii. Expected participants
 - iii. Timeframe for launch and landing MORRs such that all open actions can be identified and closed prior to launch and landing, respectively.
 - iv. Process for tracking and closure of open actions
 - v. Process for data exchange
 - vi. Relationship to mission readiness reviews.
- 5. Description of the contractor's approach to mission medical and behavioral health evaluation requirements for assigned crew that meet NASA-specific minimums in CLDP-STD-1123 Medical Standards and Capabilities Section 4 for preflight, in-flight, and postflight medical evaluations, including but not limited to:
 - a. List of contractor's mission medical and behavioral health evaluation requirements for crew.
 - i. Identification of additional contractor medical and behavioral health assessments and/or standards beyond NASA's specified minimum that will be applied to USG crew.
 - ii. Identification of any contractor medical assessments and/or standards that do not meet NASA's specified minimum and corresponding rationale/ proposed alternate standard.
 - b. Plan for conducting mission medical and behavioral health evaluations for all crew, including testing schedule, ground support requirements, facility requirements, test constraints or special requirements, format of test and/or results, thresholds for reporting off-nominal findings, and any expectation for NASA medical support.
 - c. Plan for integration of GFE medical testing and associated ground support personnel and telemetry.
 - d. Plan for delivery of mission medical and behavioral health evaluation data for USG crewmembers to NASA, including process, format, content, and schedule of data sharing.
 - e. Plan for communication of abnormal or off-nominal findings and disposition of findings for non-USG crew health to NASA surgeon.
- 6. Description of ground and flight pharmacy operations that meet applicable terrestrial laws and regulation, including but not limited to:
 - a. Approach to ordering, dispensing, packaging, labeling, and storing medications.
 - b. Approach to managing impacts of terrestrial drug shortages or drug recalls.
 - c. Approach to managing and maintaining environmental conditions to ensure safety, stability, and efficacy of medications.
 - d. Process for delivery of pharmaceuticals to flight vehicle, including management of impacts due to launch delay.
 - e. Process for ensuring adequate quantity and quality of medications, consumables, and hardware for duration of mission and for expected crew size.
 - f. Description of data sharing for each mission for data related to medication changes, recalls, shortages, usage, manifest changes, stowage locations, environmental excursions, medical kit contents and configuration updates; including process, format, content, data rights, and schedule

of data sharing and regular interaction during mission operations.

7. Description of medical and behavioral health support from launch through landing, including but not limited to:
 - a. Nominal medical support plan during all crewed mission phases, including:
 - i. On-console and on-call schedule of console-certified flight surgeon(s).
 - ii. Communication between flight surgeon(s) at contractor MCC(s) and flight surgeons at remote locations (e.g. in the field, etc.) during launch, free flight, RPOD, and landing.
 - iii. List of real-time vehicle and subsystem telemetry to be available on console and on call to flight surgeons.
 - iv. Console responsibilities of flight surgeon(s) as part of contractor's flight control team.
 - v. Method to ensure that all crew maintain adequate in-flight physical fitness levels to perform all required in-flight and postflight activities.
 - vi. Method to ensure that all crew maintain in-flight behavioral health, including considerations of shiftwork, workload, circadian entrainment, provision of recreational resources, and operational mitigations.
 - vii. Support plan and on-call availability of other personnel who will provide real-time input to support crew health.
 - viii. Medical communication plan for discussion of crew health status between contractor flight surgeons and NASA flight surgeons on a routine basis and if there is a change in crew health status (reference medical community of practice in CLDP-PLN-1111 CHOC).
 - b. Medical response plan for non-emergent, off nominal crew medical and behavioral events including but not limited to:
 - i. Description of crew response based on type and severity of event (e.g. self-care, required consultation with ground, soliciting assistance from other crew),
 - ii. Description of resources/tools available to flight surgeons for management of crew in-flight medical event
 - iii. Description of medical and behavioral health data sharing process between NASA and contractor medical personnel.
 - iv. Expected crew communication with ground medical personnel including communication method (e.g. Voice Over Internet Protocol (VoIP) phone, Space-to-Ground, Private Medical Conference (PMC), etc.),
 - v. Contractor coordination with NASA flight surgeon for events involving USG crew, and
 - vi. Plan for assessment, disposition, and communication of mission impact to flight director and mission management.
 - c. Medical response plan for crew emergency medical and behavioral events including but not limited to:
 - i. description of events considered as medical and behavioral emergencies,
 - ii. medical decision-making authority within crew complement,
 - iii. general approach to initial crew and ground response,
 - iv. communication between crew and flight control team and ground medical personnel,
 - v. coordination with NASA flight surgeon for emergencies affecting USG crew, and
 - vi. plan for assessment, disposition, and communication of mission impact to flight director and mission management.

8. Description of the contractor's approach to operational monitoring of the vehicle environment and management of off-nominal findings for the following parameters: water physiochemical and microbial levels, gas pollutants, volatile organic compounds, air microbial levels, surface cleanliness, ionizing radiation, and acoustic environment. The plan is to include:
 - a. Operational monitoring approach with description of required equipment and crew time to conduct monitoring and the frequency of monitoring.
 - b. Thresholds of off-nominal findings and action thresholds to protect crew health and safety.
 - c. Approach to manage exceedances including equipment, crew actions, and ground actions.
 - d. NASA in-mission access to environmental data collected from operational monitoring activities.
9. Description of contractor's process for stabilization and medical evacuation of an ill or injured crewmember during inflight operations back to a Definitive Medical Care Facility (DMCF) on Earth, including but not limited to:
 - a. Process and decision-making authority for declaring medical evacuation.
 - b. Process to determine appropriateness of conducting medical evacuation, considering safety, clinical, and operational impacts.
 - c. Definition of the actions and capabilities to prepare crew and transportation vehicle for emergency medical return.
 - d. Determinants of and minimum time to execute medical evacuation.
 - e. Communication plan with critical stakeholders including NASA flight surgeon, recovery forces and DMCF during medical evacuation until arrival of crew at DMCF.
10. Description of the contractor's approach to manage an on-orbit crew fatality, including but not limited to:
 - a. Timeline for executing crew fatality response and body disposition.
 - b. Preflight training and administrative actions to prepare for a crew fatality event including:
 - i. Ensuring procedural competency of crew
 - ii. Development of crew advance directives for:
 1. Preferences for own fatality.
 2. Documentation of willingness/consent to participate in forensic sampling for other crew and any exclusions.
 3. Documentation of awareness of mishap/accident investigation or other processes which may have requirements that take precedence over individual preferences.
 4. Documentation of cultural and religious crew preferences.
 - c. Processes and provisions for pronouncement of death with description of:
 - i. Ground personnel qualifications to conduct pronouncement.
 - ii. Steps to rule out confounders/mimics of death.
 - iii. Recording of time of death.
 - iv. Initial scene documentation.
 - v. Communication with ground.
 - vi. Initial containment actions.
 - d. Processes for forensic preparation including body fluid control, removal of personal effects and clothing, body photo documentation, and hair sampling for family.
 - e. Protocol for determining which forensic sampling to perform, supplies, and procedures.

- f. Processes for forensic sampling.
 - g. Processes for post-mortem handling of the deceased including viewing by next of kin, containment of remains, preservation of forensic samples, method to ensure safety of the surviving crew to prevent additional crew loss.
 - h. Disposition of remains including forensic, sample and body return to Earth, transport vehicle selection, dignified transfer of remains, and chain of custody upon landing.
 - i. Behavioral health support plan for support of non-USG crew and contractor ground personnel.
 - j. Processes for NASA flight surgeon and behavioral health personnel to participate in the crew fatality response for a USG crew fatality, and for support of USG crew in case of a non-USG crew fatality.
11. Description of contractor's approach to protect and secure USG crew health and medical communication, records, and data in accordance with NIST SP 800-122, Guide to Protecting the Confidentiality of Personally Identifiable Information, and in a manner that is consistent that complies with the Privacy Act of 1974, as amended, including but not limited to:
- a. Policies, processes, and capabilities for ensuring privacy and security of USG Crew health and medical data during activities that result in generation, storage, transfer, receipt, or communication of USG crew health and medical data between the contractor and NASA or other parties during any mission phase.
 - b. Identification and description of interfaces between contractor and NASA for exchange of crew health and medical data.
 - c. Process for coordination of requests for USG crewmember medical data from outside of the nominal working level medical support or management chain.

Remarks: Contractor may reference OCHMO-TB-012 Mortality Related to Human Spaceflight and NID 8921.143 Policy for the Handling of Mortality Related to NASA Human Spaceflight Operations for additional guidance on crew fatality. Contractor may reference JPR 1700.1 Space Systems and Test Safety for additional information on medical support during hazardous crew training.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

1. DRD Title: Food and Nutrition Plan		
2. DRD No.: CLDC-112	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: To identify and define the contractor's plans and approach for food system development, production, and certification; and define the necessary data and schedule that will be provided for NASA review to verify contractor's food system meets the technical and safety requirements and is safe for crew consumption on Commercial Low Earth Orbit (LEO) Destination (CLD) missions. If the contractor is using Government Furnished Equipment (GFE) food during initial mission, this plan will define the contractor's process and timeline to transition from GFE food to contractor food (development, production, certification).		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline at Preliminary Design Review (PDR) (if PDR is required) or Final at Critical Design Review (CDR), and updates as necessary thereafter. Submission Frequency: Final at CDR, updates for currency as necessary. Format: The contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment. Interrelationship: • Statement Of Work (SOW) Section 2.18.7 Food and Nutrition • Data Requirements Description (DRD) CLDC-113 Health Stabilization Program (HSP) Plan Applicable Documents: • CLDP-REQ-1130 Requirements and Standards for the Commercial low-Earth Orbit Development Program • Code of Federal Regulations (CFR) Title 21 Parts 113 and 114 Thermally Processed Low-Acid Foods Packaged in Hermetically Sealed Containers and Acidified Foods Scope: The Food and Nutrition Plan identifies the processes to be used to meet all regulatory and NASA requirements for the Commercial LEO Destination System (CLDS) food system throughout the contract period of performance. Contents: Food and Nutrition Plan includes, but is not limited to: 1. Plan for space food system development. a. Organizational approach to food system development that defines the skill set that the contractor		

- will use for food development, production, packaging, and certification, including:
- i. Identification of intention to procure industry services for any food system components, including agreements and maturity level of those agreements.
 - ii. Description of team roles and responsibilities.
 - iii. Definition of training requirements, skills, licensing, and certification of food lab team.
 - iv. Expectations and basis for planning technical interchange meetings, reviews, data exchange (including data rights), and evaluations, including NASA participation.
 - v. Definition of data to be used for NASA insight (e.g., Standard Operating Procedures, Work Instructions, specifications/drawings for food items, test requirements/methods/data).
 - vi. Summary timeline for activities in this plan.
 - vii. If contractor is using GFE food during initial mission, describe the contractor's process and timeline to transition from GFE food to contractor food (development, production, certification) by Final Operating Capability (FOC).
- b. The process by which the contractor will maintain appropriate facilities for food development, production, packaging, storage, and shipping, including:
- i. Regulatory compliance. The Contractor is responsible to ensure compliance with all federal, local, and state laws current at the time governing the development, production, purchase, storage, packaging, and transport of food. The laws and regulations include but are not limited to: Code of Federal Regulations (CFR) Title 21 and Title 9; Food and Drug Administration (FDA) Food Safety Modernization Act (FSMA), Current Good Manufacturing Practices (cGMP); Hazard Analysis, and Risk-Based Preventive Controls, etc. Any foods imported from outside of the United States need to comply with the FDA FSMA rule on the Foreign Supplier Verification Program (FSVP) and applicable local, federal, and state government import requirements.
 - ii. Identification of facility capabilities and capacities to be used in support of this contract.
 - iii. Facility access control and maintenance schedule.
- c. A Standard Operation Procedure or equivalent documenting the contractor's approach to food development, testing, production, processing, packaging, storage, shipping, documentation, and certification, including:
- i. R&D process to develop/approve new space foods leading to a sufficient space food system, and plan to address food/food ingredient shortages/discontinuance.
 - ii. Process that the Contractor will use to obtain NASA feedback on all menu items to be part of a menu offering.
 - iii. Documentation guiding transition from Research and Development (R&D) to operation and supporting food system certification.
 - iv. Process for sourcing ingredients and materials.
 - v. Inventory and shelf-life management, including disposal of unused/expired foods/food ingredients.
 - vi. Food preparation and processing method of shelf-stabilization.
 - vii. Food critical control points and contamination control.
 - viii. Packaging/repackaging & labeling.
 - ix. Testing such as microbiological, analytical, and sensory evaluation as part of food acceptance, and other applicable testing for space flight compatibility (e.g. material off-gas, flammability, food evaporated compound interfering with Environmental Control and Life

Support System (ECLSS)), that addresses:

- 1) Test process for shelf-stable non-commercially sterile products produced in-house and Commercial Off the Shelf (COTS) food, such as nutrition bars, dried fruits, retort thermostabilized pouches (e.g., tuna pouches, extended shelf-life tortillas, or hard candy) that will be identified as part of the menu offering.
 - a) Data exchange for comparison of which COTS items have already been tested and approved for use by NASA such that contractor can leverage previous test results as appropriate.
 - b) Plan for additional testing of foods if not previously tested and approved by NASA, as required to meet NASA requirements.
 - c) Testing to certify previously approved COTS items to the contractor's environment and proposed usage.
- 2) For retort thermostabilized foods that are not commercially procured, the process to provide proof of commercial sterility by a qualified thermal process authority in accordance with CFR Title 21 Parts 113 and 114.
 - a) Process for establishing authority by a qualified entity.
 - b) Mechanism to deliver proof of sterility in line with food production plans.
- x. Storage and transportation controls for spaceflight food.
- xi. Processes for record-keeping, recall tracing, recall plans, and documents retention schedule.
- xii. Facility environmental cleaning, sanitation, and monitoring.
2. Plan for crew training and menu planning that will be followed for each mission, including but not limited to:
 - a. Process to familiarize assigned mission crewmembers with the menu offering, including timeline.
 - b. Process for menu planning that includes crewmember choices and that meets all NASA requirements, such as safety, variety, nutritional (caloric and macro/micro) requirements, and timeline constraints for multiple meals per day.
3. Plan for prelaunch quarantine food service support to ensure balanced nutrition and food safety pre-flight to prevent any food borne illness from impacting the crew and mission.
4. Plan for data exchange with NASA for each mission that includes, but is not limited to:
 - a. Approach to food system data exchange, including process, format, content, data rights, and schedule of data sharing, meetings, and regular interaction with NASA and USG crew.
 - b. Definition of food system data that will be used for certification of flight readiness for each mission, including timeline and method of data delivery.
 - c. Description of updates to overall food system (e.g., nutritional changes, recalls, shortages, usage, manifest changes, environmental excursions, and configuration).
 - d. Description of how crew member feedback and lessons learned from each mission will be incorporated into updates over the entire contract.

Remarks: If the contractor delivers the food system by using Government Task Agreement (GTA) and/or GFE, the food plan needs to include a description of how the contractor will transition from government-provided services/equipment to fully contractor-provided by FOC.

The following references are available for food system development guidance:

- NASA-STD-3001 NASA Spaceflight Human-System Standard Volume 2: Human Factors, Habitability, and Environmental Health,
- OCHMO-TB-013 Food and Nutrition Technical Brief

- JSC 67378 Nutritional Requirements for Exploration Missions up to 365 Days
- MIL-PRF-44073 Performance Specification for Packaging of Food in Flexible Pouches
- JSC 67627 Pre-Launch and Post-Landing Service Operational Procedures

Maintenance:

Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document. The contractor to provide 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

1. DRD Title: Health Stabilization Program (HSP) Plan		
2. DRD No.: CLDC-113	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC025R001	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Health Stabilization Program (HSP) Plan describes the contractor's approach to developing and executing a Health Stabilization Program that meets the intent of Johnson Space Center (JSC) 22538 Flight Crew Health Stabilization Program. The purpose of the HSP is to mitigate the risk of occurrence of infectious disease among astronaut crews during the mission.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CLDP Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline at Critical Design Review (CDR) Submission Frequency: Final at Design Certification Review (DCR), updates for currency Format: The Contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment. Interrelationship: Statement Of Work (SOW) Section 2.18 Human Health, Medical and Performance Applicable Documents: • CLDP-REQ-1130 Requirements and Standards for the Commercial low-Earth Orbit Development Program • JSC 22358 Flight Crew Health Stabilization Program • CLDP-STD-1150 Commercial low-Earth Orbit Development Program Operations Standards. Scope: The HSP Plan describes the contractor's operational plans and controls that ensure flight crew, mission-related personnel, facilities, procedures, and employee training reduce the risk that the crew will be exposed to communicable disease for all missions with USG crew. Contents: The Health Stabilization Program (HSP) Plan includes, but is not limited to: 1. Definitions of personnel, facilities, and any contractor-unique terms. 2. Description of contractor's implementation of the roles and responsibilities defined in JSC 22538, such as infectious disease control team, designated lead of infectious disease control team, facility representatives and managers, crew surgeons, medical representatives, food service workers, security, etc. 3. Description of contractor's implementation of HSP requirements for training, medical screening, immunizations, minimization of duration of contact, limitations of exposure, housing, use of personal		

protective equipment, timelines, and late entry. Specifically identify any requirements that deviate from those defined in JSC 22538. Include approach to addressing potential emerging infectious diseases (e.g. potential pandemic).

4. Anticipated timeline for completing critical HSP milestones, such as establishing the HSP participant list and completion of participant medical forms, immunizations, training, pre-quarantine medical screening, and periodic medical screening.
5. Description of planned content of HSP education briefing for HSP personnel.
6. Description of activities occurring during HSP quarantine period and how quarantine will be maintained.
7. Name and location of all quarantine and restricted-access facilities to be used by crew from L-14 days and schedule for the contractor's development or acquisition of those facilities.
8. Approach to ensuring quarantine and restricted-access facilities meet HSP sequestered housing needs, including but not limited to:
 - a. Security plan for restricting access to quarantine facility and restricted-access facilities.
 - b. General access facilities to include sequestering of non-quarantined individuals from close contact with HSP participants.
9. Description of methods to maintain cleanliness of HSP facilities, conduct of air and water testing for potential contaminant, and availability of hand hygiene facilities and Personal Protective Equipment (PPE).
10. Description of food provisioning and dining capability while maintaining quarantine.
11. Description of exercise capabilities to enable maintain crews' preflight fitness while maintaining quarantine.
12. Description of urgent care-level medical capability to enable management of minor medical issues while maintaining quarantine.
13. Describe plans for launch scrub handling, significant breaks in protocol or illness, unique processes or facilities not previously addressed, and maintaining quarantine in case of facility emergency.
14. Describe plan for NASA involvement in HSP, including but not limited to:
 - a. Process for NASA insight and deliverables during development of the contractor's HSP, including process, format, content, data rights, and schedule of data sharing between contractor and NASA.
 - b. Process for NASA Flight Surgeon to support and oversee HSP implementation for USG crew for each mission, including process, format, content, data rights, and schedule of HSP-related data exchange.
 - c. Process for NASA Flight Surgeon participation in infectious disease control team.
 - d. Process for NASA insight into infectious disease events and disposition.
 - e. Accommodations for NASA Flight Surgeon with United States Government (USG) crew.
 - f. Provision of NASA Flight Surgeon access to facilities that USG crew visit.
15. Describe plan for conduct of HSP readiness review, including but not limited to:
 - a. Objectives for HSP readiness review inclusive of identifying and reviewing any changes to the approved plan, verifying that HSP Plan remains in compliance with JSC 22538, and disposition any areas of non-compliance with JSC 22538 requirements.

- b. Timing of HSP readiness review with respect to HSP start date.
- c. Required HSP readiness review participants inclusive of NASA personnel.
- d. HSP readiness review entrance criteria inclusive of NASA approval of HSP plan and completion of all HSP personnel training.
- e. Definition of HSP readiness review success criteria that includes, but is not limited to:
 - i. HSP Plan meets all contractual agreements and requirements, and appropriate systems/processes are in place to support execution, including the following:
 - 1. Preparation to implement infectious disease prevention as described in NASA JSC 22538.
 - 2. Prime and back-up HSP facilities in place and identified potential risks and mitigations if required to transition from prime to backup facilities.
 - ii. Appropriate activities are completed for all HSP participants prior to the start of quarantine to mitigate risk of crew exposure once in HSP, including the following:
 - 1. Vaccinations are current and complete.
 - 2. Completion of medical exams and any abnormalities identified and addressed.
 - 3. All HSP personnel have received the HSP educational briefing.
 - 4. Any issues potentially affecting crew health will be reported to NASA for review and approval.
 - iii. All activities planned during quarantine (commercial, Public Affairs Office (PAO) or otherwise) will adhere to NASA policies and mitigate risk of crew exposure, including the following:
 - 1. Personnel that have not completed HSP will adhere to HSP requirements (pre-contact observation period, PPE, social distancing, etc.) if in contact with the crew.
 - 2. PPE and hand hygiene supplies will be available for HSP Participant use in quarantine areas and those in contact with the crew.
 - 3. Preparations to maintain quarantine in the event of a facility emergency or a launch scrub.
 - 4. Any deviations from established requirements, process escapes, and/or symptoms of infectious disease amongst HSP participants during the quarantine period will be promptly reported to NASA for review and approval.

Remarks: NASA will implement the NASA HSP for missions with Government Furnished Services with Transportation.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

1. DRD Title: Medical and Crew Health System Plan		
2. DRD No.: CLDC-114	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>(Insert contract number)</i>
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Medical and Crew Health System describes the contractor's approach to develop the Commercial Low Earth Orbit (LEO) Destination System (CLDS) medical system, and crew countermeasures hardware and supplies.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CLDP Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline at Preliminary Design Review (PDR) (if PDR is required) or Final at Critical Design Review (CDR), and updates as necessary thereafter. Submission Frequency: Final at Critical Design Review (CDR), updates for currency as necessary Format: The Contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment. Interrelationship: • Statement Of Work (SOW) Section 2.18 Human Health, Medical and Performance • Data Requirements Description (DRD) CLDC-111 Medical Operations Plan • DRD CLDC-108 Human Systems Integration Applicable Documents: • CLDP-REQ-1130 Requirement and Standards for the Commercial low-Earth Orbit Development Program • CLDP-STD-1123 Commercial Low-Earth Orbit Development Program Medical Standards and Capabilities • CLDP-STD-1150 Commercial low-Earth Orbit Development Program Operations Standards • CLDP-PLN-1111 Commercial Low-Earth Orbit Development Program Crew Health Operations Concept (CHOC) Plan • CLDP-PLN-2000 Commercial LEO Destination System (CLDS) Certification Plan Scope: The Medical and Crew Health System Plan describes the processes to be used to meet NASA requirements for the CLDS medical system and crew countermeasures hardware and supplies for NASA crewed missions throughout the contract period of performance. Contents: The Medical and Crew Health System Plan includes at a minimum:		

1. A description of the contractor's approach to providing an in-flight medical system that meets NASA minimum requirements in CLDP-STD-1123 Commercial Low-Earth Orbit Development Program Medical Standards and Capabilities, including but not limited to:
 - a. Medical system definition/development:
 - i. Process for identifying appropriate inflight medical conditions to protect for on CLD missions.
 - ii. Process for establishing medical system contents to address in-scope conditions.
 - b. Process for ensuring adequate access to medical system for crew execution of medical procedures, including internal medical kit configuration and stowage location within vehicle(s).
 - c. Process for ground medical personnel to view list of medical system contents during mission operations.
2. A description of the contractor's approach to providing an in-flight exercise countermeasures system, including but not limited to:
 - a. Process to derive functional requirements from [R.CLDS.311] Countermeasures requirement in CLDP-REQ-1130 Requirement and Standards for the Commercial low-Earth Orbit Development Program.
 - b. Process to perform market research and/or trade studies including criteria to down select.
 - c. Process to identify or generate data necessary to validate countermeasure efficacy.
 - d. Process for integration of USG exercise plan and crew prescriptions in the commercial provider's exercise plan.
3. Approach to NASA insight and deliverables for contractor's medical and crew health system that is focused on path to successful certification, including process, format, content, data rights, and schedule of data sharing between contractor and NASA.

Remarks: Contractor does not need to include #2 if a government solution to exercise capability is used.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document. The contractor to provide 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

1. DRD Title: Safety & Mission Assurance (SMA) Plan		
2. DRD No.: CLDC-115	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date Revised: <u>Include the revision date (If this DRD has been revised)</u>	9. DRD Category: Technical ☐ Administrative ☐ S&MA ☒
10. Description/Use: The Safety & Mission Assurance Plan (SMAP) describes the Contractor's approach to planning, management, control, and implementation of the major Safety and Mission Assurance components to include (1) safety and mission assurance management, (2) hazard analysis and system safety, (3) software safety and assurance, (4) quality assurance (QA), and (5) reliability, maintainability, logistics, and supportability (RMLS). Due to the potential transmission of competition sensitive data in this deliverable, the Contractor's Transportation Provider (CVV and CaVV) is allowed, with the Contractor's concurrence, to transmit this deliverable, or portions of this deliverable, directly to NASA electronically. Should this occur, the Contractor's Transportation Provider shall notify the Contractor that such delivery has been made to NASA. The Contractor is still responsible for the timeliness and delivery of the entire DRD to the Government. This Data Requirements Description (DRD) is broken into multiple DRD sections with different scope, contents, and unique submittal frequencies. The DRD sections are as follows: DRD CLDC-115.1: Destination SMAP DRD CLDC-115.2: Crew Visiting Vehicle (CVV) SMAP DRD CLDC-115.3: Cargo Visiting Vehicle (CaVV) SMAP 11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR		
<u>DRD CLDC-115.1: Destination SMAP</u> Initial Submission: Draft (Sections 1-4 only) at Proposal; Baseline at Critical Baseline Review (CBR). Submission Frequency: Final at Preliminary Design Review (PDR) or Critical Design Review (whichever occurs earlier), and updates as necessary thereafter. Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment. Interrelationship: • Statement Of Work (SOW) Section 2.11 Safety and Mission Assurance • Clause Government Interagency Data Exchange Program (GIDEP)		

- Clause Contractor Certification for Society of Automotive Engineers (SAE) AS9100

Applicable Documents:

- NASA-STD-8739.8B Software Assurance and Software Safety
- SAE AS9100 Quality Management Systems – Requirements for Aviation, Space and Defense Organizations
- CLDP-STD-3102 Commercial Low-Earth Orbit Development Program (CLDP) Hazard Analysis and Safety Process Standard
- CLDP-PLN-3115 Commercial Low-Earth Orbit Development Program Reliability, Maintainability, Logistics, and Supportability Management Plan Development Guide
- CLDP-STD-1150 Commercial Low-Earth Orbit Development Program Operations Standards

Scope: The Safety and Mission Assurance (SMA) Plan addresses SMA philosophy, organization, approach, and the related processes and activities needed for program safety and mission success for the lifecycle of the contract and for all phases of mission execution. The plan addresses the approach to the major Safety and Mission Assurance components to include (1) Safety and Mission Assurance Management, (2) Hazard Analysis and System Safety, (4) Software Safety and Assurance, (4) Quality Assurance, and (5) Reliability, Maintainability, Logistics, and Supportability (RMLS). The level of detail in the plan directly correlates with the nature and complexity of the effort required to meet program requirements and objectives.

Contents:

1. **Safety and Mission Assurance Management:** A detailed description of how the SMA function is managed, including integration of the SMA function into CLDS design, development, risk management, test, ground, assembly, integration, and launch and operational activities, as applicable, throughout the contract life cycle. At a minimum, the description includes:
 - a. The SMA function's organizational structure, roles and responsibilities, and key organizational and safety process interfaces including those with management and engineering design teams.
 - b. A summary of the approach to hazard analysis and system safety, including the approach to failure tolerance.
 - c. A summary of the approach to software safety and assurance.
 - d. A summary of the approach to quality assurance.
 - e. A summary of the approach to reliability, maintenance, logistics, and supportability.
 - f. A summary of the approach for non-conformances, non-compliances, waivers, and dissenting opinions.
 - g. Description of Contractor's approach (including process, format, content, data rights, and schedule) for providing NASA access and insight into
 - i. Relevant meetings, processes, products, procedures, and data related to Safety and Mission Assurance.
 - ii. Archived and current safety data for flight, launch, transport, on-orbit, landing, and ground phases.
2. **Hazard Analysis and System Safety:** A detailed description of the Contractor's approach for the hazard analysis and system safety efforts, methods, and tasks, including identifying hazards, assessing safety risks, and assuring proper hazard controls have been developed, verified, and implemented. The Plan:
 - a. Describes the hazard analysis and system safety process and how the Contractor meets the intent of CLDP-STD-3102 CLDP Hazard Analysis and Safety Process Standard including NASA participation and approval authority.

- b. Identifies the interfaces with other program activities including design, development, test, operation, continuous risk management, program control (waivers, deviations, corrective actions), and certification and mission milestones.
- c. Describes the Contractor's approach (including process, format, content, data rights, and schedule) for providing NASA access to systems and documentation required to implement the hazard analysis and system safety process, including systems and documentation/templates needed to develop safety data packages for NASA payloads.

3. **Software Safety and Assurance:** A detailed description of the Contractor's approach to a software safety and assurance program for software development, operation, and maintenance activities that meets the intent of NASA-STD-8739.8B Software Assurance and Software Safety including documentation of procedures, processes, requirements, metrics, tools, techniques, and methods to be used throughout the lifecycle of the CLDS. The plan addresses the flow down of Software Safety and Assurance requirements to any subcontractor who develops, tests, maintains, operates, or provides services for the software.

For software Independent Verification and Validation (IV&V), the plan includes the Contractor's approach for (a) maintaining budget, management, and technical independence for the IV&V team, (b) using risk assessments to inform and guide IV&V activities, and (c) implementing the IV&V tasks requirements in NASA-STD-8739.8B, Section 4.4.2.

The term software includes safety-critical software, which can be found in all types of systems, including flight, ground support, and facilities. This includes all open-source software, firmware, data, and computer programs for complex electronics, Government Off-the-Shelf (GOTS) software, Modified Off-the-Shelf (MOTS) software, and Commercial Off the Shelf (COTS) software when included in the CLDS.

The Plan describes the Contractor's approach (including process, format, content, data rights, and schedule) to maintaining and providing NASA access to:

- a. Software safety activities and products.
- b. Software assurance records, including the selected IV&V provider's processes, plans, and results of software IV&V activities.

4. **Quality Assurance:** A detailed description of the Contractor's approach for implementation of the planned quality activities to adequately control the process used to manufacture, integrate, test, and operate hardware and software supporting the CLDS whether the work is performed by the contractor or is sourced to another entity by the contractor.

The Plan describes the Contractor's approach (including process, format, content, data rights, and schedule) to maintaining and providing NASA access to their quality management system and relevant meetings, processes, products, procedures, and data.

The Plan includes:

- a. A description of how the Contractor's documented quality management system is compliant with AS9100, Aerospace Quality Management Systems Requirements.
- b. A description of the quality management system, including:
 - i. Responsibilities – Describe which Contractor organizations will be responsible to perform the applicable quality management system activities.
 - ii. Quality Approach – Describe the contractor approach to implementing the following critical quality processes:
 - 1) Quality Workmanship Standards

- 2) Metrology and Calibration
- 3) Materials and Processes
- 4) Fracture Control
- 5) EEE Parts Control
- 6) Electrostatic Discharge Control
- 7) Contamination/Foreign Object Debris (FOD) Control
- 8) Quality Data Configuration Management
- 9) Build Process Configuration Management
- 10) Test and Inspection Requirements
- 11) Personnel Training and Certification
- 12) Non-destructive Inspection/Non-destructive Test Certification
- 13) Integrating Quality Assurance Considerations into Mission Operations
- iii. Government Furnished Equipment Management - Describe the methodologies for handling and controlling Government Furnished Property/Equipment (GFE), including preserving physical integrity and configuration.
- iv. Supply Chain Risk Management – Describe the Contractor’s approach for ensuring and verifying quality for all types of materials /parts/components the Contractor purchases including the quality management system requirements used for various acquisition types (e.g., systems, parts, materials, special processes); design and construction quality control requirements; the level of control exercised over the suppliers including how suppliers are approved, monitored, and maintained with controls for supplier non-conformances processing; and how externally sourced materials and products are certified as conforming prior to integration into systems. If non-AS9100 certified suppliers are utilized, describe methodology for ensuring equivalent risk through increased requirements flow-down, surveillance, and/or Contractor verification activities.
- v. Sub-tier QA Surveillance Approach – Describe the Contractor’s approach for surveillance of contract activities executed at sub-tier vendors to ensure quality throughout the supply chain.
- vi. Hardware Criticality Program – Describe the contractor’s approach for assessing, documenting, communicating, implementing, and verifying critical hardware aspects throughout the design and manufacturing process.
- vii. Government Quality Assurance Insight – Describe the Contractor’s process for facilitating government insight into quality management system processes to include Material Review Boards, internal and external quality audits, corrective action boards (or equivalent) and formal investigations and facilitating government quality assurance surveillance functions.
- viii. Process Control – Describe the contractor’s approach to qualifying critical manufacturing, test, integration, or operations processes prior to execution. Describe how qualified processes are configuration controlled. Describe how changes to qualified processes will be communicated to NASA.
- ix. Quality Data Retention – Describe how quality data (including source, lot, acceptance testing, screening, storage, assembly/integration records, operations records, and useful life limitations) will be collected, retained, and made available for all hardware throughout the life of the contract.
- x. Nonconformance Management – Describe the process for managing product and process nonconformances within the contractor’s process and at sub-tier vendors. Define criteria used to categorize nonconformances (e.g. minor vs major) and relevant processes for each type of nonconformance. Describe the process of convening a nonconforming product MRB. Discuss the MRB approach to dispositioning nonconforming products using a defined board of qualified personnel including Contractor quality assurance personnel and customer representatives. Describe MRB membership and roles.

- xi. Counterfeit Parts/Materials avoidance – Describe process for avoiding, detecting, and mitigating the risk of counterfeit parts and materials.
- xii. Configuration Assurance – Describe how the configuration of the hardware build is compared and verified to the approved design baseline drawings and specifications. Describe how the configuration of the CLDS is maintained within its certified conditions on the ground, through dwell, until launch; include details on how hardware will be retained in the appropriate stowage environment to preserve primary function.
- xiii. GIDEP Processing - Describe how the supplier intends to participate in GIDEP and how NASA will be informed of GIDEP usage/non-applicability for GIDEP alerts. Describe the approach for ensuring that significant parts, components, materials, specifications, software, facilities, manufacturing processes, test equipment, and safety problems of a general concern that are encountered during development and production, are identified and corresponding data are exchanged within the GIDEP on-line information system.
- xiv. Contract Fraud Reporting – Describe how the Contractor intends to communicate the requirement to report evidence of fraud, malpractice or serious misconduct associated with this contract to the NASA Office of Inspector General to the workforce.

5. **Reliability:** A description of the Contractor's Reliability organization, processes, modeling, and analysis starting in the conceptual design phase and continuing its progressive improvement throughout the lifecycle of the system to ensure system viability over the duration of the planned service life.

The plan addresses the following elements:

- a. The plan to implement and perform reliability predictions using appropriate industry/Department of Defense (DOD) Standards, including the methods to be utilized along with any specific modifications to these methods. It also addresses data sources and model/data validation.
- b. A roadmap of reliability assessments, models, and products to support the program reliability requirements, risk evaluation and reduction efforts.
- c. Interactions and exchanges between reliability and other disciplines, including maintenance and logistics support.
- d. Process details and tools planned for implementation of statistical process control and process capability activities to minimize process variances during manufacturing, testing and system integration of flight critical hardware to help understand, document, communicate, and facilitate minimizing flight safety and mission risks.
- e. The plan for integration of operational failure data into reliability models and predictions during operational lifetime of the destination.
- f. A description of the Contractor's approach (including process, format, content, data rights, and schedule) to providing NASA access to detailed reliability data, predictions, results, and reports generated in accordance with this plan over the lifecycle of the contract.

Remarks:

Initial submittal of the documents shall be submitted as one package; however, the Government may approve the discipline components separately if the need arises. For updates to a subset of discipline areas after Baseline, the Contractor may submit only the modified components. This process permits each component to be revised and approved individually. The final version, as approved, shall be incorporated in the contract as Attachment J-09 Safety & Mission Assurance Plan.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

DRD CLDC-115.2: Crew Visiting Vehicle (CVV) SMAP

Initial Submission: Baseline, in response to a Request for Task Order Proposal (RFTOP).

Submission Frequency: Final at Vehicle Baseline Review (VBR). Updates as necessary for currency.

Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment.

Interrelationship:

- Statement Of Work (SOW) Section 2.11 Safety and Mission Assurance
- Clause Government Interagency Data Exchange Program (GIDEP)
- Clause Contractor Certification for Society of Automotive Engineers (SAE) AS9100

Applicable Documents:

- NASA-STD-8739.8, Software Assurance and Software Safety
- SAE AS9100, Quality Management Systems – Requirements for Aviation, Space and Defense Organizations
- CLDP-STD-3102, Commercial Low-Earth Orbit Development Program (CLDP) Hazard Analysis and Safety Process Standard

Scope: The Safety and Mission Assurance (SMA) Plan addresses SMA philosophy, organization, approach, and the related processes and activities needed for program safety and mission success. The plan addresses the approach to the major Safety and Mission Assurance components to include (1) Safety and Mission Assurance Management, (2) Hazard Analysis and System Safety, (4) Software Safety and Assurance, and (4) Quality Assurance. The level of detail in the plan directly correlates with the nature and complexity of the effort required to meet program requirements and objectives.

Contents:

1. **Safety and Mission Assurance Management:** Description on how the SMA function is managed, including integration of the SMA function into CLDS design, development, risk management, test, ground, assembly, integration, and launch and operational activities, as applicable. At a minimum, the description includes:
 - a. The SMA function's organizational structure, roles and responsibilities, and key organizational and safety process interfaces including with management and engineering design teams.
 - b. A summary of the approach to hazard analysis and system safety, including the approach to failure tolerance.
 - c. A summary of the approach to software safety and assurance.
 - d. A summary of the approach to quality assurance.
 - e. A summary of the approach to reliability, maintenance, logistics, and supportability throughout the contract life cycle.
 - f. A summary of the approach for non-conformances, non-compliances, waivers, and dissenting opinions.
 - g. Description of Contractor's approach (including process, format, content, data rights, and schedule) for providing NASA access and insight into
 - i. Relevant meetings, processes, products, procedures, and data related Safety and Mission Assurance.

- ii. Archived and current safety data for flight, launch, transport, on-orbit, landing, and ground phases.

2. **Hazard Analysis and System Safety Plan:** The Hazard Analysis and System Safety Plan documents the Contractor's approach for the hazard analysis and system safety efforts, methods, and tasks, including identifying hazards, assessing safety risks, and assuring proper hazard controls have been developed, verified, and implemented. The Plan:
 - a. Describes the hazard analysis and system safety process and how the Contractor meets the intent of CLDP-STD-3102, including NASA participation and approval authority.
 - b. Identifies the interfaces with other program activities including design, development, test, operation, continuous risk management, program control (waivers, deviations, corrective actions), and certification and mission milestones.
 - c. Describes the Contractor's approach (including process, format, content, data rights, and schedule) for providing NASA access to systems and documentation required to implement the hazard analysis and system safety process, including systems and documentation/templates needed to develop safety data packages for NASA payloads.
3. **Software Safety and Assurance Plan:** A detailed description of the Contractor's approach to a software safety and assurance program for software development, operation, and maintenance activities that meets the intent of NASA-STD-8739.8B, including documentation of procedures, processes, requirements, tools, techniques, and methods to be used throughout the lifecycle of the CLDS. The plan addresses the flow down of Software Safety and Assurance requirements to any subcontractor who develops, tests, maintains, operates, or provides services for the software.

For software Independent Verification and Validation (IV&V), the plan includes the Contractor's approach for (a) maintaining budget, management, and technical independence for the IV&V team, (b) using risk assessment to inform and guide IV&V activities, and (c) implementing IV&V tasks requirements in NASA-STD-8739.8B, Section 4.4.2.

The term software includes safety-critical software, which can be found in all types of systems, including flight, ground support, and facilities. This includes all open-source software, firmware, data, and computer programs for complex electronics, Government Off-the-Shelf (GOTS) software, Modified Off-the-Shelf (MOTS) software, and Commercial Off the Shelf (COTS) software when included in the CLDS.

The Plan describes the Contractor's approach (including process, format, content, data rights, and schedule) to maintaining and providing NASA access to

- Software safety activities and products.
- Software assurance records, including the selected IV&V provider's processes, plans, and results of software IV&V activities.

4. **Quality Assurance (QA) Plan:** A detailed description of the Contractor's approach for implementation of the planned quality activities to adequately control the process used to manufacture, integrate, test, and operate hardware and software supporting the CLDS whether the work is performed by the contractor or is sourced to another entity by the contractor.

The Plan describes the Contractor's approach (including process, format, content, data rights, and schedule) to maintaining and providing NASA access to their quality management system and relevant meetings, processes, products, procedures, and data.

The QA Plan includes:

- a. A description of how the Contractor's documented quality management system is compliant with AS9100, Aerospace Quality Management Systems Requirements.
- b. A description of the quality management system, including:
 - i. Responsibilities – Describe which Contractor organizations will be responsible to perform the applicable quality management system activities.
 - ii. Quality Approach – Describe the contractor approach to implementing the following critical quality processes:
 - 1) Quality Workmanship Standards
 - 2) Metrology and Calibration
 - 3) EEE Parts Control
 - 4) Electrostatic Discharge Control
 - 5) Quality Data Configuration Management
 - 6) Build Process Configuration Management
 - 7) Test and Inspection Requirements
 - 8) Personnel Training and Certification
 - 9) Contamination/Foreign Object Debris (FOD) Control
 - 10) Non-destructive Inspection/Non-destructive Test Certification
 - 11) Integrating Quality Assurance Considerations into Mission Operations
 - iii. Government Furnished Equipment Management - Describe the methodologies for handling and controlling Government Furnished Property/Equipment (GFE), including preserving physical integrity and configuration.
 - iv. Supply Chain Risk Management – Describe the Contractor's approach for ensuring and verifying quality for all types of materials /parts/components the Contractor purchases including the quality management system requirements used for various acquisition types (e.g., systems, parts, materials, special processes); design and construction quality control requirements; the level of control exercised over the suppliers including how suppliers are approved, monitored, and maintained with controls for supplier non-conformances processing; and how externally sourced materials and products are certified as conforming prior to integration into systems. If non-AS9100 certified suppliers are utilized, describe methodology for ensuring equivalent risk through increased requirements flow-down, surveillance, and/or Contractor verification activities.
 - v. Sub-tier QA Surveillance Approach – Describe the Contractor's approach for surveillance of contract activities executed at sub-tier vendors to ensure quality throughout the supply chain.
 - vi. Hardware Criticality Program – Describe the contractor's approach for assessing, documenting, communicating, implementing, and verifying critical hardware aspects throughout the design and manufacturing process.
 - vii. Government Quality Assurance Insight – Describe the Contractor's process for facilitating government insight into quality management system processes to include Material Review Boards, internal and external quality audits, corrective action boards (or equivalent) and formal investigations and facilitating government quality assurance surveillance functions.
 - viii. Process Control – Describe the contractor's approach to qualifying critical manufacturing, test, integration, or operations processes prior to execution. Describe how qualified processes are configuration controlled. Describe how changes to qualified processes will be communicated to NASA.
 - ix. Quality Data Retention – Describe how quality data (including source, lot, acceptance testing, screening, storage, assembly/integration records, operations records, and useful life limitations) will be collected, retained, and made available for all hardware throughout the life of the contract.
 - x. Nonconformance Management – Describe the process for managing product and process nonconformances within the contractor's process and at sub-tier vendors. Define criteria

- used to categorize nonconformances (e.g. minor vs major) and relevant processes for each type of nonconformance. Describe the process of convening a nonconforming product MRB. Discuss the MRB approach to dispositioning nonconforming products using a defined board of qualified personnel including Contractor quality assurance personnel and customer representatives. Describe MRB membership and roles.
- xi. Counterfeit Parts/Materials avoidance – Describe process for avoiding, detecting, and mitigating the risk of counterfeit parts and materials.
 - xii. Configuration Assurance – Describe how the configuration of the hardware build is compared and verified to the approved design baseline drawings and specifications. Describe how the configuration of the CLDS is maintained within its certified conditions on the ground, through dwell, until launch; include details on how hardware will be retained in the appropriate stowage environment to preserve primary function.
 - xiii. GIDEP Processing - Describe how the supplier intends to participate in GIDEP and how NASA will be informed of GIDEP usage/non-applicability for GIDEP alerts. Describe the approach for ensuring that significant parts, components, materials, specifications, software, facilities, manufacturing processes, test equipment, and safety problems of a general concern that are encountered during development and production, are identified and corresponding data are exchanged within the GIDEP on-line information system.
 - xiv. Contract Fraud Reporting – Describe how the Contractor intends to communicate the requirement to report evidence of fraud, malpractice or serious misconduct associated with this contract to the NASA Office of Inspector General to the workforce.

Remarks: Initial submittal of the documents shall be submitted as one package; however, the Government may approve the discipline components separately if the need arises. For updates to a subset of discipline areas after Baseline, the Contractor may submit only the modified components. This process permits each component to be revised and approved individually. The final version, as approved, shall be incorporated in the contract as Attachment J-09 Safety & Mission Assurance Plan.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

DRD CLDC-115.3: Cargo Visiting Vehicle (CaVV) SMAP

Initial Submission: Baseline, in response to a RFTOP.

Submission Frequency: Final at VBR. Updates as necessary for currency.

Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment.

Interrelationship

- Statement Of Work (SOW) Section 2.11 Safety and Mission Assurance
- Clause Government Interagency Data Exchange Program (GIDEP)
- Clause Contractor Certification for Society of Automotive Engineers (SAE) AS9100

Applicable Documents:

- NASA-STD-8739.8, Software Assurance and Software Safety
- SAE AS9100, Quality Management Systems – Requirements for Aviation, Space and Defense Organizations

- CLDP-STD-3102, Commercial Low-Earth Orbit Development Program (CLDP) Hazard Analysis and Safety Process Standard

Scope: The Safety and Mission Assurance (SMA) Plan addresses SMA philosophy, organization, approach, and the related processes and activities needed for program safety and mission success. The plan addresses the approach to the major Safety and Mission Assurance components to include (1) Safety and Mission Assurance Management, (2) Hazard Analysis and System Safety, (4) Software Safety and Assurance, and (4) Quality Assurance. The level of detail in the plan directly correlates with the nature and complexity of the effort required to meet program requirements and objectives.

Contents:

1. **Safety and Mission Assurance Management:** Description on how the SMA function is managed, including integration of the SMA function into CLDS design, development, risk management, test, ground, assembly, integration, and launch and operational activities, as applicable. At a minimum, the description includes:
 - a. The SMA function's organizational structure, roles and responsibilities, and key organizational and safety process interfaces including with management and engineering design teams.
 - b. A summary of the approach to hazard analysis and system safety, including the approach to failure tolerance.
 - c. A summary of the approach to software safety and assurance.
 - d. A summary of the approach to quality assurance.
 - e. A summary of the approach to reliability, maintenance, logistics, and supportability throughout the contract life cycle.
 - f. A summary of the approach for non-conformances, non-compliances, waivers, and dissenting opinions.
 - g. Description of Contractor's approach (including process, format, content, data rights, and schedule) to NASA insight into relevant meetings, processes, products, procedures, and data related Safety and Mission Assurance.
2. **Hazard Analysis and System Safety Plan:** The Hazard Analysis and System Safety Plan documents the Contractor's approach for the hazard analysis and system safety efforts, methods, and tasks, including identifying hazards, assessing safety risks, and assuring proper hazard controls have been developed, verified, and implemented. The Plan:
 - a. Describes the hazard analysis and system safety process and how the Contractor meets the intent of CLDP-STD-3102, including NASA participation and approval authority.
 - b. Identifies the interfaces with other program activities including design, development, test, operation, continuous risk management, program control (waivers, deviations, corrective actions), and certification and mission milestones.
 - c. Describes the Contractor's approach (including process, format, content, data rights, and schedule) for providing NASA access to systems and documentation required to implement the hazard analysis and system safety process, including systems and documentation/templates needed to develop safety data packages for NASA payloads.
3. **Software Safety and Assurance Plan:** A detailed description of the Contractor's approach to a software safety and assurance program for software development, operation, and maintenance activities that meets the intent of NASA-STD-8739.8B, including documentation of procedures, processes, requirements, metrics, tools, techniques, and methods to be used throughout the lifecycle of the CLDS. The plan addresses the flow down of Software Safety and Assurance requirements to any subcontractor who develops, tests, maintains, operates, or provides services for the software.

For software Independent Verification and Validation (IV&V), the plan includes the Contractor's approach for (a) maintaining budget, management, and technical independence for the IV&V team, (b) using risk assessments to inform and guide IV&V activities, and (c) implementing the IV&V tasks requirements in NASA-STD-8739.8B, Section 4.4.2.

The Plan describes the Contractor's approach (including process, format, content, data rights, and schedule) to maintaining and providing NASA access to:

- Software safety activities and products.
- Software assurance records, including the selected IV&V provider's processes, plans, and results of software IV&V activities.

5. **Quality Assurance Plan:** A detailed description of the Contractor's approach for implementation of the planned quality activities to adequately control the process used to manufacture, integrate, test, and operate hardware and software supporting the CLDS whether the work is performed by the contractor or is sourced to another entity by the contractor.

The Plan describes the Contractor's approach (including process, format, content, data rights, and schedule) to maintaining and providing NASA access to their quality management system and relevant meetings, processes, products, procedures, and data.

The Plan includes:

- a. Contractor's documented quality management system shows compliance to AS9100, Aerospace Quality Management Systems Requirements.
- b. The documented quality management system includes:
 - i. Responsibilities – Describe which Contractor organizations will be responsible to perform the applicable quality management system activities.
 - ii. Quality Approach – Describe the contractor approach to implementing the following critical quality processes:
 - 1) Quality Workmanship Standards
 - 2) Metrology and Calibration
 - 3) EEE Parts Control
 - 4) Electrostatic Discharge Control
 - 5) Quality Data Configuration Management
 - 6) Build Process Configuration Management
 - 7) Test and Inspection Requirements
 - 8) Personnel Training and Certification
 - 9) Contamination/Foreign Object Debris (FOD) Control
 - 10) Non-destructive Inspection/Non-destructive Test Certification
 - 11) Integrating Quality Assurance Considerations into Mission Operations
 - iii. Government Furnished Equipment Management - Describe the methodologies for handling and controlling Government Furnished Property/Equipment (GFE), including preserving physical integrity and configuration.
 - iv. Supply Chain Risk Management – Describe the Contractor's approach for ensuring and verifying quality for all types of materials /parts/components the Contractor purchases including the quality management system requirements used for various acquisition types (e.g., systems, parts, materials, special processes); design and construction quality control requirements; the level of control exercised over the suppliers including how suppliers are approved, monitored, and maintained with controls for supplier non-conformances processing; and how externally sourced materials and products are certified as conforming prior to integration into systems. If non-AS9100 certified suppliers are utilized, describe

- methodology for ensuring equivalent risk through increased requirements flow-down, surveillance, and/or Contractor verification activities.
- v. Sub-tier QA Surveillance Approach – Describe the Contractor’s approach for surveillance of contract activities executed at sub-tier vendors to ensure quality throughout the supply chain.
 - vi. Hardware Criticality Program – Describe the contractor’s approach for assessing, documenting, communicating, implementing, and verifying critical hardware aspects throughout the design and manufacturing process.
 - vii. Government Quality Assurance Insight – Describe the Contractor’s process for facilitating government insight into quality management system processes to include Material Review Boards, internal and external quality audits, corrective action boards (or equivalent) and formal investigations and facilitating government quality assurance surveillance functions.
 - viii. Process Control – Describe the contractor’s approach to qualifying critical manufacturing, test, integration, or operations processes prior to execution. Describe how qualified processes are configuration controlled. Describe how changes to qualified processes will be communicated to NASA.
 - ix. Quality Data Retention – Describe how quality data (including source, lot, acceptance testing, screening, storage, assembly/integration records, operations records, and useful life limitations) will be collected, retained, and made available for all hardware throughout the life of the contract.
 - x. Nonconformance Management – Describe the process for managing product and process nonconformances within the contractor’s process and at sub-tier vendors. Define criteria used to categorize nonconformances (e.g. minor vs major) and relevant processes for each type of nonconformance. Describe the process of convening a nonconforming product MRB. Discuss the MRB approach to dispositioning nonconforming products using a defined board of qualified personnel including Contractor quality assurance personnel and customer representatives. Describe MRB membership and roles.
 - xi. Counterfeit Parts/Materials avoidance – Describe process for avoiding, detecting, and mitigating the risk of counterfeit parts and materials.
 - xii. Configuration Assurance – Describe how the configuration of the hardware build is compared and verified to the approved design baseline drawings and specifications. Describe how the configuration of the CLDS is maintained within its certified conditions on the ground, through dwell, until launch; include details on how hardware will be retained in the appropriate stowage environment to preserve primary function.
 - xiii. GIDEP Processing - Describe how the supplier intends to participate in GIDEP and how NASA will be informed of GIDEP usage/non-applicability for GIDEP alerts. Describe the approach for ensuring that significant parts, components, materials, specifications, software, facilities, manufacturing processes, test equipment, and safety problems of a general concern that are encountered during development and production, are identified and corresponding data are exchanged within the GIDEP on-line information system.
 - xiv. Contract Fraud Reporting – Describe how the Contractor intends to communicate the requirement to report evidence of fraud, malpractice or serious misconduct associated with this contract to the NASA Office of Inspector General to the workforce.

Remarks: Initial submittal of the documents shall be submitted as one package; however, the Government may approve the discipline components separately if the need arises. For updates to a subset of discipline areas after Baseline, the Contractor may submit only the modified components. This process permits each component to be revised and approved individually. The final version, as approved, shall be incorporated in the contract as Attachment J-09 Safety & Mission Assurance Plan.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD

deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

1. DRD Title: Risk Management Plan		
2. DRD No.: CLDC-116	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>(Insert Contract Number)</i>
7. Date Issued: <i>Insert the date the baseline was issued</i>	8. Date Revised: <i>Include the revision date (if this DRD has been revised)</i>	9. DRD Category: Technical ☐ Administrative ☐ S&MA ☒
10. Description/Use: To provide a risk management plan for planning, management, control, and implementation of the Contractor's risk management program.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Draft at Proposal; Baseline at Certification Baseline Review (CBR). Submission Frequency: Final at Preliminary Design Review (PDR) or Critical Design Review (whichever occurs earlier), and updates as necessary thereafter. Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment. Interrelationship: • Statement Of Work (SOW) Section 2.5 Risk Management • SOW Section 2.1 Program Management, Quarterly Review Contents Applicable Documents: • NASA Procedural Requirement (NPR) 7120.5, NASA Space Flight Program and Project Management • NPR 8000.4, Agency Risk Management Procedural Requirements Scope: The Risk Management Plan (RMP) describes the planning, management, control, and implementation of the Contractor's risk management process through the contract lifecycle and provides government insight to the Contractor's risk management approach. The RMP provides the overall approach, coordination, structure, and environment within which the risk management processes for the contract reside throughout the contract implementation. The RMP describes the methodologies and process used to identify, analyze, plan, track, control, communicate, and document the risks. A risk refers to anything that can prevent the Contractor from meeting contract objectives. All forms of risk shall be managed including safety, technical (hardware and software), programmatic, supportability, cost, and schedule risks. For an undesirable risk or event that has occurred or occurrence that cannot be stopped or directly controlled, the risk will be converted into a "problem." Problems will be presented as part of the risk reporting process.		

Contents:

At a minimum, the RMP includes:

1. **Introduction** - Specify the program/project risk objectives and policy toward risk. Explain the purpose, scope, assumptions, constraints, key ground rules, and policy pertaining to the project risk management process.
2. **Overview of Process** - Provide an overview of the risk management process and information flow; describe how the risk management process integrates and relates to other project management and system engineering activities. Include general risk mitigation strategies to be employed throughout project life cycle.
3. **Organization** - Show the organization, roles, and responsibilities of program, project, customer, and supplier key personnel regarding risk management. Document how team members will be trained in the application of risk management methodology.
4. **Process Details** - Provide the risk management process details and related procedures, methods, tools, and metrics.
 - a. Describe the specific methodologies to be used for activities of risk management: identify, analyze, plan, track, control, communicate, and document, as well as de-scope processes and risk acceptance versus closure criteria. Include the process to be used for continual assessment of the project risk profile.
 - b. Describe how risk information will be communicated to NASA, including a description of which risks will be considered “top” risks and included in risk report charts per CLDC-004, Quarterly Program Review Briefing Package.
 - c. Describe approach for NASA access to the Contractor's risk tracking information system, including process, format, content, and schedule of data sharing between contractor and NASA.
5. **Documentation of Risks** - Specify the format and data elements that will comprise the project risk list (and/or risk database), how configuration control will be applied, and how the list will be used and updated. Explain how team members will be able to access the current risk list at any time.
6. **Key System Interfaces** - Describe the relationship and interfaces of the risk management process to lessons learned reporting, System Safety analyses, reliability/probabilistic risk analyses, schedule, financial and other business reporting systems.
7. **Appendix** - Material that is too detailed or sensitive to be placed in the main body of text may be placed in an appendix or included as reference. Include the appropriate reference in the main body of the text. Appendices may be bound separately but are considered part of the RMP document. Include an alphabetized list of the definitions for abbreviations and acronyms used in this document. Include an alphabetized list of definitions for special terms used in the document (i.e., terms used in a sense that differs from or is more specific than the common usage for such terms. Include a risk attributes scorecard that provides the criteria for establishing likelihood and consequence values of a risk).

Remarks: None.

Maintenance:

Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

1. DRD Title: Mishap Preparedness and Contingency Plan (MPCP)		
2. DRD No.: CLDC-117	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>(Insert contract number)</i>
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☐ Administrative ☐ S&MA ☒
10. Description/Use: The Mishap Preparedness and Contingency (Action) Plan describes the Contractor's processes and procedures for reporting, investigating, and responding to NASA and Contractor mishaps and close calls as well as plans and procedures for the immediate protection/recovery of flight crew and operations personnel in the event of a mishap, emergency, natural disaster, or act of terrorism.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: - NASA Contracting Officer (CO) - NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline at Preliminary Design Review (PDR) or Critical Design Review (whichever occurs earlier), and updates as necessary thereafter. Submission Frequency: Final at Design Certification Review (DCR), Updates as necessary for currency. Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment. Interrelationship: - Statement Of Work (SOW) Section 2.1 Program Management - Clause Mishap Reporting - Data Requirements Description (DRD) CLDC-111 Medical Operations Plan Applicable Documents: NPR 8621.1D NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping Scope: The Contractor Mishap Preparedness and Contingency Plan (MPCP) is applicable to CLDC related activities that result in non-NASA Center or Facility, in-flight, and in-space incidents defined as a mishap or close-call. Activities at a NASA Center or facility will comply with the NASA Center's Mishap Reporting Plan. Definitions of and requirements for activities or events that require mishap investigation, action, and reporting are documented in Clause Mishap Reporting. Contents: For all phases of the contract, the Mishap Preparedness and Contingency (Action) Plan addresses the following elements: - Mishap definitions		

2. Jurisdiction (identification of the primary investigation authority) based on:
 - a. contract or mission phase
 - b. location
 - c. mission/operational regulatory authority
 - d. consequence of the event
3. Organizational responsibility for establishing mishap investigations.
4. Requirements driving mishap reporting and investigation.
5. Mishap and contingency roles, responsibilities, and preparedness/training requirements of key personnel.
6. Notification, reporting, investigating, recording, and preparedness policies and procedures for mishaps and close calls, including:
 - a. Defined methods for communicating mishaps and high visibility close call events, investigation findings, and recommendations to NASA and external entities for mishap response. This includes timeframes for initial reporting, call trees, checklists, investigation statuses, and investigation closures. Notification shall include a description of the mishap and the extent of any personnel fatalities, injuries, and property damage, if known.
 - b. Public Affairs considerations and defined methods for communicating with the public.
7. Impoundment process for records and equipment that may be involved in the mishap, including:
 - a. A list of organizations authorized to impound such evidence and secure mishap locations.
 - b. The location where impounded data, records, and equipment, including electronic media, are stored and secured during an investigation of mishaps.
 - c. Steps for release of impounded data, records, equipment, facilities, and mishap sites.
8. Investigation and debris collection process required for any mishap or close call.
9. Methods for trending mishap and close call data over time to determine if there is a common root cause, an unidentified process escape, or an increase/decrease in overall events.
10. Description of Contractor's approach (including process, format, content, data rights, and schedule of data sharing) for providing NASA access to trending data and a data repository of documented mishap events and close calls, with witness statement forms, investigation findings, and corrective actions. This includes data and reports associated with Commercial LEO Destination System (CLDS) for non-NASA missions.
11. Provisions for regular updates and assessments against changes.

The Contingency Action Plan addresses the following elements:

1. Identification of the contingency scenarios.
2. Notifications and coordinated interactions with NASA or external Agency/Center mishap preparedness and contingency plans, as appropriate.
3. Response plans and procedures, including required personnel and resources, for catastrophic events, ascent abort, emergency deorbit, or other scenarios beyond the normal ground processing and mission operations plans to protect the safety of the crew and maximize the chances of crew survival.
4. Response plans to protect the crew and ground personnel if there is a natural disaster or act of terrorism during a mission.
5. Provisions to control public and environmental hazards in order to minimize losses.
6. Provisions for the immediate embargo of operations personnel, communications, data, telemetry, and recovered hardware to ensure integrity of mishap information for coordinating an immediate mishap response.
7. Identification of the responsibilities of internal parties, the external organizations that must be notified, and of any existing agreements with external entities for mishap response (such as NASA, Search and Rescue (SAR) Teams, State Department, Department of Defense (DOD), Federal Aviation Administration (FAA), National Transportation and Safety Board (NTSB), Intergovernmental Agreements, etc.).

8. Medical care of the crew and operations personnel consistent with the Medical Operations Plan, DRD CLDC-111, for contingency operations, emergencies, launch aborts, on -orbit events, or reentry and landings, including what major facilities nearby are pre-planned or designated contingency landing zones and including any international agreements.
9. Requirements for seagoing and airborne craft supporting as first responders and perform pre-coordination with facilities at the nearby ports. (For example, this may include aircraft in flight-ready status that can call up to get key/critical personnel or equipment, including medical, to a contingency or emergency site.)
10. Provisions for regular updates and assessments against any changes.

Remarks: The Mishap Preparedness and Contingency (Action) Plan can be delivered as a single or separate plans.

Maintenance: Updates to this document shall be incorporate by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

1. DRD Title: Safety Data Package		
2. DRD No.: CLDC-118	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☐ Administrative ☐ S&MA ☒
10. Description/Use: The Safety Data Package (SDP) encompasses all pertinent safety information related to the identification and control of hazards and crew survival methods required for each safety review and NASA human rating. It serves as formal documentation of the hazard analysis, confirming the system has been evaluated for potential safety risks and associated mitigation has been thoroughly considered and verified.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Thirty (30) days prior to Initial Safety Review Submission Frequency: Thirty (30) days prior to each Safety Review. Updates as necessary for currency. Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment. Interrelationship: • Statement Of Work (SOW) Section 2.11.1 Hazard Analysis and System Safety • Data Requirements Description (DRD) CLDC-115 Safety and Mission Assurance Plan Applicable Documents: CLDP-STD-3102 Commercial Low-Earth Orbit Development Program Hazard Analysis and Safety Process Standard Scope: The SDP documents the CLDS and utilization/payloads hazard analyses. The hazard analyses address design and operational hazards associated with flight and ground hardware, software, operations, human operator performance, maintenance, and environments/facilities that impact the safety of the USG crew. Crew Survival methods will be provided in the Commercial LEO Destination System (CLDS) hazard analyses to document potential design changes or operational actions necessary to prevent loss of crew in the event the hazard controls fail to prevent a hazard from manifesting. The level of technical detail in each data package is commensurate with the level of design and phase maturity. As the design evolves, the SDP is updated to address any changes. Contents: The Safety Data Package for each Safety Review includes the content and maturity as defined in the Contractor's approved hazard analysis and system safety plan in accordance with DRD CLDC-115 S&MA Plan and CLDP-STD-3102 CLDP Hazard Analysis and Safety Process Standard. The SDP includes:		

1. A description of the design and operations, including planned maintenance, being addressed in the review, including interface descriptions/diagrams and drawing/schematics of components.
2. Hazard reports and supporting analysis, data, and verification evidence, as needed for each review.
3. Single point failures, failure tolerance non-compliances/variances, and DFMR Candidates with a description of their effects and rationale for acceptance.
4. Maintenance hazard assessment.
5. Integrated hazard assessment.
6. Software safety analysis.
7. Compliance matrix of safety requirements.
8. Crew survival methods and a crew survival strategy summary report that describes the approach for crew survival during each mission phase derived from an integrated design and safety analysis, the system capabilities or the trade studies/analysis for implementation, the effectiveness of the capability under conditions and time constraints to be encountered during high-risk accident conditions and their impact of the risk to the crew, and a matrix that traces the capabilities to the highest level of program requirements where the capability is implemented. Crew Survival Methods are not required for Payload SDPs.
9. Open verifications with rationale and closure plan for safety reviews correlated with or after the Design Certification Review (DCR) milestone.

Remarks: None.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and redlined version showing the updates made since the last submittal.

1. DRD Title: Micrometeoroid Orbital Debris (MMOD) Report		
2. DRD No.: CLDC-119	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>(Insert contract number)</i>
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☒
10. Description/Use: Micrometeoroid and Orbital Debris (MMOD) analysis involves the assessment of risk to the CLDS (destination, crew transportation system, and cargo transportation system) and crew resulting from critical damage to or penetration of system components from micrometeoroid and orbital debris impacts during various mission phases. MMOD analyses provide evidence that the flight system design will meet MMOD protection requirements in CLDP-REQ-1130 Requirement and Standards for the Commercial Low Earth Orbit Development Program. Due to the potential transmission of competition sensitive data in this deliverable, the Contractor's Transportation Provider (CVV and CaVV) is allowed, with the Contractor's concurrence, to transmit this deliverable, or portions of this deliverable, directly to NASA electronically. Should this occur, the Contractor's Transportation Provider shall notify the Contractor that such delivery has been made to NASA. The Contractor is still responsible for the timeliness and delivery of the entire DRD to the Government. This Data Requirements Description (DRD) is broken into multiple DRD sections with different scope, contents, and unique submittal frequencies. The DRD sections are as follows: DRD CLDC-119.1: Destination MMOD Report DRD CLDC-119.2: Crew Visiting Vehicle (CVV) MMOD Report DRD CLDC-119.3: Cargo Visiting Vehicle (CaVV) MMOD Report 11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR		
<u>DRD CLDC-119.1: Destination MMOD Report</u> Initial Submission: Baseline six months prior to Critical Design Review (CDR) Submission Frequency: Update as required at CDR; Final at Design Certification Review (DCR). Format: Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment. Interrelationship: • Statement Of Work (SOW) Section 2.11.5 Orbital Debris, Jettisons, and Deorbit • CLDP-REQ-1130, Requirement and Standards for the Commercial Low Earth Orbit Development		

Program

Applicable Documents:

- NASA/TP-2003-210788 Meteoroid/Debris Shielding
- NASA/TM-2003-212065 Integration of MMOD Impact Protection Strategies into Conceptual Spacecraft Design
- NASA/TM-2009-214789 MMOD Shield Ballistic Limit Analysis Program
- NASA/TM-2009-214785 Handbook for Designing MMOD Protection
- NASA/TM-2020-220555 NASA Meteoroid Engineering Model 3.0

Scope: The MMOD Report applies to the Destination, Crew Transportation Vehicle, and Cargo Transportation Vehicle. The meteoroid environment is defined in NASA/TM-2020-220555, NASA Meteoroid Engineering Model 3.0, and the orbital debris environment is defined in NASA Orbital Debris Engineering Model ORDEM 3.2. NASA TM-2009-214785, NASA TP-2003-210788, NASA TM-2003-212065 and NASA TM-2009-214789 are available for guidance.

Contents: The MMOD Report includes:

1. Baseline assessments of the MMOD risk to the Commercial LEO Destination System (CLDS) for loss of mission and loss of crew for the entire lifetime of the system.
2. Focused MMOD impact assessments for safety-critical components and subsystems such the thermal protection system, radiators and other fluid systems, pressure vessels and windows, attitude control system, power system, pressure vessels and safety-critical mechanisms.
3. Supplemental MMOD analyses to define the sensitivities of the baseline results to orbital altitude, spacecraft attitude, duration of exposure, and uncertainties or projected growth in the MMOD environment.
4. Evaluation of the baseline results to support system design optimization with respect to competing design priorities and constraints.
5. Evaluation of supplemental or alternate MMOD shielding approaches, as appropriate.
6. Description of all MMOD analysis models and tools including calibration results against accepted standards. This description includes all risk assessment assumptions and inputs, MMOD protection configurations used in the risk assessments, failure criteria as appropriate for loss of crew and loss of mission from the MMOD environment, ballistic limit equations and available impact test data supporting the equations. Detail shall be adequate for NASA to duplicate the Contractor's results.
7. Document all vehicle design, system and operational considerations implemented to meet MMOD protection requirements during system risk allocation.

Remarks: ORDEM 3.2, MSC-25457-1, obtained via the NASA software catalog:

<https://software.nasa.gov/software/MSC-25457-1>

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

DRD CLDC-119.2: Crew Visiting Vehicle (CVV) MMOD Report

Initial Submission: Baseline six months prior to CDR

Submission Frequency: Update as required at CDR; Final at DCR.

Format: Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment.

Interrelationship:

- SOW Section 2.11.5 Orbital Debris, Jettisons, and Deorbit
- CLDP-REQ-1130, Requirement and Standards for the Commercial Low Earth Orbit Development Program

Applicable Documents:

- NASA/TP-2003-210788 Meteoroid/Debris Shielding
- NASA/TM-2003-212065 Integration of MMOD Impact Protection Strategies into Conceptual Spacecraft Design
- NASA/TM-2009-214789 MMOD Shield Ballistic Limit Analysis Program
- NASA/TM-2009-214785 Handbook for Designing MMOD Protection
- NASA/TM-2020-220555 NASA Meteoroid Engineering Model 3.0

Scope: The MMOD Report applies to the Destination, Crew Transportation Vehicle, and Cargo Transportation Vehicle. The meteoroid environment is defined in NASA/TM-2020-220555, NASA Meteoroid Engineering Model 3.0, and the orbital debris environment is defined in NASA Orbital Debris Engineering Model ORDEM 3.2. NASA TM- 2009-214785, NASA TP-2003-210788, NASA TM-2003-212065 and NASA TM-2009-214789 are available for guidance.

Contents: The MMOD Report includes:

1. Baseline assessments of the MMOD risk to the CLDS for loss of mission and loss of crew for the entire lifetime of the system.
2. Focused MMOD impact assessments for safety-critical components and subsystems such the thermal protection system, radiators and other fluid systems, pressure vessels and windows, attitude control system, power system, pressure vessels and safety-critical mechanisms.
3. Supplemental MMOD analyses to define the sensitivities of the baseline results to orbital altitude, spacecraft attitude, duration of exposure, and uncertainties or projected growth in the MMOD environment.
4. Evaluation of the baseline results to support system design optimization with respect to competing design priorities and constraints.
5. Evaluation of supplemental or alternate MMOD shielding approaches, as appropriate.
6. Description of all MMOD analysis models and tools including calibration results against accepted standards. This description includes all risk assessment assumptions and inputs, MMOD protection configurations used in the risk assessments, failure criteria as appropriate for loss of crew and loss of mission from the MMOD environment, ballistic limit equations and available impact test data supporting the equations. Detail shall be adequate for NASA to duplicate the Contractor's results.
7. Document all vehicle design, system and operational considerations implemented to meet MMOD protection requirements during system risk allocation.

Remarks: ORDEM 3.2, MSC-25457-1, obtained via the NASA software catalog:
<https://software.nasa.gov/software/MS-C-25457-1>

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

Initial Submission: Baseline six months prior to CDR

Submission Frequency: Update as required at CDR; Final at DCR.

Format: Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment.

Interrelationship:

- SOW Paragraph 2.11.5 Orbital Debris, Jettisons, and Deorbit
- CLDP-REQ-1130, Requirement and Standards for the Commercial Low Earth Orbit Development Program

Applicable Documents:

- NASA/TP-2003-210788 Meteoroid/Debris Shielding
- NASA/TM-2003-212065 Integration of MMOD Impact Protection Strategies into Conceptual Spacecraft Design
- NASA/TM-2009-214789 MMOD Shield Ballistic Limit Analysis Program
- NASA/TM-2009-214785 Handbook for Designing MMOD Protection
- NASA/TM-2020-220555 NASA Meteoroid Engineering Model 3.0

Scope: The MMOD Report applies to the Destination, Crew Transportation Vehicle, and Cargo Transportation Vehicle. The meteoroid environment is defined in NASA/TM-2020-220555, NASA Meteoroid Engineering Model 3.0, and the orbital debris environment is defined in NASA Orbital Debris Engineering Model ORDEM 3.2. NASA TM- 2009-214785, NASA TP-2003-210788, NASA TM-2003-212065 and NASA TM-2009-214789 are available for guidance.

Contents: The MMOD Report includes:

1. Baseline assessments of the MMOD risk to the CLDS for loss of mission and loss of crew for the entire lifetime of the system.
2. Focused MMOD impact assessments for safety-critical components and subsystems such the thermal protection system, radiators and other fluid systems, pressure vessels and windows, attitude control system, power system, pressure vessels and safety-critical mechanisms.
3. Supplemental MMOD analyses to define the sensitivities of the baseline results to orbital altitude, spacecraft attitude, duration of exposure, and uncertainties or projected growth in the MMOD environment.
4. Evaluation of the baseline results to support system design optimization with respect to competing design priorities and constraints.
5. Evaluation of supplemental or alternate MMOD shielding approaches, as appropriate.
6. Description of all MMOD analysis models and tools including calibration results against accepted standards. This description includes all risk assessment assumptions and inputs, MMOD protection configurations used in the risk assessments, failure criteria as appropriate for loss of crew and loss of mission from the MMOD environment, ballistic limit equations and available impact test data supporting the equations. Detail shall be adequate for NASA to duplicate the Contractor's results.
7. Document all vehicle design, system and operational considerations implemented to meet MMOD protection requirements during system risk allocation.

Remarks: ORDEM 3.2, MSC-25457-1, obtained via the NASA software catalog:
<https://software.nasa.gov/software/MS-C-25457-1>

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

1. DRD Title: Jettison Plan		
2. DRD No.: CLDC-120	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>(Insert contract number)</i>
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☒
10. Description/Use: The Jettison Plan communicates the Contractor's policy and processes on jettisoning objects from the Destination and Visiting Vehicles.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline at Preliminary Design Review (PDR) or Critical Design Review (whichever occurs earlier), and updates as necessary thereafter. Submission Frequency: Final at Design Certification Review (DCR). Updates as necessary. Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment. Interrelationship: Statement Of Work (SOW) Section 2.11.5 Orbital Debris, Jettisons, and Deorbit Applicable Documents: N/A Scope: The Jettison Plan addresses the risk acceptance rationale, analysis, and acceptance process for proposed jettisons from the Destination and Visiting Vehicles. Contents: The Jettison Plan describes the Contractor's strategies and methods for the protecting crew, vehicles, and the mitigation of space debris due to jettisoned items consistent with the guidelines and practices of the U.S. Government Orbital Debris Mitigation Standard Practices (November 2019), the Inter-Agency Space Debris Coordination Committee (IADC) Space Debris Mitigation Guidelines (February 2025), and the Space Debris Mitigation Guidelines of the United Nations Committee on the Peaceful Uses of Outer Space, (2010). The Jettison Plan contains: 1. A policy statement that describes the Contractor's commitment to preserve the near-Earth space environment and to mitigate the risk to human life and space missions due to jettisoned items. 2. A management plan for jettison related activities. 3. The jettison candidate identification, analysis, and approval process, including criteria intended to quantify and control additional orbital debris risk from any jettison candidate and the risk of collision a jettison candidate poses to the Destination and Visiting Vehicles.		

4. Requirements that address the guidelines and practices in the U.S. Government Orbital Debris Mitigation Standard Practices (November 2019), the Inter-Agency Space Debris Coordination Committee (IADC) Space Debris Mitigation Guidelines (February 2025), and the Space Debris Mitigation Guidelines of the United Nations Committee on the Peaceful Uses of Outer Space, (2010).

Remarks:

The following NASA documents can be used as guidelines, reference, and best practices:

- NASA Procedural Requirement (NPR) 8715.6E Orbital Debris Mitigation
- NASA-STD-8719.14B Process for Limiting Orbital Debris
- International Space Station (ISS) Partner Program Directive (PPD) 1011 Rev C, Multilateral International Space Station (ISS) and ISS Visiting Vehicles Jettison Policy

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

1. DRD Title: Nonconformity (NC) Reporting and Review Board Status		
2. DRD No.: CLDC-121	3. Data Type: 3	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☐ Administrative ☐ S&MA ☒
10. Description/Use: Reporting of emerging and confirmed hardware, manufacturing process, or quality management system Non-Conformances (NCs) that threaten the achievement of requirements conformity informs the Project of exposure to risks that threaten mission success with respect to performance, schedule, and cost.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Submitted ninety (90) days following contract award. Submission Frequency: Quarterly thereafter until Completion of Contract Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment. Interrelationship: • Statement Of Work (SOW) Section 2.11.4 Reliability • Data Requirements Description (DRD) CLDC-115 Safety and Mission (SMA) Plan • DRD CLDC-104 Insight and Collaboration Implementation Plan Applicable Documents: N/A Scope: The supplier will provide information, data, and metrics about hardware and process NCs that are a threat to mission success and/or crew safety, and the status and outcomes of actions they take to understand and resolve the impact of the NCs. Reportable nonconformances include issues known to occur within the sub-tier supply chain, particularly those that drive the use of customer-issued Corrective Action Requests (CARs). Contents: Quarterly nonconformance reporting includes all NCs currently being addressed with investigation and resolution boards (e.g., materials review board, failure review board, technical interchange meeting(s)) until their associated concerns, issues, and risks have been resolved or have been mitigated to the point of acceptance. Previously reported data are included on subsequent reports when a status has changed, for example "Under Review in Material Review Board (MRB)" changes to "Closed/Retired". The minimum information required for quarterly reporting of NCs is:		

1. Date the nonconformity occurred or was originally found,
2. Supplier whose process created the nonconformity,
3. Supplier who discovered the nonconformity,
4. Description of the nonconformity and the affected product and/or process
5. Point of contact.
6. Detailed description of the hardware configuration location or Quality Management System (QMS) process including the following when applicable: procedure and/or work order number, drawing number, physical location reference Identification Description (ID).
7. Requirement that was violated. For dimensional nonconformities, include both “is” and “should be” dimensions.
8. Identification of any impacted hazard reports.
9. Method by which the nonconformity was found or confirmed.
10. Process being used to investigate and mitigate the nonconformity (e.g., MRB, Failure Review Board (FRB), Technical Interface Meeting (TIM), Standard Practice)
11. Status of mitigation plan and execution of the plan including current actions being taken
12. Traceability to a formal risk if applicable and that risk’s likelihood x consequence severity rating
13. Description of the justification for closing an open NC
14. Resolution for product NCs (e.g., return, replace, rework, repair, use as is) and concurrence by project technical authorities if applicable.
15. Additional points of contact: NASA and relevant original equipment manufacturer (OEM) Point of Contacts (POCs) in the supply chain.

Remarks: Contractor’s approach, including the approach for reporting sub-tier nonconformances to the government, are reflected in DRD CLDC-115 Safety and Mission Assurance Plan, Section 5.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

1. DRD Title: Supply Chain Visibility (SCV) Reporting		
2. DRD No.: CLDC-122	3. Data Type: Type 3	4. OPR: CDO, OSMA & SCRM Program
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date Revised: <u>Include the revision date (if the DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☒
10. Description/Use: Supply Chain Visibility (SCV) Reporting by Contractors to NASA is required to systematically build and maintain visibility into the supply chains for NASA mission programs/projects to enable pro-active Supply Chain Risk Management (SCRM) that supports situational awareness, planning, risk analysis and informed decision-making at NASA project, program, center and agency levels.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR The SCV Reporting application of the NASA Supply Chain Insight Central (SCIC) information and analysis services platform shall be used by the Contractor to securely fulfill SCV reporting requirements in accordance with instructions provided in this Data Requirements Description (DRD) and the SCV Reporting application. The reporting will be maintained within SCIC, which is part of a secure NASA / U.S. Government information system with access restricted to authorized users. SCIC is operated in accordance with NASA / U.S. Government requirements for the management of Controlled Unclassified Information (CUI). Initial Submission: Within thirty (30) days from contract award the Contractor shall use the publicly available SCV Reporting User Registration website (https://www.nasa.gov/visibility-scic/) to identify the primary individual and an alternative individual designated by the Contractor to perform the submission of the required SCV reporting. The Contractor shall use the SCV Reporting User Registration website to change or update information on the designated individuals within thirty (30) days of any updates to the prime or alternative SCV reporting roles. The SCV Reporting User Registration website provides instructions for the provisioning of secure access by the designated individuals to the SCV Reporting application. The Contractor shall submit an initial report via the SCV Reporting application within ninety (90) days after contract award. Submission Frequency: The Contractor shall submit an updated report via the SCV Reporting application every six (6) months after the due date of the initial report for the duration of the contract. Format: The SCV Reporting application provides the format. Interrelationship: • Statement Of Work (SOW) Section 2.11.3.1 Supply Chain Quality Surveillance • DRD CLDC-115 Safety and Mission Assurance (SMA) Plan		

Applicable Documents: N/A

Scope: The SCV Reporting by the Contractor shall provide information as specified in the Contents section of this DRD for all critical components, subsystems, or major assemblies, as determined by the Contractor's methods for identifying critical components.

SCV Reporting by the Contractor contains information pertaining to the Contractor (Tier One (1) by contractual supply chain level) and the product and/or service deliverables required by the NASA contract, and on the Contractor's sub-tier suppliers issued contracts to provide products and/or services in fulfillment of the NASA contract, which, at a minimum, encompasses all of the Contractor's direct sub-contractors (Tier Two (2) by contractual supply chain level) and all of the direct suppliers to the sub-contractors (Tier Three (3) by contractual supply chain level). For Contractor-provided transportation services, the Contractor reports on three tiers from the selected transportation system provider.

Contents:

The SCV Reporting by the Contractor provides the following information on each Tier's contractors:

1. Operating (doing business as) name of the entity.
2. Direct contractual customer for the issued contract(s) (for Tier 2 contractors, this is the Tier 1 contractor company, for Tier 3 contractors this is the Tier 2 contractor they are on contract to).
3. Location(s) of places of contract performance with complete addresses (street number, city, state, country and zip code or equivalent for non-U.S. locations).
4. Commercial and Government Entity (CAGE) code, Unique Entity Identification code or North Atlantic Treaty Organization Commercial and Government Entity (NCAGE) code, if available/applicable.
5. Summary description of the contractually required product and/or service deliverables, including product/service name, product part or model number or other identifying information as applicable.
6. Contract start and end dates as awarded and amended.

Remarks: Note that this DRD requires reporting on three tiers of supplier information by the Contractor. It is not expected that suppliers to the Contractor utilize the SCV reporting tool or provide data directly to NASA in support of this DRD.

Maintenance: Fulfillment of the SCV Reporting DRD will be maintained via the SCIC SCV Reporting application.

1. DRD Title: Destination Disposal Plan		
2. DRD No.: CLDC-123	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>(Insert contract number)</i>
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Destination Disposal Plan communicates the Contractor's plan to safely dispose of the Destination at end of life and the approach to mitigating the technical and safety risks of deorbiting the Destination in the event of a contingency de-orbit. A controlled deorbit of the Destination would minimize a major safety risk to the public if components survive Earth's atmospheric re-entry.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline at Preliminary Design Review (PDR) (if PDR is required) or Final at Critical Design Review (CDR), and updates as necessary thereafter. Submission Frequency: Final at Critical Design Review (CDR). Updates as necessary. Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment. Interrelationship: Statement Of Work (SOW) Section 2.11.5 Orbital Debris, Jettisons, and Deorbit Applicable Documents: U.S. Government Orbital Debris Mitigation Standard Practices, November 2019 Update Scope: Addresses the plan to safely dispose of the Destination at end of life and the approach to mitigating the technical and safety risks of deorbiting the Destination in the event of a contingency de-orbit. Contents: The Disposal Plan describes the Contractor's strategies, methods, and design considerations for the mitigation of the risk of an unplanned deorbit and for the planned disposal of the destination consistent with the objectives of the U.S. Government Orbital Debris Mitigation Standard Practices (November 2019), the Inter-Agency Space Debris Coordination Committee (IADC) Space Debris Mitigation Guidelines (February 2025), and the Space Debris Mitigation Guidelines of the United Nations Committee on the Peaceful Uses of Outer Space, (2010). The Disposal Plan shall address the following items: 1. A plan addressing disposal of the destination (spacecraft and/or orbital stages) at the end of life a. Technical decommission and disposal plans b. Minimum probability of success for removal from designated region with minimal generation of space debris		

- c. Probability of safe disposal without impacting populated regions of Earth
2. Risk assessment identifying system failures that could potentially lead to an uncontrolled deorbit and disposal and a probability assessment of these failures
 - a. Compare the risk assessment associated with an uncontrolled re-entry against the probability of an uncontrolled de-orbit and the result shall be lower than the 1 in 10000 ground casualty risk threshold as defined in Section 4.1 of the “U.S. Government Orbital Debris Mitigation Standard Practices, November 2019 Update”
3. Mitigation options to reduce the risk of system failures leading to an uncontrolled deorbit of the Destination and the resulting probability of an uncontrolled deorbit.
4. Assessment of risk mitigation options to protect for de-orbit capability in the event of a failure that prevents completion of assembly of the planned destination configuration

Remarks:

The following documents can be used as guidelines, reference, and best practices:

- International Space Station (ISS) Program Partner Directive (PPD) 1011 Rev C, Multilateral ISS and ISS Visiting Vehicles Jettison Policy
- NASA/SP-20210024973 Tri-Agency Reliability Engineering Guidance: Post Mission Disposal and Extension Assessment
- IADC Space Debris Mitigation Guidelines (2025)
- United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) Space Debris Mitigation Guidelines (2010)

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Data Requirements Description (DRD) deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redline version showing updates made since the last submittal.

1. DRD Title: Utilization Integration Plan (UIP)		
2. DRD No.: CLDC-124	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>(Insert contract Number)</i>
7. Date Issued: <u>Insert the date baseline was issued</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Utilization Integration Plan describes the plan for integrating United States Government (USG) payloads and the USG or Commercial Low Earth Orbit (LEO) Destination System (CLDS) commercial facilities hosting the USG-sponsored payloads, including roles and responsibilities.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Draft (Sections 1-3 and 6, DRM #1 and DRM #2 only) at Proposal; Baseline at Preliminary Design Review (PDR) or Critical Design Review (whichever occurs earlier), and updates as necessary thereafter. Submission Frequency: Final due at Design Certification Review (DCR) with subsequent revisions shall be provided upon change(s) made to ensure currency. Format: The Contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment. Interrelationship: Statement Of Work (SOW) Section 2.15 Utilization Applicable Documents: • CLDP-PLN-3017 CLDP Utilization Integration Plan • CLDP-STD-1150 CLDP Operations Standards • CLDP-PLN-2110 CLDP Mission Integration Plan Scope: The Contractor's Utilization Integration Plan describes the Contractor's end-to-end series of tasks or milestones to integrate and operate a USG payload or facility onboard the CLDS based on CLDP Utilization Integration Plan, CLDP-PLN-3017 for the eight Design Reference Missions (DRM) listed in Section 3 of CLDP-PLN-3017. The Contractor's Utilization Integration Plan begins with the "Design and Analyze" phase as listed in CLDP-PLN-3017, Figure 5.0-1, i.e., after payloads/facilities are selected for a mission/increment through launch (via NASA's delivery of the list of payloads/facilities targeting a given increment) through on-orbit operations and return of payloads/facilities/payload samples to the Payload Developer or Principal Investigator, as detailed in the "Utilization Objective Completion" phase in CLDP-		

PLN-3017. Thus, any references to the Early Integration Phase in CLDP-PLN-3017 are out of scope for the Contractor's Utilization Integration Plan. The Contractor's Utilization Integration Plan covers integration of a single utilization activity along with the entire complement for a given mission/increment.

Contents:

The Contractor should tailor NASA's Utilization Integration Plan presented in the CLDP-PLN-3017 CLDP Utilization Integration Plan, and include the following for each DRM:

1. Tasks with descriptions that must be completed and by whom (NASA or Contractor);
2. Primary or Shared Owner(s) of tasks;
3. Identification of tasks that are subcontracted out (and by whom)
4. Any inputs or interdependencies between the tasks;
5. Applicability to various payload types (small, portable, subrack, rack, external);
6. Description of any tools the Contractor utilizes during the payload integration flow and the development status of proposed tools and whether there are any known compatibilities/incompatibilities with existing NASA tools.
7. Description of Contractor's approach and flexibility to accommodate delayed USG payloads/facilities along with any final due date(s) by which the Contractor can exercise the flexibility during payload integration, whereby "delayed USG payloads/facilities" means that a USG payload or facility misses key integration milestones and is at risk for making target launch).

Remarks: None.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

1. DRD Title: Payload Users Guide		
2. DRD No.: CLDC-125	3. Data Type: 3	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>(Insert contract number)</i>
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date Revised: <u>Include the revision date (if the DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
Description/Use: The Payload Users Guide (PUG) describes the following key aspects of the Commercial Low Earth Orbit (LEO) System (CLDS) and is intended for research sponsors, NASA, and potential/new United States Government (USG) payload customers: 1. Utilization Integration Plan Summary 2. Payload Integration Schedule Template 3. CLDS Payload Facilities Reference Manual 4. Payload and Facility Verification and Validation 5. Capabilities and Resources for Payloads/Facilities 6. Mission Unique (optional) services.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline due at Critical Design Review (CDR) Submission Frequency: Final due at System Certification Review (SCR) and updates for currency as necessary. Format: The Contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment. Interrelationship: Statement Of Work (SOW) Section 2.15 USG Utilization Applicable Documents: • CLDP-PLN-3017 CLDP Utilization Integration Plan • CLDP-STD-1150- CLDP Operations Standards • CLDP-PLN-2110, CLDP Mission Integration Plan Scope: 1. <u>Utilization Integration Plan Summary</u>- provides a high-level summary of the Contractor's tasks or milestones to integrate and operate a USG payload or facility onboard the CLDS based on DRD CLDC-124 Utilization Integration Plan (UIP). 2. <u>Payload Integration Schedule Template</u> –provides a high-level summary of key milestones and deliverables in the Contractor's Utilization Integration Plan along with due dates, expressed as		

“Launch minus” or “Return plus” terms.

3. CLDS Payload Facilities Reference Manual - provides detailed information for user(s) to successfully understand the design, operation, and resources associated with and made available to Commercial LEO Destination (CLD) Contractor’s transportation and on-orbit payload facilities (i.e., payload facilities, Mid-deck Locker Equivalent (MLE) locations, and open cabin volume).
4. Payload and Facility Verification and Validation – provides listing of Contractor’s hardware/software ground testing and analyses capabilities available to user(s) and used in performing Verification and Validation of payload/facility hardware and software interface requirements, including testing of ground remote commanding and receipt of telemetry.
5. Capabilities and Resources for Payloads/Facilities – provides listing of capabilities or resources Contractor can offer payloads or facilities during integration, turnover, launch, on-board operation, and return, including, but not limited to ground processing, fit checks, post-shipment functional testing, ground support equipment, auxiliary flight hardware, remote commanding/telemetry/voice access, payload software installation, transportation, logistics.
6. Mission Unique (optional) services – provides listing of mission unique optional services that the Contractor could make available to USG payload customer, upon request.

Contents:

1. Utilization Integration Plan Summary:

The summary should include a high-level description of the Contractor’s payload/facility integration tasks along with USG customer and Contractor roles and responsibilities.

2. Payload Integration Schedule Template:

Based on the Contractor’s Utilization Integration Plan (DRD CLDC-124), the Contractor should also include a payload integration schedule template (1 pager) identifying key Contractor milestones and expected deliverables from USG payload customers, NASA, and the Contractor. The Contractor should also include anticipated owner of the deliverable along with due date or milestone date, expressed in “Launch minus” and “Return plus” terms. Payload integration schedule templates typically include need dates for interface requirements definition, safety reviews, interface/safety/science testing, having safety and interface verifications approved, research planning/manifest data need dates, operations products baseline need dates, turnover dates, and hardware/science return dates.

3. CLDS Payload Facilities Reference Manual- The Contractor’s CLDS Payload Facilities Reference Manual defines the overall capabilities and resources provided for each of the Contractor’s payload facilities, resources provided to payloads operating in the open CLDS cabin volume, and MLE locations and contains, at a minimum:
 - a. Overall description of each payload facility, with identified use cases.
 - b. Dimensions/size of the payload facility, cabin volume, and MLE locations, specifically any sizing constraints for payloads and/or utilization activities.
 - c. Operational safety information and use data that will help in design of payloads and/or utilization activities and operations concepts (i.e. levels of containment provided and how those are achieved)
 - d. Resources available (i.e. power, data, video, heat rejection, water, nitrogen, vacuum, etc.), from the facility to the payload and any associated limitations, total resources available to prospective payloads deployed in open CLDS cabin as well as resources available to NASA MLE powered locations.
 - e. Commanding capabilities/limitations
 - f. Other pertinent design information and/or hardware available for use (ferrous surface, attachment points, laptop access, decontamination system, etc.)

- g. Ancillary hardware and/or consumables available for multi-users (cabling, hoses, laptops, tablets, gloves, etc.)
 - h. Requirement(s) for fit check and/or ground testing of utilization hardware.
 - i. Type of crew training requirements for each facility (ex. hands on ground training, on-board training (OBTs), or no training required).
 - j. Any training required for NASA, Payload Developers, remote operators, etc.
4. Payload/Facility Verification and Validation - The Contractor should list and describe all CLDS payload facility hardware and software testing capabilities that the Contractor will provide as part of verification/validation testing, fit checks, post shipment functional checkouts (data, power) for USG payloads. The Contractor should also discuss its own analyses capabilities should analyses be used to perform verification/validation. The Contractor should also discuss whether any facility emulators will be made available. The Contractor should also discuss any testing that can be made available to perform ground system testing for remote commanding and receipt of telemetry.
5. Capabilities and Resources for Payloads/Facilities – provides listing and description of capabilities or resources Contractor can offer payloads or facilities during integration, turnover, launch, on-board operation, and return, including, but not limited to fit checks, post-shipment functional testing, ground processing, ground support equipment, auxiliary flight hardware, remote commanding/telemetry/voice access, payload software installation, transportation, logistics.

Contents include:

- a. Contractor's capabilities to support ground fit checks with USG payloads.
- b. Payload Ground Processing User Guide containing:
 - i. A list and description of each of the Contractor's ground processing facility capabilities for pre-/post flight. A ***Payload Ground Processing Requirements Reference Guide*** is provided as part of the Technical Library to provide a guideline as to capabilities historically requested by NASA for pre- and post-flight ground processing of payloads.
 - ii. Process users must follow to request access. Process includes templated timeframes a payload representative may have access to ground processing capability pre, during and post-flight.
 - iii. Timeframes that the payload representative must request ground processing capability(ies) prior to launch (and return).
 - iv. Contractor's interfaces and roles/responsibilities to request and schedule ground processing capabilities.
- c. List of payload facilities/capabilities (included in CLDP-STD-1106, CLDP Utilization Capabilities Standard) that may be used on the ground for supporting USG customer's needs, such as payload training, science verification testing, ground control enabling flight-following experiments on-orbit, and anomaly response. List should include quantities and fidelity (e.g., functional equivalent units, engineering units, flight units) for each payload facility/capability.
- d. The Remote Payload Operations User Guides defines the requirements and processes needed to access the Contractor's commanding/software capabilities including, but not limited to:
 - i. Define the process to pass commands to payloads on the destination.
 - ii. Define the process for receiving telemetry from the destination.
 - iii. Detail the process to interface with the systems to perform 2-way voice communications between remote users and Contractor control center and/or onboard crew.
 - iv. Define software needed for access and instructions on downloading/receiving the software. This includes, but is not limited to accounts needed, special system requests/approvals, etc.

- v. Define the process for security and/or antivirus updates as well as baseline security requirements.
 - vi. Detail testing requirements, including facility accessibility and availability, testing expectations, etc.
 - vii. Define command structure/command mapping requirements and instructions.
 - viii. Define telemetry structure mapping requirements and instructions.
 - ix. Detail real-time anomaly resolution structure/support mechanisms if user is having problems commanding or accessing the commanding system/software, and what to do to obtain assistance resolving the issues.
 - x. Define any training requirements for accessing remote payload commanding/software systems.
 - xi. Define remote operator certification requirements.
- e. The Payload Software Load Process contains, at a minimum, the following:
- i. Process for user submitting software or updates/patches for uplinks, including obtaining the necessary approvals and performing any additional verification/validation with Contractor support prior to uplink.
 - ii. Provide a list of key interfaces and roles and responsibilities of Contractor and anticipated customer (USG) personnel responsible for loading or updating payload software onboard the CLDS.
 - iii. Criteria that software must meet for customer (or Contractor on behalf of the customer) to perform software uplink.
6. Mission Unique Services (optional) – The Contractor should list any optional mission unique services offered to the USG payload customers.

Remarks: The document should be marked in such a way that US government agencies and research sponsors can share with potential researchers.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

1. DRD Title: Science Data Management Plan		
2. DRD No.: CLDC-126	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>(Insert Contract number)</i>
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date Revised: <u>Include the revision (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Contractor provides a Science Data Management Plan for how mission data and research data for USG payloads/facilities or utilization activities are processed and distributed to NASA and the USG payload teams.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA CO 2. NASA CDO COR and Alternate COR Initial Submission: Baseline due at DCR Submission Frequency: Final due at SCR with Subsequent revisions shall be provided upon change(s) made to ensure currency. Format: The Contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment. Interrelationship: SOW 2.15 Utilization Applicable Documents: • CLDP-PLN-1122, Science Data Management Plan • CLDP-REQ-1130, Requirement and Standards for the Commercial Low-Earth Orbit Development Program • CLDP-PLN-3017, Utilization Integration Plan. Scope: The Contractor's Science Data Management Plan covers transmission of mission and research data for all phases of operations as appropriate for the USG payloads/payload facilities or other utilization activities that are active or in a state whereby they are collecting research data, including launch and free-flight, on-orbit CLD operations, and return. In addition, the Contractor's Science Data Management Plan covers transmission of mission and research data for all phases of operations as appropriate for conditioned stowage assets hosting USG payloads during launch, on-orbit CLD operations, and return. Contents: The Contractor's Science Data Management plan states how the Contractor provides "mission" and "research" data as defined in CLDP-PLN-1122 Science Data Management Plan Section 1.2 for USG payloads and the facilities they operate in on the Commercial LEO Destination System (CLDS). Mission		

and research data should also be provided for NASA USG and utilization activities operating in the open cabin volume of the CLDS or while operating in an external environment. Finally, mission and research data should also be provided for USG payloads hosted in conditioned stowage assets during launch, on-orbit operations, and return.

The Contractor's Science Data Management Plan shall address the following:

1. Description of Contractor's roles and responsibilities related to data management consistent with CLDP-PLN-1122, Section 5.1;
2. Ability to transfer various file types for "research data" and "mission data" as detailed in the CLDP-PLN-1122, Sections 3.3 and 3.4, respectively, for payloads and facilities;
3. Ability to meet the Data Security Requirements outlined in CLDP-PLN-1122, Section 8.1; and
4. Details as to how the Contractor will meet the "mission data" and "research data" requirements as specified in CLDP-PLN-1122, Sections 8.2 and 8.3, respectively; and
5. Details as to how the Contractor will meet customer data requirements, pertaining to frequency at which the data is collected onboard the CLDS, data precision, accuracy, temporal resolution, transmission frequency, stowage and deletion frequency, delivery methods and end-user locations, as described in CLDP-PLN-1122, Section 3.0. Customer data requirements specific to a payload or mission will be provided to the Contractor as part of the payload integration process described in the CLDP-PLN-3017.
6. Describe the Contractor's approach in ensuring Research Data and Research-Related Mission Data (also called Mission Data in the CLDP-PLN-1122) delivered under this DRD is delivered with the "Special Works" rights set forth in Clause FAR 52.227-17 RIGHTS IN DATA-SPECIAL WORKS (DEC 2007).

Remarks: None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal."

1. DRD Title: Mission Systems Plan		
2. DRD No.: CLDC-127	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Contractor will supply a plan for how the Mission Systems (MS) will be developed in support of training and control center development. This deliverable includes the Contractors plans to develop or procure, provisioning and sustaining of mission control support or capabilities and flight simulators, mockups, training systems/tools, associated software, and the supporting data, documentation, and Contractor personnel who maintain those systems.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline at Preliminary Design Review (PDR) (if PDR is required) or Final at Critical Design Review (CDR), and updates as necessary thereafter. Submission Frequency: Final due at Critical Design Review (CDR). Updates for currency as needed. Format: The Contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment. Interrelationship: • Statement Of Work (SOW) Section 2.17 Transportation • SOW 2.10.3 Software Management • SOW 2.10.5 Verification and Validation (V&V) Applicable Documents: • CLDP-STD-1150 Commercial Low-Earth Orbit Development Program Operations Standards • CLDP-REQ-1130 Requirements and Standards for the Commercial Low-Earth Orbit Development Program • Johnson Space Center (JSC)-35199 Mission Control Center Interface Specification • JSC Procedural Requirement (JPR) 1700.1 JSC Safety and Health Requirements • Space Station Program (SSP) 50305 POIC to Generic User Interface Definition Document • PMOD-PIDD-001 Payload Operations Integration Center (POIC) Interface Definition Document (PIDD). Scope: The Mission Systems (MS) are used for support during flight operations and contingencies, crew and flight controller training, procedure development and verification, systems and concept of operations development.		

Contents: The Contractor shall provide a plan to develop MS supporting all phases of mission preparations and flight. The plan provided for this Data Requirements Description (DRD) must cover the end-to-end array of principal functions carried out by the Contractor as they relate to Training and Mission Support capabilities.

Key reviews and certification milestones shall be captured within DRD CLDC-002 Integrated Master Schedule (IMS).

The following information shall be included as supporting data for completion of this DRD and will present a functional breakdown and description of how the Contractor manages the processes and products required to successfully develop, train, and operate Commercial Low Earth Orbit Destination System (CLDS) activities.

This plan shall show how a Contractor will create and implement processes to develop, deliver, integrate, and schedule both mission control and training capabilities based on the categories below, at a minimum. The plan addresses facility support personnel and capabilities and nominal, off-nominal, and emergency training situations and availability. The following categories are suggestions to ensure the overall information will be categorized.

Updates to this DRD are expected at the certification milestones listed above as this plan matures.

1. The generic standards for mission systems and training systems shall include a description of how the operations and training facilities will be maintained, including a description of the following:
 - a. Overall physical and Information Technology (IT) security protocols to protect the facilities from physical and technological threats and ensure compliance with CLDC-006 Information Technology Security Plans (ITSP).
 - b. How the facility will support flight-specific configuration changes.
 - c. Capabilities for maintenance of MS for any repairs or updates needed to infrastructure internal or external to the facility, with minimal impacts to ongoing operations.
 - d. Appropriate levels of redundancy and backups for MS that can be temporarily failed over to during times of facilities maintenance or unscheduled outages
 - e. How to schedule and coordinate outages with the operations teams around these events when maintenance of the facility is likely to cause outages and impacts to ongoing activities within the facility (mission, simulation, and test).
 - f. The process to ensure that facility operations do not induce hazards into the flight hardware.
 - g. Define the responsibilities of organizations that use or operate the facility and how those organizations work together.
2. The MS standards shall include a description of how the control centers will support training and real-time operations, that includes, but is not limited to, the following:
 - a. How operators will interface with the command and telemetry system
 - b. The type of voice interface used to communicate to internal and external ground controllers and the Destination.
 - c. How consoles will be laid out and what operating systems will be used for commanding
 - d. If the Contractor elects to make use of MCC-H internal services and capabilities in a RSAA or GTA, the Contractor shall utilize JSC-35199, MCC Interface Specification for external interface definition. NASA will collaborate with the Contractor to evaluate alternate approaches during interface definition and jointly develop a ground segment Interface Control

- Document within the RSAA or GTA.
- e. If the Contractor elects to make use of POIC internal services and capabilities in support of Payload operations in a RSAA or GTA, the Contractor shall utilize PMOD-PIDD-001, Payload Operations Integration Center (POIC) Interface Definition Document (PIDD) for external interface definition. NASA will collaborate with the Contractor to evaluate alternate approaches during interface definition and jointly develop a ground segment Interface Control Document within the RSAA or GTA.
 - f. How ground facilities will accommodate privacy for ground participants in crew private medical conferences, private psychological conferences, and private family conferences.
 - g. Plans for redundancy between critical systems to allow operations to continue despite ground component or system failures including both single failure tolerant command and telemetry systems within the prime mission control center as well as an alternate location, if needed due to failure at the primary facility due to unforeseen circumstances, including weather related issues.
 - h. How dedicated, redundant, and geographically diverse mission-critical networks are segregated from corporate IT traffic.
 - i. Providing operations personnel with access to stored engineering data and telemetered/stored flight data for the launch/ascent vehicle and spacecraft vehicle/element.
 - j. Segregating interfaces with external facilities to create isolation points for potential security incidents and minimize impact.
 - k. Having a command system mechanism and/or tools in place for command inhibit/release and for two-stage verification for hazardous commands.
 - l. Enabling a proxy telemetry access to any remote and/or external users to maintain system performance and security availability for the flight/mission-critical Flight Control Team (FCT), while also enabling the flight/mission-critical FCT to monitor the proxy telemetry for troubleshooting with remote users.
 - m. Ensure production environment mission, simulation and test activities that operate concurrently within the facility have infrastructure and/or interface segregation to prevent data from being routed to/from the unintended activity, causing the mission control Flight Control Team (FCT) to potentially take action on incorrect data or commands being routed to the wrong end item.
 - n. Use Interface Control Documents (ICDs) (or equivalent) to define the interface when Commercial Contractor operations facilities connect to other Commercial Contractors or NASA facilities.
 - o. Have a defined process to ensure that onboard flight software is synchronized with ground tools.
Note: For example, ensure that telemetry available on the ground matches telemetry generated by the vehicle.
 - p. Be tested in an end-to-end environment that includes the facility, the integrated space vehicle(s) and/or a high-fidelity simulator.
 - q. Be stress tested and/or have an analysis performed to determine that system capacity can accommodate the maximum anticipated demand.
 - r. Have documented process for software validation for any software that will be used to make mission-critical decisions, including any tools used by mission controllers to perform calculations necessary for the operation of the CLDS.
 - s. Have a certification and roll-out process for all ground tools that is configuration managed and ensures non-certified versions of tools cannot be accidentally used for mission operations.
 - t. Operations infrastructure also requires operations products that may include configuration files, display definitions, settings, and databases that provide the means for mission controllers to

monitor data, send commands, and plan/organize operations during the mission

- u. Provide NASA and the remote payloads teams access to key telemetry values of both the CLDS and of the payloads facility/payloads themselves, while providing a methodology of remote commanding to the team's payload(s). Provide NASA and the remote payloads teams access to communicate (audio) with the relevant CLD flight control team members and on-board crew. Note: exact implementation can be a discussion between the CLD Commercial Contractor and NASA as to what capability the CLD Commercial Contractor gives to NASA to manage versus what capability the CLD Commercial Contractor manages directly with the payloads teams.

3. Training Systems – These include how the training facilities will operate with internal and external partner facilities to prepare trainers, flight controllers, and crew for mission operations. The training facilities shall contain the following capabilities, at a minimum:

- a. Ensure the Contractor can connect to and interface with external simulators.
 - i. Examples of external simulators include NASA, Cargo Transportation Contractor, Crew Transportation Commercial Contractor, etc.
- b. Allow malfunctions from external simulators as input into the Contractor's simulator during simulations that involve multiple entities to support joint integrated simulations, as needed.
- c. Prior to first use by United States Government (USG) personnel, including instances of significant updates to hardware or infrastructure, operations shall adhere to the NASA Test Readiness Review (TRR) safety review process and adhere to the Space Systems and Test Safety Requirements documented in JPR 1700.1 Section 6.8.
- d. Have at least one high-fidelity training facility or mock-up for crew training and one high-fidelity training facility for flight software testing. These facilities may be combined.
- e. Ensure that sensitive data transmitted to and from the facility is secure and that unauthorized personnel cannot access private or critical information about the CLDS or crew.
- f. Ensure that facility operations protect participants from injury.
- g. Support health stabilization protocols (masks, instructor medical checkups etc.) for USG crew, during pre-launch training events that might happen while the crew is in the quarantine period.
- h. Provide ICDs (or equivalent) for interoperability and interface agreements for all training simulators including the software and hardware components to define how the simulators will work together for integrated sims, if needed.
- i. Provide NASA personnel, including remote operators, access to simulator telemetry and voice loops to participate in joint simulations.

Remarks: None.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

1. DRD Title: Operations and Training Plan (O&TP)		
2. DRD No.: CLDC-128	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>(Insert contract number)</i>
7. Date Issued: <i>Insert the date the baseline was issued</i>	8. Date Revised: <i>Include the revision date (If this DRD has been revised)</i>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Operations and Training Plan documents the Contractor's approach to conducting mission operations and training. This includes the processes, products, and plans that meet the intent of the standards defined in CLDP-STD-1150 Commercial Low-Earth Orbit Development Program (CLDP) Operations Standards and the roles and responsibilities of the operations, training, and personnel needed to execute the mission. A product delivery template is included with this plan to map the process to implement the NASA expectations defined in CLDP-STD-1150, CLDP Operations Standards.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Draft due at Preliminary Design Review (if required) or Baseline at Critical Design Review (CDR) Submission Frequency: Baseline due at Critical Design Review (CDR). Final due one year prior to start of crew training for first mission. Updates as required. Format: Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment. Interrelationship: • Clause Authority and Responsibilities of the Destination Commander, Chain-Of-Command and Succession On-Orbit; Relationship Between Ground and On-Orbit Management • Statement Of Work (SOW) 2.12 NASA Operational Support/Access to Partner Facilities, Control Centers, and Transportation/Access to Tools • SOW 2.14 Mission Integration • SOW 2.15 Utilization • SOW 2.16 Mission Operations • SOW 2.21 Crew Code of Conduct (CCoC) • DRD CLDC-117 Mishap Preparedness and Contingency Plan (MPCP). Applicable Documents: • CLDP-STD-1150 Commercial Low-Earth Orbit Development Program Operations Standards • CLDP-PLN-2110 Mission Integration Plan (MIP) • CLDP-PLN-3017 Utilization Integration Plan (UIP) Scope: The Operations and Training Plan documents the Contractor's approach to the activities, processes,		

standards, organizational responsibilities, interactions, and data exchanges required to execute operations. The plan covers all phases, including mission design, mission planning, operations product development, test and verification, training of crew and ground support team(s), and real-time execution for the CLDS. This plan ensures readiness of the operations products, ground support personnel, operations personnel, Mission Management Team (MMT), and the Crew for CLDS missions.

Contents: Accompanying the data delivered with the Operations and Training Plan, the Contractor shall develop a product delivery template to map each process to the NASA operational standards defined in CLDP-STD-1150, CLDP Operations Standards.

The Contractor shall deliver an Operations and Training Plan that describes the following operational processes in a similar outline as shown below:

1. Operations Planning Processes

a. Mission Design and Analysis Process

- i. Visiting Vehicle Mission Design and Real-time Analysis in accordance with Section 3.1.1.1 of CLDP-STD-1150, CLDP Operations Standards
- ii. Destination Mission Trajectory Design and Real-time Analysis in accordance with Section 3.1.1.2 of CLDP-STD-1150, CLDP Operations Standards
- iii. Consumables and Resource Management Analysis in accordance with Section 3.1.1.3 of CLDP-STD-1150, CLDP Operations Standards
 - (1) Parts of the delivery may point to data deliver per DRD CLDC-201 *Mission Integration and Operations Management Plan*.
- iv. Abort and Breakout Planning in accordance with Section 3.1.1.4 of CLDP-STD-1150, CLDP Operations Standards

b. Operations Procedures process, as defined in Section 3.1.3.1 of CLDP-STD-1150, CLDP Operations Standards, that additionally includes:

- i. Utilizing an Operations Nomenclature (OPNOM) process as defined in Section 3.1.2 of CLDP-STD-1150, CLDP Operations Standards.
- ii. Being validated prior to use in operations and that use flight like hardware/software when possible.
- iii. Ensuring consistency between flight crew and mission controller procedures, with clear designation of who (crew or ground) is to perform which actions.
- iv. Identification and designation of a time-critical action or an action to be performed at a specific time/frequency.
- v. Identifying of the safing required to perform a specific action.
- vi. Clearly distinguishing designations for hazard controls.
- vii. Incorporating NASA's input to procedures that impact US Government (USG) crew or USG assets.

c. Providing NASA with all Flight/Mission operations procedures in a similar format as to the format the crew will use onboard. Flight Rules process, as defined in Section 3.1.8 of CLDP-STD-1150, CLDP Operations Standards, that additionally includes:

- i. Allowing for real-time Flight Rule changes.
- ii. Documenting any violation of design/operational limits, operations controls, or pre-defined decisions (elements that define a preapproved risk base)
- iii. Defining a method for waiving a Flight Rule when conditions necessitate, and the waiver is approved per a pre-defined process.
- iv. Defining who on the Contractors flight control team has the approval authority for Flight Rule

- deviations in real-time.
- v. Partitioning proprietary information so that Flight Rules are viewed by only the approved personnel.
- vi. Enabling external entities access the Flight Rules when applicable.
- vii. Providing supporting rationale for each Flight Rule which is designed to aid the reader in understanding the intent of the Flight Rule as written by the authors.
- d. Flight Rule content that includes the following at a minimum:
 - i. Definition of Mission Authority, including roles and responsibilities of operations personnel, critical event definitions, control centers, and crewmembers for all flight operations.
 - ii. Launch Commit Criteria
 - iii. Go/No Go Criteria
 - iv. Visiting Vehicle dynamic, off nominal, and contingency operations
- e. Launch Commit Criteria Process as defined in Section 3.1.9 of CLDP-STD-1150, CLDP Operations Standards, that additional includes:
 - i. Defining criteria for the CLDS spacecraft, instruments, launch control center(s), mission control center, launch critical ground support equipment (GSE), and associated activities prior to liftoff.
 - ii. Establishing hold criteria for CLDS, included but not limited to the following guidelines:
 - (1) Any condition that could result in unacceptable risk to the long-term health and safety of the CLDS
 - (2) Any condition that could result in significant loss of redundancy of major subsystems and/or instruments
 - (3) Any condition that could result in either of the above items if current trending continued.
 - iii. Defining the approach for monitoring the CLDS LCC configuration for launch via real-time telemetry
 - iv. Tabulating each LCC telemetry parameter with its acceptable values, tolerances, trending patterns, and out-of-limits conditions requiring resolution prior to launch.
 - v. Defining the approach for coordinating the CLDS LCCs with NASA for mission operations-related criteria.
- 2. Operations Training Process as defined in Section 3.2.1, 3.2.2, 3.2.3, 3.2.3.1, and 3.2.4 of CLDP-STD-1150, CLDP Operations Standards and includes the additional content documented in bullets #5-14 of this DRD.
- 3. Operations Execution
 - a. Mission Execution and Monitoring process as defined in Section 3.3.1 of CLDP-STD-1150, CLDP Operations Standard, that additionally includes:
 - i. Providing a breakdown of the roles and responsibilities of each major console position responsible for execution and monitoring of the CLDS.
 - ii. Describing the real-time operations chain of command.
 - b. Operations Communication and Data Exchange Process as defined in Section 3.3.2 of CLDP-STD-1150, CLDP Operations Standard, that additionally includes:
 - i. A plan for real-time flight control team interactions between the Contractor, NASA, and other commercial providers using tools as defined in Section 3.3.7 of CLDP-STD-1150, CLDP Operations Standard.

- ii. A plan for real-time and near-real-time flight control interactions between the Contractor, CVV Transportation Provider, Mission Control Center (MCC)-Houston (H), and other control centers (if applicable) when USG crew are on the CVV
 - c. Anomaly Reporting and Resolution Process for reporting and managing anomalies observed during all phases of the mission, as defined in Section 3.3.6 of CLDP-STD-1150, CLDP Operations Standard, that additionally includes:
 - i. Defining the roles and responsibilities for anomaly resolution, when the Contractor or NASA will lead the anomaly investigation and resolution process, and including subcontractor support to provide subject matter expertise when necessary.
 - ii. How the Contractor and/or subcontractors will provide support, data sharing, and technical subject matter expertise to address issues and concerns for NASA-led investigations of anomalies.
 - iii. Differentiating between if non-conformance is due to a faulty or unexpected part failure and if it is specific to a single piece of hardware or applicable for vehicles/elements in flow.
 - iv. Identifying any Hardware design or operational process/product change as part of resolution.
 - v. Documenting the effectivity and rationale of acceptance for any anomaly that is not fully resolved through retest or replacement.
 - vi. Providing a resolution process that includes the incorporation of process improvements, lessons learned, and replacement or retest of failed hardware/software before closure.
 - vii. Ensuring anomalies and results of the investigation are available to assist with future operations or troubleshooting/anomalies.
 - viii. Documenting of responses, includes updates to operational products, actions to prevent recurrence, or actions to mitigate impacts and risk should the anomaly reoccur, including:
 - (1) Short-term impacts to the vehicle, hardware, software, Crew, and operations personnel.
 - (2) To account for measures for preventing or minimizing the recurrence of the anomaly.
 - (3) To account for any other actions or controls required for safety or mission assurance.
 - ix. Identifying anomalies affecting dynamic phases of flight that need to be reviewed for applicability as part of the CoFR/FRR process.
 - x. Defining NASA personnel will be notified of discussions where anomalies are discussed that impact NASA.
 - xi. Describing how anomalies will be elevated to Contractor and NASA management, including the Mission Management Team.
 - d. Debrief and lessons learned process as defined in Section 3.3.8 of CLDP-STD-1150, CLDP Operations Standard.
4. The Contractor shall deliver an Mission Management plan and Mission Management Team (or equivalent) Charter that includes:
- a. Mission Management Plan as defined in Section 3.3.3 of CLDP-STD-1150, CLDP Operations Standards, that additionally includes:
 - i. Description of the roles and responsibilities of the Contractor, sub-contractors and external organizations (including NASA) for operations during all phases of flight, including integration of facilities, personnel, and processes.
 - ii. Identifying external stakeholders, including NASA, and roles and responsibilities for reviewing mission information throughout all phases of flight and making informed decisions on risk-acceptance of increased risk when departing from previously agreed-to operational controls,

flight rules, operational plans, or CLDS operational limits.

- iii. Describing how the Mission Management Team will maintain insight into the status of the mission and ensure crew safety.
 - iv. Establishing of authority definitions that clearly state when decision-making authority is delegated to the real-time team and when decisions need approval by the management team.
 - v. Defining when mission authority is delegated to the Orbit Flight Director, the on-console Launch Director, and the on-console Landing and Recovery Director to make any decisions necessary to ensure the safety of the crew, the safety of the vehicle and the success of the mission.
 - vi. Describing the authority and responsibilities for management making informed decisions, for all significant near real-time CLDS operations.
 - vii. Defining responsibility for all significant near real-time management decisions involving the Contractor's Destination and/or Transportation operations (i.e. proceeding with a major on-orbit activity or granting authority to proceed to the next mission phase).
 - viii. Managing Flight Rule violations and approval of Flight Rule modifications.
 - ix. Describing the process for dissents made to a Mission Management Team decision, that includes a control board made up of senior NASA and Commercial Provider that is jointly chaired.
 - x. Managing and coordinating the response to an anomaly, contingency event, or emergency; in accordance with CLDC-117 Mishap Preparedness and Contingency Plan (MPCP).
 - xi. A breakdown of the training plan for the mission management team and critical decision-making roles, that includes, but is not limited to joint simulations with the real-time operations team.
- b. The Contractor shall deliver an Mission Management Team Charter that codifies the Mission Management Process described in bullet (a) above.

Operations Training content can be delivered with the Operations and Training Plan or as a separate delivery under this Data Requirements Document (DRD).

5. Crew and Ground Team Training process that includes:

- a. Systems and utilization training required for crew and ground personnel, including training provided by an outside entity.
 - i. This content includes lesson plans, supplemental materials, facility requirements, and other items necessary to complete training for the CLDS, Crew Transportation System(CTS), and Cargo Transportation System (CaTS).
- b. Integration of NASA training inputs for USG payloads into the Contractor's process.

6. Ground Console Operators and Instructors Training process that includes:

- a. A detailed plan for the development and maintenance of training plans, study materials, and hardware and/or software aids for the ground support teams.
- b. The schedule for personnel training, certification and certification maintenance that will enable execution of mission objectives, including details for joint integrated simulations schedule, training plans, and certification requirements.
- c. Evaluation standards and core competencies demonstrating student mastery and currency of the subject material.

7. Instructor Core Competencies, Training, and Certification process that includes:

- a. Providing, beyond the training development phase, certified training personnel to conduct training lessons and/or simulations.
 - b. Development of ground controller and operations personnel training plans and certification requirements.
 - c. Development of instructor training plans and certification requirements.
 - d. Developing, maintaining, and updating training lessons and materials
 - e. Capabilities to effectively train all personnel on the materials necessary to complete their designated tasks
 - f. Maintaining certification and proficiency records for all other team members
8. Ground Team Training Core Competencies, Content, and Certification process that includes:
- a. Content appropriate for the role being performed
 - b. Any necessary certifications to perform duties such as hazardous chemical handling or commercial driving licenses.
 - c. A defined proficiency/currency requirements and provides training and evaluations to renew certifications periodically.
 - d. Provide for industry standards to fulfill some certifications, if applicable.
 - e. A medical certification standard for all safety-critical and mission critical ground personnel positions and crew.
9. Operations Controller Core Competencies, Training, and Certification process that includes:
- a. Basic systems knowledge to operate and maintain the CLDS.
 - b. Training for all phases of the mission.
 - c. General knowledge of ground systems hardware.
 - d. Proper physical and medical certifications for appropriate personnel, as required.
 - e. Effective communications with other operations personnel through the use of standardized protocol (oral) and console tools (written).
 - f. Communication skills and protocol with USG crew, and external organizations, if applicable.
 - g. A standardized process for the identification and resolution of anomalies and off-nominal events.
 - i. E.g. Failure, Impact, Workaround (FIW) process
 - h. Identification of risks and elevating risks to appropriate leadership when required.
 - i. Ability to identify, comprehend, and project information to establish an understanding of the current state of the CLDS in the real-time environment.
 - j. A personnel certification plan that includes and documents the final certification requirements of personnel.
10. The Contractor shall provide a description of each critical decision-making roles, including purpose and required competencies, and provide training plans for how each role will be selected, trained, evaluated and certified, as defined in Section 3.2.3.1 of CLDP-STD-1150, CLDP Operations Standard
11. Training that enables personnel in critical decision-making roles to:
- a. Understand the position's authority, responsibilities, and chain of command.
 - b. Understand the technical and non-technical response to a loss of crew scenario or major medical incident. Considerations such as medical privacy, public disclosures prior to coordinated public release, preservation of data, etc.

- c. Understand how authority/approval agreements are managed between the Contractor and NASA.
- d. Lead and execute real-time CLDS operations if applicable.
- e. Assume responsibility for the safety of the crew, safety of the Destination/Crew Visiting Vehicle (CVV), and success of the mission, if applicable.
- f. Maintain composure in sudden and unexpected situations where performance could result in loss of life and/or loss of vehicle, if applicable.
- g. Accurately and clearly communicate within the chain of command and all teams in a timely manner during critical activities
- h. Maintain order, enforce Flight Rules and procedures, and take effective actions in challenging and evolving operational environments during all phases of a mission.
- i. Make time-critical, high consequence, risk-based decisions to ultimately ensure crew safety.
- j. Understand the mission control infrastructure sufficiently to be able to recognize and communicate how certain ground-based system failures can impact operations and voice/data communications with the CLD, if applicable.

12. Crew Training process that includes:

- a. Generation of a schedule for Crew training, including for all Prime and Backup crewmembers.
- b. Training the crew to the minimum operational knowledge, procedure proficiency, and skill required to safely operate the CLDS.
- c. Using integrated CLDS systems and procedures training systems to accomplish the nominal planned mission objectives and operational responses expected by the crew.
- d. Familiarization with personal symptoms of exposure to off-nominal critical environmental conditions (ex, elevated Carbon Dioxide (CO₂) exposure, hypoxia exposure).
- e. Specified training on emergency medical hardware and procedures upon arrival to ensure familiarity with the equipment in case of an emergency.
- f. Training to operate the medical system, perform nominal and off-nominal medical procedures, concisely and accurately communicate medical information with ground medical personnel.
- g. Ground operations that, at a minimum, include:
 - i. CLDS crew integration
 - ii. Ground, flight hardware, and flight software handling and processing for crew needs
 - iii. Personnel interactions with the USG Crew during the pre-launch timeframe
 - iv. Crew emergency pad egress
 - v. Crew return operations
 - vi. Mission-unique-specific training, including Simulation training to practice nominal, off-nominal, and emergency mission activities.
- h. Familiarization with rescue operations and training for recovery operations, plans, and equipment, if required.
- i. Emergency procedure exercises for ensuring crew survival in the event of a mishap or contingency throughout the mission.
- j. Familiarization with CLDS flight hardware, equipment, and interfaces that provide crewmembers with the opportunity to:
 - i. Understand any differences between the training mock-ups and flight vehicle
 - ii. Train on any items for which there are no flight-like mock-ups
 - iii. Identify differences between flight procedures and spacecraft CLDS configuration.

- k. Launch countdown simulation where the Crew and launch team interface in a launch dress rehearsal and the sequence of crew operations from suit-up through terminal countdown are evaluated.
 - l. Training on behavioral health and performance including teamwork, resilience, conflict resolution, stress management, expeditionary skills, cultural competencies, response to psychological contingencies.
13. Additional training for Crew Commander as defined in Section 3.2.2.1 of CLDP-STD-1150, CLDP Operations Standards and in accordance with Clause Authority and Responsibilities of the CLDS Commander, Chain-of-Command and Succession On-Orbit; Relationship between Ground and On-Orbit Management.
14. If unique training is required to support CLD objectives, including payload objectives, provide how the Contractor will develop and deliver training materials and provide training to NASA ground personnel, including delivery of presentation material or unique hardware/software necessary for training.

Remarks: None.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

1. DRD Title: Crew Code of Conduct		
2. DRD No.: CLDC-129	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>(Insert contract number)</i>
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Contractor's plan for the Crew Code of Conduct (CCOC) shall include the proposed content for the CCOC and the plan for evaluation of each crew.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: - NASA Contracting Officer (CO) - NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Draft at Proposal; Baseline at Preliminary Design Review (PDR) (if PDR is required) or Final at Critical Design Review (CDR), and updates as necessary thereafter. Submission Frequency: Final at Critical Design Review (CDR). Updates as needed Format: Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment. Interrelationship: - Clause Authority and Responsibilities of the Destination Commander, Chain-Of-Command and Succession On-Orbit; Relationship Between Ground and On-Orbit Management - SOW Section 2.18 Human Health, Medical and Performance - SOW Section 2.20 Crew Selection and Mission Evaluation - SOW Section 2.21 Crew Code of Conduct (CCoC) Applicable Documents: CLDP-STD-1150 Commercial Low-Earth Orbit Development Program Operations Standard Scope: The Crew Code of Conduct (CCOC) establishes a clear chain of command on-orbit; establishes a clear relationship between ground and on-orbit management; establishes a management hierarchy; sets forth standards for work and activities for all pre-flight, on-board, and post-flight activities for the Commercial Low Earth Orbit (LEO) Destination System (CLDS); establishes responsibilities with respect to elements and equipment; sets forth disciplinary regulations; establishes physical and information security guidelines; and defines the Commander's authority and responsibility, on behalf of all crewmembers, to enforce safety procedures, physical and information security procedures and crew rescue procedures. Contents:		

The Contractor shall deliver a CCOC with content as defined in Clause Authority and Responsibilities of the Destination Commander, Chain-Of-Command and Succession On-Orbit; Relationship Between Ground and On-Orbit Management and SOW Section 2.21 Crew Code of Conduct (CCoC) and using the content suggested below to help ensure a safe and harmonious workspace for all crew during pre-flight, onboard, and post-flight activities. The CCOC plan should also include how the Contractor will evaluate compliance with the CCOC for non-USG crew members.

A summary of the type of information to be included in the sections below is included to aid in the development of this document.

- Applicability
 - The length of time pre-flight and post-flight these requirements will apply
- General Standards
 - Responsibilities of the Crew
 - Information on how all crew members behavioral norms including but not limited to, following the chain of command and following company or NASA guidance set forth
 - General Rules of Conduct
 - General behavior rules; mutual respect for one another, protection of the property of the CLDS
 - Use of Position
 - If there are any restrictions on sales, auctions, donations, or other monetary gain from this person noting their activities associated with their participation on the flight, it should be listed here
 - Mementos and Personal Effects
 - Policy that permits crewmembers to carry mementos and personal effects
 - If there are any restrictions on sales, auctions, donations, or other monetary gain from these items, it should be listed here
- Include content from Clause Authority and Responsibilities of the Destination Commander, Chain-of-Command and Succession On-Orbit; Relationship between Ground and On-Orbit Management
- Disciplinary Regulations
 - This section should reference a disciplinary policy that will be enforced based on the violations and note what crewmembers the policy would apply to.
 - This should also include how the CLDS crew will be bound by the CCOC.
- Physical and Information Security Guidelines
 - Include information here about protections to be used for any proprietary data or hardware the crew may see or interact with while on the ground or on-board
 - Include information on the protection of private personal or medical information that could be overheard or seen at any point related to another crewmember.
- Protection of Human Research Subjects
 - This section should provide any stipulations associated with human research being conducted including any medical assessment prior to or following the research, any follow-up that may be required as a result of the research, gathering consent from the subject for the research, and permission to withdraw from the research.
- Difference in Requirements for United States Government (USG) vs. non-US Government crew, if any
 - USG crew will have a separate, more constrained, CCOC to abide upon assignment. The Contractor may choose to supplement the signature for the USG Crew CCOC for this as evidence of acknowledgement.
 - There will be additional guidance the USG crew will abide by, and the Contractor may

choose to list the differences for the non-USG crew awareness.

- Definition of Terms
 - A list of any terms used in the CCOC that may need to be defined
- Other Contractor ideas
 - Anything the Contractor wishes to add.

Remarks: None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document. Contractor to provide 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

1. DRD Title: Crew Selection and Evaluation Plan		
2. DRD No.: CLDC-130	3. Data Type: Type 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>(Insert contract number)</i>
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The plan describes the Contractor's internal crew selection process that incorporates minimum requirements for crew qualifications and criteria. The content also includes the evaluation plan for Crew selection as well as pre- and post-mission evaluation criteria.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: - NASA Contracting Officer (CO) - NASA CLDP Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline at Preliminary Design Review (PDR) (if PDR is required) or Final at Critical Design Review (CDR), and updates as necessary thereafter. Submission Frequency: Final at Critical Design Review (CDR). Updates as needed. DRD should be updated to maintain currency, if there are changes mission-to-mission or if there are changes in standard of care. Format: Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment. Interrelationship: - Clause Authority and Responsibilities of the Destination Commander, Chain-Of-Command and Succession On-Orbit; Relationship Between Ground and On-Orbit Management - Statement Of Work (SOW) Section 2.18 Human Health, Medical and Performance, - SOW 2.20 Crew Selection and Mission Evaluation, - SOW 2.21 Crew Code of Conduct (CCoC) Applicable Documents: - CLDP-STD-1150 Commercial Low-Earth Orbit Development Program Operations Standard - CLDP-PLN-1111 Crew Health Operations Concept (CHOC) - CLDP-STD-1123 Commercial Low-Earth Orbit Development Program Medical Standards and Capabilities. Scope: The contractor's Crew Selection and Mission Evaluation Plan includes the contractor's approach to ensure that crew on CLDS missions meet NASA minimum criteria in accordance with RFP Clause Authority and Responsibilities of the Destination Commander, Chain-of-Command and Succession On-Orbit; Relationship between Ground and On-Orbit Management and SOW Section 2.21 Crew Selection and Mission Evaluation. The contractor may establish additional standards or qualification assessments or		

criteria for mission certification beyond those specified by NASA.

Contents:

The Contractor's crew selection plan shall include the process for crew selection and evaluation of crew mission training and verification of data that includes:

- Selection Criteria:
 - Incorporation of minimum standards per SOW Section 2.20.1 Minimum Standards.
 - List of contractor's medical and behavioral health qualification standards and medical and behavioral health evaluation and testing requirements in accordance with CLDP-1123 Medical Standards and Capabilities Section 3,
 - Identification of additional contractor medical and behavioral assessments and/or standards beyond NASA's specified minimum that will be applied to USG crew.
 - Identification of any contractor medical and behavioral assessments and/or standards that do not meet NASA's specified minimum and corresponding rationale/ proposed alternate standard.
 - Includes post-flight performance and medical evaluation for previously flown non-USG crew, if planned.
 - Description of any additional requirements levied by the Contractor
- Selection Evaluation Process
 - Description of the Contractors process for evaluation of each minimum standard listed in SOW Section 2.20.1 Minimum Standards.
 - Inclusion of additional criteria is provided for the following:
 - Description of contractor's process for evaluation and consideration of Educational and Professional Experience including previous aviation and/or space flight experience.
 - Description of process for evaluation of English language proficiency using the American Council on the Teaching of Foreign Languages (ACTFL) scale.
 - Description of contractor's medical and behavioral health certification process that meets the intent of CLDP-1123 Medical Standards and Capabilities Section 3, including description of processes for psychiatric evaluation, psychodiagnostics assessment, and psychological suitability assessment.
 - Description of process to evaluate and disposition medical risk for each CLD mission in accordance with CLDP-STD-1123, including:
 - Review of data from the full suite of each crewmember's medical and behavioral screening, examinations, and testing.
 - Identification of findings from screening, examinations, and testing that does not meet the established standards.
 - Determination of elevated medical risk for conditions not meeting standards and identification of mitigations to lower the risk to an acceptable level for the mission.
 - Determination that conditions not meeting medical standards can be adequately mitigated to qualify for training and spaceflight duties.
 - Process to evaluate and disposition medical waiver requests.
 - Description of Evaluation authority include a phased approach to crew medical and behavioral health certification process, including but not limited to:
 - Forums and/or boards used to conduct medical certification, including approach to transition from NASA medical board(s) to contractor medical board(s) for risk assessment and disposition.
 - Minimum contractor personnel (including qualifications) required to conduct

- certification process.
 - NASA role in medical certification process for NASA missions, including scope of veto authority.
 - Decision making hierarchy during medical certification process.
 - Medical certification timeline, certification currency period and re-certification timeline that ensures crew are certified no later than L-12 months and prior to hazardous training on site at NASA facilities and remain certified through duration of flight.
 - Description of process to re-certify crew after any changes in crew health status that arise after crew medical certification and that are in violation of medical selection standards and/or pose an elevated risk to USG crew or to the NASA mission.
- Description of the process, format, content, and schedule for data sharing between contractor and NASA to support medical and behavioral health evaluation.
- Mission Evaluation Process
 - Description of the pre-flight crew mission evaluation process and format to include the following:
 - Description noting all required training is complete. If any training is outstanding, identify completion date.
 - Medical and behavioral assessment data included for evaluation purposes
 - Confirmation of English language proficiency using the American Council on the Teaching of Foreign Languages (ACTFL) scale at Intermediate to High for safety purposes.
 - Description of any additional requirements levied by the Contractor required to support the mission and completion status.
 - Description of the post-flight crew evaluation process.

Remarks: Reference information on NASA's approach to astronaut medical standards and certification can be found in Office of Chief Health and Medical Office (OCHMO)-STD-100.1A NASA Astronaut Medical Standards, Selection and Annual Recertification, and OCHMO-TB-034 Crew Selection and Recertification Technical Brief.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated and 2) Redlined version showing the updates made since the last submittal.

1. DRD Title: Pre-Launch and Post-Landing Operations		
2. DRD No.: CLDC-131	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Contractor will describe their plan to support pre-launch and post-landing operational processes and facilities. The content below could be broken out into multiple deliveries or a single delivery, based on Contractor preference. The products generated from the processes delivered in this Data Requirements Description (DRD) may be considered competition sensitive data. Because of this, the Contractor's Transportation Provider (Crew Visiting Vehicle (CVV) and Cargo Visiting Vehicle (CaVV)) is allowed, with the Contractor's concurrence, to transmit this deliverable, or portions of this deliverable, directly to NASA electronically. Should this occur, the Contractor's transportation Provider shall notify the Contractor that such delivery has been made to NASA. The Contractor is still responsible for the timeliness and delivery of the entire DRD to the Government 11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Applicability: • The following <i>ARE NOT</i> required if NASA provides Transportation Government Furnished Services (GFS): • (1.a) Transportation of the Crew to the launch site • (1.e) Pre-Launch Closeout Crew • (1.f) Pre-Launch Crew Security • (1.g) Pre-Launch Emergency Triage Site Operations and Emergency/EMS Command and Control • (2.g) Post-Landing Crew Safety • (2.h) Post-Landing Crew Nominal Medical Care • (2.i) Contingency Medical Evacuation Initial Submission: Baseline at Critical Design Review (CDR). Submission Frequency: Final due at Mission Integration Review (MIR) for first crewed flight. Updates as required. Format: Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment. Interrelationship:		

- Statement Of Work (SOW) 2.12 NASA Operational Support/Access to Partner Facilities, Control Centers and Transportation/Access to Tools,
- SOW 2.17 Transportation

Applicable Documents:

- CLDP-STD-1150 Commercial Low-Earth Orbit Development Program Operations Standards
- CLDP-REQ-1130 Requirements and Standards for Commercial LEO Development Program (CLDP)
- CLDP-PLN-2110 Mission Integration Plan (MIP)
- CLDP-STD-1123 Medical Standards and Capabilities

Scope: Pre-launch and post-landing operations address all activities related to Crew operations immediately prior to and following launch and landing operations.

Contents:

1. Pre-Launch Operations

The Contractor shall describe their Crew Transportation Launch Site Operations plan, including roles and responsibilities, to prepare the crew, cargo and CTS for launch while maintaining pre-launch Human Stabilization Protocol (HSP)/quarantine as required that includes the following:

- Pre-launch logistics including transportation of the crew and NASA and CLD support personnel to the launch site in accordance with Section 3.3.5.1.1 of CLDP-STD-1150, CLDP Operations Standards.
- Crew quarters for the crew to live until launch in accordance with Section 3.3.5.1.2 of CLDP-STD-1150, CLDP Operations Standards
- Crew suit up room operations in accordance with Section 3.3.5.1.3 of CLDP-STD-1150, CLDP Operations Standards
- Dry dress rehearsal with suited crew operations
- Pre-launch closeout crew operations in accordance with Section 3.3.5.1.4 of CLDP-STD-1150, CLDP Operations Standards
- Pre-Launch security operations in accordance with Section 3.3.5.1.5 of CLDP-STD-1150, CLDP Operations Standards.
- Emergency operations including pad egress, pad abort, triage operations and EMS coordination in accordance with Sections 3.3.5.1.6, 3.3.5.1.7, and 3.3.5.1.8 of CLDP-STD-1150, CLDP Operations Standards.
- Pre-launch cargo and utilization processing and preparation for launch operations
- Pre-launch readiness review
- Description of launch site personnel, facilities and roles in support of pre-launch operations
- Pre-launch communications
- Scrub turn around operations

2. Post-Landing Operations

The Contractor shall describe their Crew Transportation Landing Site Operations plan, including roles and responsibilities, to safely secure and transport the crew, cargo and CTS after landing that includes the following:

- Landing site identification
- Landing site selection process including weather briefings and mission management team assessment plan
- Landing site preparation and equipment logistics
- Landing and recovery team composition and logistics (inclusive of NASA Landing and Recovery Team (LRT)), including transportation of USG personnel supporting recovery in accordance with

Section 3.3.5.2.3 of CLDP-STD-1150, CLDP Operations Standards.

- e. Landing and recovery simulations, rehearsals, and training
 - f. Crew and cargo recovery, transportation, and turnover
 - g. Post-Landing security operations in accordance with Section 3.3.5.2.1 of CLDP-STD-1150, CLDP Operations Standards.
 - h. Post-Landing Crew Nominal Medical Care in accordance with Section 3.3.5.2.2 of CLDP-STD-1150, CLDP Operations Standards.
 - i. Off-nominal medical operations including DMCF identification and transportation plan and support Contingency Medical Evacuation in accordance with Sections 3.3.5.2.4 and 3.3.5.4 of CLDP-STD-1150, CLDP Operations Standards.
 - j. CVV and CaVV post-landing handling, processing, and transportation
 - k. Contingency landing and rescue operations
 - l. External agency coordination
 - m. Post-Landing communications
 - n. Waive off operations
3. Support Crew Rescue after Emergency Landing
The Contractor shall describe their plan to Support Crew Rescue after Emergency Landing in accordance with Section 3.3.5.3 of CLDP-STD-1150, CLDP Operations Standards.

Remarks None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

1. DRD Title: Vehicle Interface Definition Document (IDD)		
2. DRD No.: CLDC-132	3. Data Type: 3	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The purpose of this document is to describe the capabilities and constraints of the Destination, the Crew Visiting Vehicle(s) (CVV), and the Cargo Visiting Vehicle(s) as they pertain to interfaces with crewmembers and cargo items. This document is intended for crew member familiarization as well as cargo provider compatibility assessments. For the purpose of this deliverable, “cargo” herein refers to cargo, utilization (payloads), and supplies. As this Data Requirements Description (DRD) applies to the Destination, CVV(s), and CaVV(s), it is broken into multiple DRD sections with different scope, applicability, and unique submittal frequencies. The DRD sections are as follows: DRD CLDC-132.1: Destination Vehicle Interface Definition Document (IDD) DRD CLDC-132.2: Crew Visiting Vehicle (CVV) Interface Definition Documents (CVV IDD) DRD CLDC-132.3: Cargo Visiting Vehicle (CaVV) Interface Definition Documents (CaVV IDD) Due to the potential transmission of competition sensitive data in this deliverable, the Contractor’s Transportation Provider (CVV and CaVV) is allowed, with the Contractor’s concurrence, to transmit this deliverable, or portions of this deliverable, directly to NASA electronically. Should this occur, the Contractor’s Transportation Provider shall notify the Contractor that such delivery has been made to NASA. The Contractor is still responsible for the timeliness and delivery of the entire DRD to the Government. 11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR		
<u>DRD CLDC-132.1: Destination Vehicle Interface Definition Document (IDD)</u> Initial Submission: Baseline at Critical Design Review (CDR) Submission Frequency: Final at Design Certification Review (DCR) Format: The Contractor’s format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment Interrelationship: Statement Of Work (SOW) 2.14 Mission Integration		

Applicable Documents: CLD-PLN-2000 Commercial Low-Earth Orbit Destination System Certification Plan

Scope: The Destination Vehicle Interface Definition Document (IDD) describes all crew and cargo physical, functional, and interface designs and environments for the Destination. The IDD provides descriptive text and diagrams to describe spacecraft internal, external, and GFE interfaces for individual Destination elements.

Contents: The Destination Vehicle IDD includes crew interfaces and accommodations, pressurized and unpressurized cargo interfaces, mass and volume limits, and accommodations, electrical and mechanical interface, command and data interface, any destination element constraints, and destination environments. Environments includes, but is not limited to: microgravity loads, docking loads, random vibration loads, acoustic loads, thermal loads, pressure loads, shock, atmospheric gas concentration, allowable gas release, relative humidity, radiation, electromagnetic, and any further environment constraints deemed necessary. Environments are defined as the maximum environments that crew or cargo may be exposed to during all phases of operation.

Remarks: None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

DRD CLDC-132.2: Crew Visiting Vehicle (CVV) Interface Definition Documents (IDD)

Applicability:

- This DRD is *NOT* required if NASA provides Transportation Government Furnished Services (GFS), as NASA will already receive the VIDD through existing contract mechanisms.

Initial Submission: Baseline due at Vehicle Baseline Review (VBR)

Submission Frequency: Final due at Mission Integration Review (MIR)

Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment

Interrelationship: SOW 2.14 Mission Integration

Applicable Documents: CLD-PLN-2110 Mission Integration Plan (MIP)

Scope: The Crew Visiting Vehicle (CVV) Interface Definition Document (IDD) describes all crew and cargo physical, functional, and interface designs and environments for the Crew Visiting Vehicle (CVV). The IDD provides descriptive text and diagrams to describe spacecraft internal, external, and GFE interfaces.

Contents: The IDD includes allowable crew and cargo mass properties, mechanical interfaces (i.e., mount, ducting), electrical interface, data interface (including command capability), handling, any spacecraft specific constraint, and spacecraft environments. Environments includes, but is not limited to: quasi-static load, low frequency loads, random vibration loads, acoustic loads, thermal loads, pressure loads, shock, atmospheric gas concentration, allowable gas release, relative humidity, radiation, electromagnetic, and any other environment constraints deemed necessary. Environments shall be defined as the maximum environments that cargo may be exposed to during ground processing, launch, on-orbit, reentry, and recovery.

The IDD shall provide an instrumentation plan including translation of data from flight instrumentation to the crew and cargo interface of interest. The plan shall include location and type of sensors, sampling rate, and downlink method and bandwidth for each mission phase. Launch and landing load factors and rotational accelerations shall be provided in the following reference frame:

$$\begin{aligned} &N_x(g), N_y(g), N_z(g), \\ &R_x(\text{rad/sec}^2), R_y(\text{rad/sec}^2), R_z(\text{rad/sec}^2) \end{aligned}$$

X: The longitudinal axis of the spacecraft. Positive x axis extends from the base or bottom of the spacecraft to the nose of the cargo spacecraft.

Y: Y axis is perpendicular to the x axis.

Z: Z axis is perpendicular to the x and y axes and completes the right-handed coordinate system.

Random vibration environments shall be provided in each axis from 20-2000 Hz at the crew and cargo interface to the spacecraft. The overall grms (root mean square acceleration) values shall be reported. The duration of the excitation shall be reported.

Acoustic environments shall be provided 1/3-octave band format, starting from a 31.5 Hz center frequency and extending to a 2500 Hz center frequency, at the cargo/payload interface. The overall acoustic environment shall also be provided. A reference sound pressure level of $2 \times 10^{-5} \text{ N/m}^2$ shall be used to report the acoustic environment in terms of decibels.

Shock environments shall be provided from 10-10000 Hz at the cargo/payload interface. The response shall be reported in units of peak acceleration.

Load spectrums shall be provided which cover the expected loading events for one flight (launch, free-flight, berthing) at the cargo interface. The spectrum shall be divided by a minimum of 10% amplitude tiers.

Pressure and thermal environments for crew and cargo interfaces in the orbital spacecraft shall be provided.

Remarks: None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

DRD CLDC-132.3: Cargo Visiting Vehicle (CaVV) Interface Definition Documents (IDD)

Applicability:

- This DRD is *NOT* required if NASA provides Transportation Government Furnished Services (GFS), as NASA will already receive the VIDD through existing contract mechanisms.

Initial Submission: Baseline due at VBR

Submission Frequency: Final due at MIR

Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment

Interrelationship: SOW 2.14 Mission Integration**Applicable Documents:** CLD-PLN-2110 Mission Integration Plan

Scope: The IDD describes all crew and cargo physical, functional, and interface designs and environments for the CaVV. The IDD provides descriptive text and diagrams to describe spacecraft internal, external, and GFE interfaces.

Contents: The environments shall include low frequency loads, random vibration loads, acoustic loads, thermal loads, pressure loads, and shock. Environments shall be reported at the cargo/payload interface with the visiting vehicle. The Contractor shall specify any vehicle constraints.

The Contractor shall provide an instrumentation plan for translation from flight instrumentation to the cargo interface of interest. The plan shall include location and type of sensors, sampling rate, and downlink method and bandwidth for each mission phase and for all cargo environments.

Launch and landing load factors and rotational accelerations shall be provided in the following reference frame:

$$N_x(g), N_y(g), N_z(g), \\ R_x(\text{rad/sec}^2), R_y(\text{rad/sec}^2), R_z(\text{rad/sec}^2)$$

X: The longitudinal axis of the vehicle. Positive x axis extends from the base or bottom of the cargo vehicle to the nose of the cargo vehicle

Y: Y axis is perpendicular to the x axis.

Z: Z axis is perpendicular to the x and y axes and completes the right-handed coordinate system

Random vibration environments shall be provided in each axis from 20-2000 Hz at the cargo/payload interface to the visiting vehicle. The overall grms values shall be reported. The duration of the excitation shall be reported.

Acoustic environments shall be provided 1/3-octave band format, starting from a 31.5 Hz center frequency and extending to a 2500 Hz center frequency, at the cargo/payload interface. The overall acoustic environment shall also be provided. A reference sound pressure level of $2 \times 10^5 \text{ N/m}^2$ shall be used to report the acoustic environment in terms of decibels.

Shock environments shall be provided from 10-10000 Hz at the cargo/payload interface. The response shall be reported in units of peak acceleration.

Load spectrums shall be provided which cover the expected loading events for one flight (launch, free-flight, berthing/docking) at the cargo/payload interface. The spectrum shall be divided by a minimum of 10% amplitude tiers.

Pressure and thermal environments shall be provided for pressurized cargo interfaces in the visiting vehicle

Unpressurized Payload CaVV IDD Content:

Should the Contractor offer unpressurized payload capability, the Vehicle Interface Definition Document (VIDD) defines the unpressurized Payload Random vibration environments, Acoustic environments, Shock environments, Load spectrums, Pressure and thermal environments, Electrical Power and Data, allowable

mass, allowable volume, and allowable center of gravity.

Remarks:. None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

1. DRD Title: Integrated Maintenance and Logistics Support		
2. DRD No.: CLDC-133	3. Data Type: 1, 3	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021		6. Contract No.: <i>(Insert contract number)</i>
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☒
10. Description/Use: The Integrated Maintenance and Logistics Support Plan (IMLSP) provides insight into the Contractor's approach to integrated logistics support throughout the Destination lifecycle and helps ensure maintainability is accounted for in vehicle design. Integrated Maintenance and Logistics Support Data documents the results of the maintenance and logistic analysis performed to support the total logistics support resources necessary for the maintenance and supportability of the Destination over the operational lifecycle. This Data Requirements Description (DRD) is broken into multiple DRD sections with different scope, contents, and unique submittal frequencies. The DRD sections are as follows: CLDC-133.1: IMLS Plan (Type 1) CLDC-133.2: IMLS Data (Type 3) 11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR		
CLDC-133.1: IMLS Plan (Type 1) Initial Submission: Baseline at CBR Submission Frequency: Final at Preliminary Design Review (PDR) (if required) or Critical Design Review (CDR) (whichever occurs earlier). Updates for currency as necessary. Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment. Interrelationship: • Statement Of Work (SOW) Section 2.11.8 Integrated Maintenance and Logistics Support Applicable Documents: None Scope: The Integrated Maintenance and Logistics Support Plan (IMLSP) describes how the Contractor will conduct integrated maintenance and logistics support. The IMLSP documents priorities and develops cross-cutting initiative for ensuring consistent implementation of programmatic logistics support and maximizing supportability, commonality, and affordability across the Destination. IMLSP activities integrate and analyze flight components and ground equipment logistics data for hardware maintenance and		

supportability planning.

The maintenance and logistics support data addresses the supportability design characteristics (reliability, maintainability, testability and standardization/commonality) of the system design, and the total support resources required for nominal and off-nominal maintenance and supportability of the system over its operational life.

Contents:

1. The Integrated Maintenance and Logistic Support Plan (IMLSP) documents priorities, responsibilities, and develops cross-cutting initiatives for ensuring consistent implementation of programmatic logistics support and maximizing supportability, commonality, and affordability.

The Plan includes a description of the Contractor's approach (including process, format, content, data rights, and schedule) to:

- a. Providing NASA access to detailed IMLS data, predictions, results, and reports generated in accordance with this plan.
- b. Delivering a summary of the IMLS tracking, trending, analysis, and results performed over the lifecycle of the contract.

It includes the following elements:

- a. **Design Interface/Influence:** Defines how the Contractor will work to impact system design to be supportable and sustainable; to include supportability management and interface with other disciplines, such as reliability, maintainability, fault management, and design engineering. Disposal planning (i.e. hazardous items, hazardous materials and fluids, and end of life of hardware items) is also considered.
- b. **Sustaining Engineering:** Defines considerations for anticipated support difficulties, continuous product improvement, design change assessment, service life extension, and compliance with GIDEP, obsolescence/diminishing manufacturing and material shortage (DMSMS) planning.
- c. **Supply Support:** Defines the supply support integration strategy including provisioning, predictive/prioritized sparing plan (taking into account the time required for procurement, build timing, life of the spares, and positioning (on-ground/on-orbit) based on sparing calculations), and catalog planning for nationally stock listed items for alignment and integration with Federal Logistics Information Systems.
- d. **Maintenance Planning & Management:** Defines the maintenance concept and planning considerations operations. This could include the analyses to be accomplished, the design constraints, the concept for support (human and/or robotic), criteria for selecting maintenance items, criteria for level of the maintenance item (Orbital Replacement Unit vs. small part), and the plan for implementation.
- e. **Packaging, Handling, Storage and Transportation (PHS&T) Planning & Management:** Defines the planning and analyses to be accomplished to determine the PHS&T requirements and documentation
- f. **Technical Data:** Defines the technical data management processes, alignment with configuration management and logistics product databases, risks associated with access to and availability of engineering drawings, data requirements, logistics product data associated with each IPS Element for interest items, and intellectual property (data rights).
- g. **Support Equipment:** Defines the approach to identify support and test equipment required to support maintenance items, support and test equipment required during storage and transportation of the item, and PSA activities that will be performed against peculiar/unique support equipment to ensure supportability of the item separately from the operational system.

- h. **Training & Training Support:** Defines the approach to integrate training needs analysis as part of the support concept for maintenance tasks requiring specialty skills, peculiar tools, critical performance, and hazardous procedures. Identify the need for training devices or mockups required to support the maintenance concept and planning.
- i. **Manpower & Personnel:** Defines the approach to identify number of personnel and skill level requirements to perform maintenance and support related tasks. (Maintenance Task Analysis and Human Performance/Task Analysis are separate but inherently related processes and should be addressed as part of an integrated analysis to develop both task time and crew time estimates.)
- j. **Outfitting, Initial Installation, and Checkout:** Defines the approach to address outfitting, initial installation, and checkout of equipment to be performed. These considerations include item list, task analysis with associated data, assembly drawings, tools, materials, consumables, crew time estimates, training, and step by step instructions.
- k. **Supportability:** Defines the approach to supportability quantitative and qualitative activities at the system level to ensure their Destination will operate satisfactorily at a given point in time when used under stated conditions in the operational environment and will not have any failure which cannot, through maintainability, be restored to operational service within a permissible time constraint.

Remarks: CLDP-PLN-3115, Commercial Low-Earth Orbit Development Program Reliability, Maintainability, Logistics, and Supportability Management Plan Development Guide is available for reference in developing an IMLSP.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document. The contractor to provide 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

CLDC-133.2: IMLS Data (Type 3)

Initial Submission: Baseline at Preliminary Design Review (PDR) (if required) or Final at Critical Design Review (CDR) (whichever occurs earlier).

Submission Frequency: Final at Critical Design Review (CDR). Updates for currency as necessary.

Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment.

Interrelationship:

- Statement Of Work (SOW) Section 2.11.8 Integrated Maintenance and Logistics Support

Applicable Documents: None

Scope: The maintenance and logistics support data addresses the supportability design characteristics (reliability, maintainability, testability and standardization/commonality) of the system design, and the total support resources required for nominal and off-nominal maintenance and supportability of the system over its operational life.

Contents: Integrated Maintenance and Logistics Support Data includes:

1. Maintenance Item List

- a. Defines MIs that will require corrective or preventive maintenance during the life of the system.

2. Non-Maintainable Item List

- a. Defines non-maintainable critical items and other items identified as most likely to fail but do not meet criteria for MI selection.
- b. Identifies if item is a candidate for contingency maintenance.

3. Maintenance Task Analysis Data

- a. Defines the supportability requirements necessary to perform preventive or corrective maintenance for each MI

4. Supply Support & Provisioning Data, including:

- a. Maintenance Consumables List, Tools List, Test and Support equipment List, Production Lead Time List, Long Lead Time Item List, Spares and Repair Parts List.
- b. Non-maintainable critical item supplier procurement strategy

Remarks: None.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

1. DRD Title: Mission Integration and Operations Management Plan		
2. DRD No.: CLDC-201	3. Data Type: 2	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Mission Integration and Operations Management Plan (MIOMP) describes the Contractor's current processes, product delivery templates, and organizational interfaces necessary for the Contractor to incorporate the NASA inputs and objectives into the Contractor's increment plan. This Data Requirements Description (DRD) applies to the Destination and transportation systems and is broken into multiple DRD sections with different scope, applicability, and unique submittal frequencies. The DRD sections are as follows: DRD CLDC-201.1: Destination Mission Integration Management Plan (MIMP) DRD CLDC-201.2: Crew Transportation System Mission Integration and Operations Management Plan DRD CLDC-201.3: Cargo Transportation System Mission Integration and Operations Management Plan Due to the potential transmission of competition sensitive data in this deliverable, the Contractor's Transportation Provider (CVV and CaVV) is allowed, with the Contractor's concurrence, to transmit this deliverable, or portions of this deliverable, directly to NASA electronically. Should this occur, the Contractor's Transportation Provider shall notify the Contractor that such delivery has been made to NASA. The Contractor is still responsible for the timeliness and delivery of the entire DRD to the Government. The document shall contain integrated text and graphics as required to describe and/or illustrate the various aspects of services provided, including process descriptions, schedule flows, facility and tool illustrations, organizational hierarchies, and any other information deemed necessary to accurately convey to the NASA the Contractor's operational processes. For the purposes of this deliverable, "cargo" herein refers to cargo, payloads, and supplies. 11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: - NASA Contracting Officer (CO) - NASA CDO Contracting Officer Representative (COR) and Alternate COR		
DRD CLDC-201.1: Destination Mission Integration Management Plan (MIMP) Initial Submission: Baseline at Critical Design Review (CDR) Submission Frequency: Final at Mission Integration Review (MIR), updates as required Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at		

the beginning of this attachment.

Interrelationship: Statement Of Work (SOW) 2.0, 3.0 and all subsections

Applicable Documents:

- CLD-PLN-2110 Mission Integration Plan (MIP)
- CLDP-PLN-3017 Utilization Implementation Plan (UIP)
- CLDP-STD-1150 CLDP Operations Standards

Scope:

The destination MIMP describes the Contractor's processing facilities, processes, plans, schedules, product delivery templates, review milestones, working groups, forums, boards, organizational interfaces, decision authority, and governance models necessary for the Contractor to interface with NASA and execute an end-to-end mission.

Contents:

1. Strategic and Tactical Traffic Planning:

The Contractor shall define the process to evaluate and develop a strategic and tactical Destination traffic plan. This includes identifying visiting vehicle and element launch dates, traffic model groundrules, dependencies, constraints, crewmembers, manifest upmass and downmass requirements, key stakeholders, and sources of traffic planning information. The Contractor shall define the process to approve, publish, and publicly release the Destination traffic plan, including the necessary coordination between the contractor, NASA, and all other customers.

2. Mission Integration Processes:

The Contractor shall define the processes for interfacing with NASA and other customers to:

- a. Exchange inputs to and receive data deliveries from the Contractor for all mission integration and operations tools and products such as the manifest, increment objectives, priorities, procedures, timelines, constraints, and console tools for all phases of the mission.
- b. Mature the end-to-end increment plan from a strategic plan at the Mission Baseline Review to a detailed and executable tactical plan. This includes identifying hardware or software constraints, prerequisites, critical paths, dependencies, and interrelationships that affect the mission.
- c. Define the process, milestones, timeline, and criteria for evaluating the destination flight readiness to receive a visiting vehicle, crewmembers, or a new element prior to the launch.
- d. Integrate, manage, and approve mission objectives, priorities, constraints, and conflict resolution during pre-flight, near real-time, and real-time operations. This includes defining the integration tools, roles and responsibilities, and interfaces associated with NASA personnel and other customers.
- e. Reconcile the baseline mission plan with the as-flown mission
- f. Capture, track, and implement lessons learned and corrective actions into future missions

3. Management of on-orbit Destination capabilities:

The Contractor shall define:

- a. The destination topology by location code including, systems (including emergency equipment), payload facilities (including payload power sources), standard and non-standard stowage locations, and crew accommodations
- b. An inventory and stowage management plan for how the Contractor will update, manage, track, audit, and report on-orbit stowage, as well as provide stowage procedures to the on-orbit crew.
- c. A consumable management plan for how the Contractor will update, manage, track, audit, and report consumables including but not limited to oxygen, nitrogen, water, food, medical supplies,

hygiene supplies and equipment, propellant, power, waste system consumables, payload facility consumables, and custom fit crew equipment (e.g. EVA suits, visiting vehicle flight suits, custom fitted seats, etc.)

- d. A spares management plan for on-orbit safety critical destination systems (i.e life support, emergency response)
- e. An altitude management plan that accounts for solar cycle, beta angle, visiting vehicle altitude capabilities, visiting vehicle traffic models, destination reboost capabilities, debris models, and both planned and unplanned debris avoidance maneuvers.
- f. A crew-time management plan that describes the overall strategic and tactical schedule development, crew-time approval process, change management process, task prioritization, reporting of completed activities, and rescheduling of incomplete tasks.

Remarks: None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

DRD CLDC-201.2: Crew Transportation System Mission Integration and Operations Management Plan

Applicability:

- This DRD is *NOT* required if NASA provides Transportation Government Furnished Services (GFS), as NASA will already receive the VIDD through existing contract mechanisms.

Initial Submission: Baseline at Critical Design Review (CDR)

Submission Frequency: Final at Mission Integration Review (MIR), updates as required

Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment

Interrelationship: SOW 2.0, 3.0 and all subsections

Applicable Documents:

- CLDP-REQ-1130 Requirement and Standards for the Commercial Low-Earth Orbit Development Program
- CLDP-PLN-2110 Mission Integration Plan (MIP)
- CLDP-PLN-3017 Utilization Implementation Plan (UIP)
- CLDP-STD-1150 CLDP Operations Standards

Scope:

The Crew Transportation Mission Integration and Operations Management Plan describes the Contractor's current processes, product delivery templates, and organizational interfaces necessary for the Contractor to execute all mission integration functions for a Crew Transportation System (CTS) mission to a destination. The document shall contain integrated text and graphics, as required, to describe and/or illustrate the various aspects of services provided, including process descriptions, schedule flows, facility and tool illustrations, and organizational hierarchies.

Contents:

The following information shall be included under the corresponding principal function material:

1. Crew Transportation System Mission Integration and Analysis Support:
The Contractor shall provide a functional breakdown and description of how it interfaces with NASA to:
 - a. Ensure the timely provision of data and documentation required in support of crew transportation mission integration.
 - b. Incrementally mature the mission design (launch window, planned mission profile, back-up opportunities) and flight readiness.
 - c. Provide the necessary data for NASA to determine pre-mission status and flight readiness including personnel training and certification, ground accommodation interfaces and service agreements.
 - d. Define the crew and cargo processes, procedures, timelines, and constraints, for crew and cargo through handover for pre-launch and post-landing. This includes roles and responsibilities and interfaces associated with NASA personnel, operators, crew, ground support equipment, flight support equipment, cargo, and facilities.
 - e. Define the Governance Model and real-time decision authority as partnered with NASA
2. Crew Transportation System Mission Operations Documentation:
The Contractor shall provide a functional breakdown and description of how the Contractor manages the collection, preparation, and execution of integrated increment requirements, joint operations products, and utilization products in conjunction with NASA.
3. Crew Transportation System Operations Training:
The Contractor shall provide a functional breakdown and description of how it manages the training for flight crews, operators, and instructors. This includes the approach to:
 - a. Development and maintenance of training plans, study materials, and hardware and software aids
 - b. Development of training requirements and schedules including personnel certification and certification maintenance
 - c. Development and utilization of training mockups.
4. Crew Transportation System Ground Facilities:
The Contractor shall provide a functional breakdown and description of how it allocates facilities to be utilized during all phases of the crew transportation mission including pre-launch preparation, in flight mission execution, Crew and payload sample return, and post flight recovery.
5. Data Management:
The Contractor shall provide a functional breakdown and description of how it manages commands and data. This includes: the approach to development of data requirements (including requirements for data processing, storage, and distribution); coordination of the methods by which this data is integrated into the standard destination communication and data services; establishment of interfaces with NASA and non-NASA components of the air-to-ground communications network; and coordination of the Contractor's data management plan with NASA.
6. Simulations and Mission Operations Support:
The Contractor shall provide a functional breakdown and description of how it manages support from the contractor's control center during all phases of the CTS mission. The contractor shall describe how the real-time operations control team interfaces with the NASA personnel, processes, and facilities during all joint integrated simulations and real-time crew transportation mission operations.
7. Cargo Capabilities:
The Contractor shall define the CTS cargo capabilities as specified in CLDP-REQ-1130, including:

- a. Standard cargo turnover schedule and location for pressurized cargo,
- b. Late stow pressurized cargo capacity and turnover schedule and location,
- c. Powered cargo capacity and turnover schedule and location,
- d. Return/disposal cargo capacity and turnover schedule,
- e. Launch and scrub turnaround capability and schedule,
- f. Early handover cargo capacity and return location and schedule,
- g. Schedule flexibility in the following table:

Crew Transportation System Cargo Capabilities			
Cargo Type	Maximum Mass (Kg)	Maximum Volume (m³)	Turnover Schedule
Standard Stow	TBP	TBP	L-TBP
Late Stow	TBP	TBP	L-TBP
Powered Cargo	TBP	TBP	L-TBP
Early Access	TBP	TBP	Docking+TBP
Return/Disposal Stow	TBP	TBP	Undocking-TBP
Standard Internal Destow	TBP	TBP	Landing+TBP
Early Destow	TBP	TBP	Landing+TBP

TBP: To be Proposed

L-: Launch minus

8. For Cargo Manifesting and Integration Support:

The Contractor shall provide a functional breakdown and description of how it works with NASA and cargo hardware developers to establish a mission manifest within the capability of the spacecraft and based on the crew complement. The processes shall include: the collection and documentation of pertinent technical and operational data; establish mission manifests and execution; and physically integrate cargo into and out of the pressurized volume of the orbital spacecraft.

9. Launch and Landing Processing:

The Contractor shall provide a functional breakdown and description of the processes and schedule for ground processing of crew and cargo at the launch site, the landing site, and return facilities. This section shall include service and facility capabilities, ground safety processes, cargo and crew integration from handover to launch and from return to handover back to NASA, cabin atmosphere environmental control, vehicle battery state of charge and health monitoring (including launch scrub turn around conditions), accommodation of all NASA and provider personnel (e.g., NASA flight surgeons) and equipment, and processing schedules.

Remarks: None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

DRD CLDC-201.3: Cargo Transportation System Mission Integration and Operations Management Plan

Applicability:

- This DRD is *NOT* required if NASA provides Transportation Government Furnished Services (GFS), as NASA will already receive the VIDD through existing contract mechanisms.

Initial Submission: Baseline at Critical Design Review (CDR)

Submission Frequency: Final at Mission Integration Review (MIR), updates as required

Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment

Interrelationship: SOW 2.0, 3.0 and all subsections

Applicable Documents:

- CLDP-REQ-1130 Requirement and Standards for the Commercial Low-Earth Orbit Development Program
- CLDP-PLN-2110 Mission Integration Plan (MIP)
- CLDP-PLN-3017 Utilization Implementation Plan (UIP)
- CLDP-STD-1150 CLDP Operations Standards

Scope:

The Cargo Transportation System Mission Integration and Operations Management Plan describes the Contractor's current processes, product delivery templates, and organizational interfaces necessary for the Contractor to execute all mission integration functions for a Cargo Transportation System (CaTS) mission. The document shall contain integrated text and graphics, as required, to describe and/or illustrate the various aspects of services provided, including process descriptions, schedule flows, facility and tool illustrations, and organizational hierarchies.

Contents:

The following information shall be included under the corresponding principal function material:

1. Cargo Transportation System Mission Integration and Analysis Support:
The Contractor shall provide a description of how it interfaces with NASA to:
 - a. Ensure the timely provision of data and documentation required in support of CaTS mission integration.
 - b. Incrementally mature the mission design (launch window, planned mission profile, back-up opportunities) and flight readiness.
 - c. Provide the necessary data for NASA to determine pre-mission status and flight readiness including personnel training and certification, ground accommodation interfaces and service agreements.
 - d. Define the cargo processes, procedures, timelines, and constraints, for cargo transportation missions. This includes roles and responsibilities and interfaces associated with ground personnel, operators, crew, ground support equipment, flight support equipment, cargo, and facilities.
 - e. Define the Governance Model and real-time decision authority as partnered with NASA
2. Cargo Transportation System Mission Operations Documentation:
The Contractor shall provide a functional breakdown and description of how the Contractor manages the preparation and execution operations products in conjunction with NASA.
3. Cargo Transportation System Operations Training:
The Contractor shall provide a functional breakdown and description of how it manages the training for the CaTS for the USG flight crews, contractor operators, and instructors, if applicable. This includes the approach to (1) development and maintenance of training plans, study materials, and

hardware and software aids; (2) development of training requirements and schedules including personnel certification and certification maintenance; (3) development and utilization of training mockups.

4. Cargo Transportation System Ground Facilities:

The Contractor shall provide a functional breakdown and description of how it allocates facilities to be utilized during all phases of the cargo transportation mission including pre-launch preparation, in flight mission execution, Payload Sample Return, and post flight recovery.

5. Simulations and Mission Operations Support:

The Contractor shall provide a functional breakdown and description of how it manages CaTS support from the contractor's control center during all phases of the Transportation mission. The contractor shall describe how the real-time operations control team interfaces with the NASA personnel, processes, and facilities during simulations and real-time transportation mission execution.

6. Cargo Capabilities:

The Contractor shall define the CaTS cargo capabilities as specified in CLDP-REQ-1130, including:

- Standard cargo turnover schedule and location for pressurized cargo,
- Late stow pressurized cargo capacity and turnover schedule and location,
- Powered cargo capacity and turnover schedule and location,
- Return/disposal cargo capacity and turnover schedule,
- Launch and scrub turnaround capability and schedule,
- Early handover cargo capacity and return location and schedule,
- and schedule flexibility in the following table:

Cargo Transportation System Cargo Capabilities

Cargo Type	Maximum Mass (Kg)	Maximum Volume (m ³)	Turnover Schedule
Standard Stow	TBP	TBP	L-TBP
Late Stow	TBP	TBP	L-TBP
Powered Cargo	TBP	TBP	L-TBP
Early Access	TBP	TBP	Docking+TBP
Return/Disposal Stow	TBP	TBP	Undocking-TBP
Standard Internal Destow	TBP	TBP	Landing+TBP
Early Destow	TBP	TBP	Landing+TBP

TBP: To be Proposed

L-: Launch minus

7. Launch and Landing Processing:

The Contractor shall provide a functional breakdown and description of the processes and schedule for ground processing of NASA cargo at the launch site, the landing site, and return processing facilities. This section shall include available facility services, ground safety processes, cargo integration from handover to launch and from return to handover back to NASA, cabin atmosphere environmental control, vehicle battery state of charge and health monitoring (including in launch scrub turn around conditions), accommodation of NASA personnel and equipment, and template processing schedules.

Remarks: None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

1. DRD Title: Mission Resource Allocation Document (MRAD)		
2. DRD No.: CLDC-202	3. Data Type: 2/3	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Mission Resource Allocation Document (MRAD) identifies the contractor's allocation of the transportation system resources and technical data requirements for integration of the crew and United States Government (USG) payload elements and their support hardware with the visiting vehicle pressurized and unpressurized (as warranted) volumes for each for Crew Transportation System (CTS) or Cargo Transportation System (CaTS) Missions to a Commercial Low Earth Orbit (LEO) Destination (CLD). The associated data will provide the required assessment to confirm compatibility with the spacecraft environments defined in the DRD-132 Vehicle IDD and compatibility with CLDP-REQ-1130 Requirements and Standards for Commercial Low-Earth Orbit Development Program and CLDP-STD-1102 Commercial Low Earth Orbit (LEO) Development Program (CLDP) Payload Interface Standard for Heritage Hardware. The report shall be generated, and the data updated based on progressive maturity of the mission definition and crew and cargo complement. The Contractor shall submit any changes or additions to NASA, in a timely manner, for the execution of the mission. The final MRAD data deliveries shall be coordinated with NASA. Referenced data is considered Type 3 for purposes of this document; however, if referenced data deliverables have a different data type than indicated herein, the referenced data type will prevail. As this DRD applies to the CTS, and CaTS, it is broken into multiple DRD sections with common scope, applicability, and submittal frequencies but with unique data requirements. The DRD sections are as follows: DRD CLDC-202.1: Crew Transportation System Mission Resource Allocation Documents (MRAD) DRD CLDC-202.2: Cargo Transportation System Mission Resource Allocation Documents (MRAD) Due to the potential transmission of competition sensitive data in this deliverable, the Contractor's Transportation (CTS and CaTS) Provider is allowed, with the Contractor's concurrence, to transmit this deliverable, or portions of this deliverable, directly to NASA electronically. Should this occur, the Contractor Transportation Provider shall notify the Contractor that such delivery has been made to NASA. The Contractor is still responsible for the timeliness and delivery of the entire DRD to the Government. 11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: - NASA Contracting Officer (CO) - NASA CDO Contracting Officer Representative (COR) and Alternate COR Applicability: - This DRD is <i>NOT</i> required if NASA provides Transportation Government Furnished Services (GFS), as NASA will already receive the VIDD through existing contract mechanisms.		

DRD CLDC-202.1: Crew Transportation System (CTS) Mission Resource Allocation Documents (MRAD)

Initial Submission: See table

Submission Frequency: See table

Product	DRD Type	Baseline	Final
Overall MRAD document with pointers to applicable data deliverables (as noted below)	2	Critical Design Review (CDR)	Design Certification Review (DCR)
1. Crew, cargo and supply layouts 2. Mass and volume 3. Mission propulsion and power resources 4. Listing of stowed consumables and cargo 5. Mission complement electrical power and energy 6. Non-Standard command and data requirements for United States Government (USG) payloads 7. Crew and pressurized payloads environmental assessment 8. Spacecraft vehicle dynamics Analysis 9. Crew Visiting Vehicle (CVV) Verification Loads Analysis and CVV/Launch Vehicle Coupled Loads Analysis (1 or more) 10. Launch manifest and cargo processing plan 11. Return manifest and cargo processing plan 12. Identification of Government Furnished Equipment (GFE) and Government Furnished Services (GFS) 13. Identification of any Non-NASA cargo and mission unique hardware 14. Identification of any mission unique Design Test Objectives (DTOs) 15. Listing of design changes of the contractors CVV and launch vehicle 16. Spacecraft ephemeris 17. Atmospheric and drag characteristics for the Destination and Spacecraft	3	Mission Integration Review (MIR)	MCR
18. Spacecraft mass properties	3	Mission Certification Review (MCR)	L-1m
19. Spacecraft structural math model 20. Spacecraft thermal math model	3	MIR	MCR
21. Trajectory data	3	L-1m/	L-1w/

U-1m

U-1w

- Updates to all products will be delivered as needed due to late changes to manifest or mission resource utilization

Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment.

Interrelationship:

- SOW 2.15 Utilization
- SOW 2.17 Transportation
- DRD CLDC-001 Integrated Master Schedule
- DRD CLDC-102 Verification, Validation, and Certification Plan (VVCP)
- DRD CLDC-106 Verification Closure Notice
- DRD CLDC-132 Vehicle IDD
- DRD CLDC-208 Payloads Interface Requirements Document
- DRD CLDC-209 Unique Payload Interface Control Document

Applicable Documents:

- CLDP-REQ-1130 Requirements and Standards for Commercial Low-Earth Orbit Development Program
- CLDP-STD-1150 CLDP Operations Standards
- CLDP-STD-1102 CLDP Payload Interface Standard for Heritage Hardware

Scope: The Mission Resource Allocation Document (MRAD) will be used to demonstrate that the allocation of resources and technical data requirements needed for each CTS mission is in compliance with the Task Order (TO). The MRAD shall address specific technical and operational issues pertaining to each proposed cargo and payload item for Crew Visiting Vehicle (CVV). It will also contain recommendations for combining the proposed cargo items into an optimized crew/cargo configuration for CVV. Any technical or operational issues that could not be resolved shall be documented in the report with a recommended forward action plan. The MRAD shall be the source of accurate data pertaining to the mission-unique mass, volume, power, and other resources allocated to each crew member, cargo item, and its supporting hardware. The MRAD may point to previously delivered data or analysis sources/records as described in the data requirements descriptions (below) and confirm mission-specific variables are within baseline analysis space. Analysis shall be provided only if mission specific resources required to support flight specific manifest/parameters are NOT within verification analysis submitted for certification. If necessary, associated VCNs will be reopened, and data shall be delivered per DRD CLDC-102 Verification, Validation, and Certification Plan (VVCP), and DRD CLDC-106 Verification Closure Notice delivery.

Contents:

The MRAD shall include the following:

1. Crew, cargo and supply layouts: Mission physical configuration of the visiting vehicle pressurized module and unpressurized carrier volumes (if applicable) including ascent, on-orbit, and return stowage configurations for NASA provided manifest and contractor-provided consumables and cargo/supplies; Delivery of this MRAD data may consist of pointer(s) to previously delivered integrated cargo maps and integrated manifest, if applicable.
2. Mass and volume allocations for each individual pressurized cargo item and its flight support equipment
3. Mission propulsion and power resources and margins for all mission phases including flight-specific free flight power and prop data shall be delivered. The MRAD may point to previously delivered

VCNs and confirm mission-specific variables are within baseline analysis space. Mission-unique analysis shall be provided only if mission specific prop/power resources required to support flight-specific manifest/parameters are not within verification analysis submitted and approved for certification. If necessary, associated VCNs will be reopened, and data shall be delivered per DRD CLDC-102 Verification, Validation, and Certification Plan (VVCP), and DRD CLDC-106 Verification Closure Notice delivery.

4. Listing of stowed consumables and cargo/supplies for the crew for all mission phases. This includes USG and contractor provided supplies. MRAD pointer to previously delivered cargo maps and manifest is acceptable, if applicable.
5. Mission complement electrical power and energy provided to cargo for all mission phases. The MRAD may point to previously delivered power profile and confirm mission-specific variables are within baseline analysis space.
6. Non-Standard command and data requirements for USG payloads. The MRAD may point to the approved DRD CLDC-132 Vehicle IDD, DRD CLDC-208 Payloads Interface Requirements Document (IRD), or DRD CLDC-209 Unique Payload Interface Control Document (ICD) for standard payload communication and data services and confirm mission-specific variables are within baseline analysis space.
7. Crew and pressurized payloads environmental assessment. For Crew, and USG payloads, the contractor shall perform mission specific analysis for all phases of the mission of the environment of the pressurized cabin environment. The MRAD may point to previously delivered VCNs and confirm mission-specific variables are within analysis space. Analysis shall be provided only if mission specific thermal/environment are not within verification analysis submitted for certification and as documented within the DRD CLDC-132 Vehicle IDD. Associated VCNs will be reopened, and data shall be delivered per DRD CLDC-102 Verification, Validation, and Certification Plan (VVCP), and DRD CLDC-106 Verification Closure Notice delivery.
8. Spacecraft vehicle dynamics Analysis. The MRAD may point to previously delivered VCNs and confirm mission-specific variables are within baseline analysis space. Analysis provided only if mission specific parameters are NOT within verification analysis submitted for certification. Associated VCNs shall be reopened, and data delivered per DRD CLDC-102 Verification, Validation, and Certification Plan (VVCP), and DRD CLDC-106 Verification Closure Notice delivery. (Note: Flight specific trajectory data requirements defined under 21).
9. CVV Verification Loads Analysis and CVV/Launch Vehicle Coupled Loads Analysis (1 or more). The MRAD may point to previously delivered VCNs and confirm mission-specific variables are within analysis space. Analysis provided only if mission specific dynamic environments are not within verification analysis submitted for certification and as documented within the IDD. Associated VCNs shall be reopened and data delivered per DRD CLDC-102 Verification, Validation, and Certification Plan (VVCP), and DRD CLDC-106 Verification Closure Notice delivery. This report shall include:
 - a. Sensitivity of crew and cargo response to spacecraft configuration (location and mass)
 - b. Expected crew and cargo environment during all phases of flight and associated margins against NASA-provided environmental limits
 - c. Results from Loads, Random Vibe, Shock, and Acoustics assessments.
10. Launch Manifest and Cargo Processing.
 - a. Summary of the launch manifest including confirmation that all USG cargo constraints and time critical requirements are met
 - b. Cargo delivery schedules
 - c. Cargo Installation schedules for all loading opportunities

- d. Payload/facility pre-flight ground processing plan and schedules
 - e. Utilization facility interface testing and checkout plans and schedules
11. Return Manifest and Cargo Processing
- a. Summary of the return manifest and disposal plans including confirmation that all USG cargo constraints and time critical requirements are met
 - b. On-Orbit USG cargo and time sensitive payload return loading plans and schedules
 - c. Post-Landing USG Cargo and time sensitive payload post-flight handover plans and schedules
12. Identification of Government Furnished Equipment (GFE) and Government Furnished Services (GFS)
13. Identification of any Non-NASA cargo and mission unique hardware; MRAD pointer to previously delivered integrated cargo maps and integrated manifest
14. Identification of any mission unique DTOs
15. Listing of design changes of the contractors CVV and launch vehicle. The MRAD may point to a listing of design changes that may affect the requirements in in CLDP-REQ-1130 Requirements and Standards for Commercial Low-Earth Orbit Development Program, CLDP-STD-1102 CLDP Payload Interface Standard for Heritage Hardware and associated analytical products necessary for the CVV.
16. Spacecraft ephemeris including time, position, velocity, and covariance. The MRAD may point to flight specific data to be delivered
17. Atmospheric and drag characteristics for the Destination and Spacecraft. MRAD may include a pointer to DVVI Interface Control Document (ICD) and previously delivered VCNs where data is documented and statement that there are no design changes requiring redelivery of data for this flight.
18. Spacecraft mass properties. The MRAD may point to separate mass properties report delivered to MRAD schedule. The final mass properties delivery within L-6 weeks is expected to be a weighed, final spacecraft configuration. If the as-weighed mass properties cannot be provided to NASA at L-1 month, an additional mass properties report shall be delivered to NASA with final as-weighed mass properties NLT L-2 weeks. Estimated weight will be provided for cargo not stowed at time of weighing
19. Spacecraft structural math model. MRAD pointer to applicable model versions. If hardware change drives redelivery of a model, the required data should be provided with final delivery no later than MCR
20. Spacecraft thermal math model. MRAD pointer to applicable model versions. If hardware change drives redelivery of a model, the required data should be provided with final delivery no later than MCR
21. Trajectory data to be delivered for assessments: within one month and again within one week of launch; within one month and again within one week of departure; and near real-time updates during flight for key events such as maneuvers monitoring. The MRAD may point to flight specific data to be delivered in real time operational documents. This shall include:
- a. Timeline of free-flight activities (e.g., launch insertion, appendage configuration, jettisons, major mode changes)
 - b. Spacecraft maneuver plan. For each maneuver, insertion through entry, includes inertial and relative state vector, attitude at time of burn, burn components by axis, spacecraft mass at time of burn, and time of burn

Remarks: None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

DRD CLDC-202.2: Cargo Transportation System (CaTS) Mission Resource Allocation Documents (MRAD)

Initial Submission: See table

Submission Frequency: See table

Product	DRD Type	Baseline	Final
Overall CaVV MRAD document with pointers to applicable data deliverables (as noted below)	2	CDR	DCR
1. Cargo and supply layouts 2. Mass and volume allocations 3. Mission complement electrical power and energy 4. Non-Standard command and data requirements for USG payloads 5. Pressurized cargo environmental assessment 6. Launch manifest and cargo processing plan 7. Return manifest and cargo processing plan 8. Identification of Government furnished equipment (GFE) and Government furnished services (GFS); 9. Identification of any mission unique DTOs; 10. Listing of design changes of the contractors CaVV	3	MIR	CIR

* Updates to all products will be delivered as needed due to late changes to manifest or mission resource utilization

Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment.

Interrelationship:

- SOW 2.15 Utilization
- SOW 2.17 Transportation
- DRD CLDC-001 Integrated Master Schedule
- DRD CLDC-102 Verification, Validation, and Certification Plan (VVCP)
- DRD CLDC-106 Verification Closure Notice
- DRD CLDC-132 Vehicle IDD
- DRD CLDC-211 Payloads Interface Requirements Document
- DRD CLDC-212 Unique Payload Interface Control Document

Applicable Documents:

- CLDP-REQ-1130 Requirements and Standards for Commercial Low-Earth Orbit Development Program
- CLDP-STD-1150 CLDP Operations Standards
- CLDP-STD-1102 CLDP Payload Interface Standard for Heritage Hardware

Scope: The Mission Resource Allocation Document (MRAD) will be used to demonstrate that the allocation of resources and technical data requirements needed for each CaTS mission is in compliance with the Task

Order (TO). The MRAD shall address specific technical and operational issues pertaining to each proposed USG cargo or payload item. It will also contain recommendations for combining the proposed cargo items into an optimized cargo configuration for CaVV. Any technical or operational issues that could not be resolved shall be documented in the report with a recommended forward action plan. The MRAD shall be the source of accurate data pertaining to the mission-unique mass, volume, power, and other resources allocated to each crew member, cargo item, and its supporting hardware. The report shall be generated and the data updated based on progressive maturity of the mission definition and cargo complement. The Contractor shall submit any changes or additions to NASA, in a timely manner. The final MRAD data deliveries shall be coordinated with NASA. The MRAD may point to previously delivered data or analysis sources/records as described in the data requirements descriptions (below) and confirm mission-specific variables are within baseline analysis space. Analysis shall be provided only if mission specific resources required to support flight specific manifest/parameters are NOT within verification analysis submitted for certification. If necessary, associated VCNs will be reopened, and data shall be delivered per DRD CLDC-102 Verification, Validation, and Certification Plan (VVCP), and DRD CLDC-106 Verification Closure Notice delivery. Referenced data is considered Type 3 for purposes of this document; however, if referenced data deliverables have a different data type than indicated herein, the referenced data type will prevail.

Contents:

The MRAD shall include the following:

1. Cargo and supply layouts: Physical configuration of the visiting vehicle pressurized module including ascent, on-orbit, and return/disposal stowage configurations for NASA provided manifest and contractor-provided cargo/supplies; MRAD can point to previously delivered integrated cargo maps and integrated manifest
2. Mass and volume allocations for each individual pressurized and unpressurized USG Payload item and its flight support equipment
3. Mission complement electrical power and energy provided to USG payloads for all mission phases. The MRAD may point to previously delivered power profile and confirm mission-specific variables are within baseline analysis space
4. Non-Standard command and data requirements for USG payloads. The MRAD may point to the approved DRD CLDC-132 Vehicle IDD, DRD CLDC-211 Payloads Interface Requirements Document (IRD), or DRD CLDC-212 Unique Payload Interface Control Document (ICD) for standard payload communication and data services and confirm mission-specific variables are within baseline analysis space
5. Pressurized cargo environmental assessment. For pressurized USG cargo, the contractor shall perform mission specific analysis for all phases of the mission of the environment of the pressurized cabin and external environment. The MRAD may point to previously delivered VCNs and confirm mission-specific variables are within analysis space. Analysis shall be provided only if mission specific thermal/environment are not within verification analysis submitted for certification and as documented within the IDD. If necessary, associated VCNs will be reopened, and data shall be delivered per CLDC DRD-102 Verification, Validation, and Certification Plan (VVCP), and CLDC DRD-106 Verification Closure Notice delivery.
6. Launch Manifest and Cargo Processing
 - a. Summary of the launch manifest including confirmation that all USG cargo constraints and time critical requirements are met
 - b. Cargo delivery schedules
 - c. Cargo Installation schedules for all loading opportunities
 - d. Payload/facility pre-flight ground processing plan and schedules

- e. Utilization facility interface testing and checkout plans and schedules
- 7. Return Manifest and Cargo Processing
 - a. Summary of the return manifest and disposal plans including confirmation that all USG cargo constraints and time critical requirements are met
 - b. On-Orbit USG cargo and time sensitive payload return loading plans and schedules
 - c. Post-Landing USG Cargo and time sensitive payload post-flight handover plans and schedules
- 8. Identification of Government Furnished Equipment (GFE) and Government Furnished Services (GFS)
- 9. Identification of any mission unique Detailed Test Objectives (DTO's)
- 10. Listing of design changes of the contractors CaVV. The MRAD may point to a listing of design changes that may affect the requirements in in CLDP-REQ-1130 Requirements and Standards for Commercial Low-Earth Orbit Development Program, and CLDP-STD-1102 CLDP Payload Interface Standard for Heritage Hardware, and associated analytical products necessary for the berthing/docking of the Contractor's on-orbit vehicle

Remarks: None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

1. DRD Title: Tactical Increment Execution Report (TIER)		
2. DRD No.: CLDC-203	3. Data Type: 2	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Tactical Increment Execution Report (TIER) describes how the Contractor has incorporated all NASA inputs, products, and mission objectives into the integrated Increment plan prior to the start of the Increment. The TIER also provides timely insight into the health and status of the destination and its ability to support the integrated increment and execution of all NASA Mission Objectives. The Data Requirements Description (DRD) acts as a snapshot of the Increment delivered at key milestones with ongoing NASA insight into the Contractor's Increment Integration planning, execution and data sources. The data provided through the TIER may support the Contracting Officer's mission success determination. 11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline at Mission Integration Review (MIR) Submission Frequency: Final at Mission Certification Review (MCR). Updates at Operations Readiness Review (ORR). The TIER also defines and links to the real-time source data used to develop and maintain the TIER, provides access to the Contractor's source data repositories, customer interface summary dashboards, and metric reports throughout the duration of the Increment. Format: The Contractor's format is acceptable and shall be in accordance with the data format section at the beginning of this attachment. Interrelationship: Statement Of Work (SOW) 2.0 and all subsections Applicable Documents: - CLD-PLN-2110 Mission Integration Plan (MIP) - CLDP-PLN-3017 Utilization Implementation Plan (UIP) - CLDP-STD-1150 CLDP Operations Standards Scope: The TIER provides the Contractor's integrated plan for all customers through all phases of the Increment. Examples of TIER source data, summary dashboards, or metric reports could include, but are not limited to: Integrated increment mission objectives and priorities, Increment Flight Planning Summary, Cargo Manifest and Stowage products, Crew timelines, destination consumable inventories, maintenance plans, medical operations plans, Utilization plans including time critical launch and stowage, return, and/or disposal plans.		

Contents: The contractor shall compile and deliver a Tactical Increment Execution Report comprised of the content defined below for a specific Increment. The TIER shall reflect the latest content at the time of DRD submittal with the understanding that the content will mature in the lead up to the Increment start. Whenever products are immature or not yet defined, the contractor shall include product templates for a typical Increment until defined. The Contractor may also make use of summary dashboards or metric reports to convey an integrated status or reflect product maturity trends over time in the lead up to the start of an Increment.

1. Crew medical and behavioral mission data as defined in DRD CLDC-111 *Medical Operations Plan*.
2. Mission food and nutrition data as defined in DRD CLDC-112 *Food and Nutrition Plan*.
3. Health Stabilization Program mission data as defined in DRD CLDC-113 *Health Stabilization Program (HSP) Plan*.
4. Prioritized Increment Mission Objectives
 - a. Confirmation that all defined US Government (USG) Mission Objectives are incorporated into the baseline Increment Plan
 - b. Integrated Increment Mission Objective priorities reflecting the priority of USG Mission Objectives relative to all other stakeholders and Contractor customer Mission Objectives
 - c. Mission Objective pre-requisites, dependencies, or constraints
5. Increment Flight Plan Summary
 - a. Strategic and Tactical flight plan
 - b. Primary and Backup Launch opportunities and any dependencies or constraints across the entire Commercial Low Earth Orbit Destination System (CLDS)
 - c. Timelines for pre-launch, countdown, and crew-ingress with targeted T-0's for the primary and backup launch dates
 - d. Launch scrub turnaround opportunities, cargo refresh requirements, timelines, dependencies, and constraints
 - e. Rendezvous-to-dock durations and timelines for the confirmed primary and backup launch opportunities
 - f. Planned Increment durations
 - g. Planned Visiting Vehicle (VV) traffic during the Increment duration
 - h. Destination altitude and attitude strategy
 - i. Commercial activity plans using USG assets (on-orbit and ground crew, flight and ground hardware)
6. Crew Plans:
 - a. All prime and backup Contractor, USG, or Space Flight Participant crew assignments
 - b. USG crew quarantine and launch handover schedules
 - c. All Planned USG crew inspections, custom crew equipment fit-checks, and medical operations data for pre-launch, On-orbit, and crew return and recovery
 - d. Crew training schedule for prime and backup USG crew
 - e. Increment crew time allocations
7. Current On-orbit Destination Configuration:
 - a. Topology map showing the internal and external destination configuration for the Increment
 - b. Summary of increment scheduled assembly or reconfiguration sequences reflecting the initial and final configuration with a summary of the associated capability changes
 - c. Open anomalies and plans for resolution or mitigation and risks characterization
 - d. Payload facility availability, health, and status
 - e. Total destination pressurized stowage capability and specific USG allocations
8. Current consumable inventories, expected trends, run-to-zero thresholds, consumable resupply plans, and margins during the increment duration including but not limited to:
 - a. Crew consumables
 - b. Onboard medical kit inventory

- c. Destination consumables such as power, propellant and atmospheric gas(es)
- d. Known periods of reduced resources, consumables, spares, or services that have the potential to affect USG Mission Objectives
- e. Payload facility consumables such as power, gas, and sample collection systems
- f. Payload facility through-put allocations and time management plan for the Increment duration
- g. Payload facility installations, activations, relocations, modifications, planned down-time, or facility decommissioning that have the potential to affect USG Mission Objectives
- h. USG Payload sample return capabilities including both active and passive cold stowage return resources

Remarks:

Due to the potential for competition sensitive data in this deliverable, the Contractor's Transportation Provider is allowed, with the Contractor's concurrence, to transmit this deliverable, or portions of this deliverable, directly to NASA electronically. Should this occur, the Contractor Transportation Provider shall notify the Contractor that such delivery has been made to NASA. The Contractor is still responsible for the timeliness and delivery of the entire DRD to the Government.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

1. DRD Title: Imagery Plan		
2. DRD No.: CLDC-204	3. Data Type: Imagery Plan: Type 2 Imagery Deliveries: Type 3	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Contractor Imagery plan establishes the providers plan to capture and deliver video and imagery as defined here within. Additionally, the Contractor shall deliver the specified imagery for NASA as defined here within.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: - NASA Contracting Officer (CO) - NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline at Preliminary Design Review (PDR) or Critical Design Review (whichever occurs earlier), and updates as necessary thereafter. Submission Frequency: - Final at Critical Design Review (CDR) - Mission specific imagery deliveries per the schedule outlined in the Imagery Plan Format: - Ground Still Images The minimum resolution for the digital still imagery shall be no less than 4k x 6k resolution. Imagery downloaded from the camera shall be in a raw native camera format for maximum image resolution. Image cataloging data (Dublin Core metadata standard preferred) with include enough detail to support subsequent retrieval and shall be submitted for incorporation into the NASA Imagery Database. The preferred method of delivery is for the contractor to host the imagery within a secure and remotely accessible contractor repository, with NASA imagery clearly marked/tagged for quick sorting and a streamlined method for NASA to quickly export the NASA imagery. - On-orbit Still Images The minimum resolution for mission digital still imagery shall be no less than 5k x 8k resolution. Images downloaded from the camera shall be in a raw native camera format for maximum image resolution. Image cataloging data should include sufficient detail to support subsequent retrieval and shall be submitted for incorporation into the NASA Imagery Database. The preferred method of delivery is for the contractor to host the imagery within a secure and remotely accessible contractor repository, with NASA imagery clearly marked/tagged for quick sorting and a streamlined method for NASA to quickly export the NASA imagery. - Recorded Video Imagery The minimum resolution for the digital video imagery shall be no less than 1080p resolution. Imagery		

downloaded from the camera shall be in a raw native camera format for maximum image resolution. Image cataloging data with enough detail to support subsequent retrieval shall be submitted for incorporation into the NASA Imagery Database. The preferred method of delivery is for the contractor to host the imagery within a secure and remotely accessible contractor repository, with NASA imagery clearly marked/tagged for quick sorting and a streamlined method for NASA to quickly export the NASA imagery.

- a. Live Video Imagery: The minimum resolution for the digital video imagery shall be no less than 1080p resolution. Images downlinked from the camera shall be no less than High-Definition (HD) Downlink H.264 High Profile Level 4, 4:2:0, 8 Bit, 1920x1080p, 16x9 aspect ratio, 59.94fps.
- b. Imagery Metadata: Imagery Metadata shall be submitted in accordance with NASA-STD-2822 V2.0 Appendix C

Interrelationship:

- NASA Procedural Requirement (NPR) 1441.1E NASA Records Management Program Requirements
- Clause Applicability of Rights In Data – Special Works
- Statement Of Work (SOW) Section 2.14 Mission Integration

Applicable Documents: NASA-STD-2822 NASA Imagery Procedure and Metadata Standard V2.0 Appendix C

Scope: The Imagery Plan defines the contractor's plan for collection of imagery

Contents:

1. Imagery Plan (Type 2):

An Imagery Plan defines all imagery to be captured by the Contractor throughout the hardware build and life cycle including leading up to, conducting and completing a mission. The Imagery Plan will list all hardware to be imaged, the type of view (i.e. close-up, normal, wide view) and the integration stage of the hardware (before/after installation of shields, covers, labels or Multilayer Insulation (MLI)). The plan uniquely defines the Type 4 deliverable imagery to be delivered to the USG as defined below.

2. Deliverable Imagery (Type 3):

The four categories of imagery delivered for NASA are:

- a. Commercial Destination Imagery includes but is not limited to:
 - i. Wide view external outer mold line (OML) imagery documenting the CLD as-built configuration
 - ii. Detailed close-up imagery of all crew interfaces before, during, and after integration
 - iii. Imagery of labels including work site, cables, fluid lines, emergency response hardware, and emergency egress labels and placards
 - iv. Imagery of the installation and operation of any NASA utilization or hardware
 - v. Docking and/or Berthing interfaces
- b. Transportation System Imagery
 - i. Wide view and close-up imagery of the Crew Transportation System (CTS) and Cargo Transportation System (CaTS) external outer mold line (OML) documenting the as-built pre-flight configuration
 - ii. Detailed close-up imagery of all crew interfaces before, during, and after integration
 - iii. Imagery of labels including work site, cables, fluid lines, emergency response hardware, and emergency egress labels and placards

- iv. Imagery of the installed configuration of NASA hardware, payloads, utilization equipment or supplies for launch and return
- c. United States Government (USG) Crew Imagery
 - i. All images, recordings, or live video of the USG crew through all phases of the mission including training, pre-flight preparations, transportation to and from the destination, and all on-orbit operations.
- d. Government Furnished Equipment Imagery
 - i. Recorded video, live video, or imagery of the installation, operation, or maintenance of installed Government Furnished Equipment (GFE)

Remarks:

Minimum recommendation for live video feeds is five (5) live feeds. During the mission, live imagery should be recorded simultaneously during transmission to ensure that all footage is captured and available for later review, playback to MCC, archiving, and scrubbing of temporary/unneeded files.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

1. DRD Title: Post Increment Report (PIR)		
2. DRD No.: CLDC-205	3. Data Type: 2	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Post Increment Report (PIR) summarizes the overall system performance of the Commercial LEO Destination (CLD) through the entire increment for a mission unique Task Order (TO). The PIR summarizes the CLD system health, consumables, critical spares, and any unplanned maintenance or future resupply required to restore full system functionality or maintain positive margins prior to the next USG increment. The PIR confirms the successful execution of all USG mission objectives and identifies any incomplete or deferred tasks. The Post Increment Report supports the NASA Contracting Officer's mission success determination.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR Initial Submission: Baseline no later than (NLT) fourteen (14) days after the completion of an Increment for each unique mission unique TO. An Increment is completed at the return and handover of the USG crew or assets to NASA at the defined rally point or as otherwise specified in the mission unique TO. Submission Frequency: Final NLT forty-five (45) days after the completion of an Increment for each mission unique TO. Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment. Interrelationship: 1. Clause Success Determination 2. Statement Of Work (SOW) Section 3.3 Mission Services Description (CLIN 3) Applicable Documents: None Scope: The post increment report informs NASA of any incomplete tasks, performance issues, anomalies, or fleet- wide concerns that affect Commercial Low Earth Orbit Development System (CLDS) performance, completion of NASA utilization, or crew safety. This report provides NASA a comprehensive post-flight summary of the Increment, compares the as-planned Increment defined in CLDC-204 TIER to the as-executed Increment, and provides supporting evidence that the success criteria outlined in the Clause Success Determination has been satisfied. Contents: The contractor shall compile and deliver a Post Increment Report comprised of the content defined below for a specific Increment as it pertains to the Destination. The Contractor may also make use of summary dashboards or metric reports to convey the as-executed increment as compared to the pre-increment		

plans defined in the TIER.

1. Any deviations to the Crew medical and behavioral mission data defined in DRD CLDC-111 Medical Operations Plan prior to the start of the increment.
2. Any deviations to the Mission food and nutrition data defined in DRD CLDC-112 Food and Nutrition Plan prior to the start of the increment.
3. Any deviations to the Health Stabilization Program mission data defined in DRD CLDC-113 Health Stabilization Program (HSP) Plan prior to the start of the increment.
4. Prioritized Increment Mission Objectives
 - a. Compare the USG Mission Objectives originally defined in the TIER against the as-executed mission objectives and identify any deviations
 - b. Compare the baselined integrated increment mission objective priorities against actual mission execution across all stakeholders and identify any deviations.
 - c. Confirm all Mission Objective pre-requisites, dependencies, and constraints were met and identify any deviations, workarounds, or unplanned constraints encountered.
5. Increment Flight Plan
 - a. Compare the planned Primary and Backup Launch Opportunities throughout the increment with the actual launch execution and identify any differences
 - b. Compare the planned pre-launch, countdown, crew ingress timelines, and targeted T-0s against the actual achieved timelines and T-0 events.
 - c. Compare the planned launch scrub turnaround timelines against actual as executed timelines including crew egress and cargo refresh timelines for any launch scrubs that occur during the increment
 - d. Compare the predicted rendezvous to dock timelines for primary and backup launch opportunities with the actual as flown timelines and durations
 - e. Compare the planned Increment Duration with actual as flown duration, highlighting any drivers for an early or late crew or cargo return.
 - f. Compare the planned Vehicle Traffic throughout the increment with actual docked/visiting vehicle traffic
 - g. Compare the planned altitude/attitude strategy throughout the increment with the actual as-flown altitude including any deviations or contingency maneuvers.
6. Crew Plan
 - a. Compare the planned prime and backup crew assignments against the actual flown crew manifest, noting any late changes or emergency substitutions.
 - b. Compare the planned USG crew quarantine periods and handover schedules with the actual execution timelines and identify any schedule deviations.
 - c. Compare the planned USG crew inspections, fit checks, and medical operations (prelaunch, onorbit, return) with those actually executed and identify any missed, deferred, or modified procedures.
7. On-Orbit Destination Configuration
 - a. Compare the planned topology map for an increment with the actual as flown internal/external configuration and identify any deviations
 - b. Compare the planned assembly or reconfiguration sequences for an increment with the as-flown sequence and identify any deviations
 - c. Compare the predicted Payload Facility availability/health/status with actual as flown capabilities and identify any deviations in facility performance or planned availability.
 - d. Compare the planned pressurized/unpressurized stowage allocations for an increment with actual USG usage and identify any exceedances or unplanned allocation shortfalls
8. Consumables
 - a. Compare the planned consumables inventory/trends/run to zero thresholds with actual as flown consumption and identify any delta in usage rates or margin excursions with any impacts to future

increment consumables

- b. Compare the planned medical kit inventory (quantities, expirations, lot/NDC data) with actual as flown consumption and identify any impacts to future increment medical kit inventories.
 - c. Compare the predicted destination consumable usage (power, propellant, atmospheric gases) with actual increment consumable usage and identify any impacts to future increment consumable margins
 - d. Compare the planned Payload Facility consumables usage (power, gases, sample systems) with actual as-flown usage and identify any impacts to future payload facility consumables
 - e. Compare the planned Payload Facility allocations, usage times, and sample throughput with the actual as executed utilization results and identify any impacts to future increments.
 - f. Compare the planned facility installations, relocations, modifications, and downtime with actual as-flown facility changes and identify any impacts to future increments.
 - g. Compare the planned active and passive cold-stow payload return allocations with the actual samples returns and cold-stow resources used and identify any impacts to future increments.
9. Launch Ground Processing
- a. Compare the planned pre-flight interface tests, sampling, and inspections with those actually performed, identifying skipped, added, or delayed tasks.
 - b. Compare the planned cargo and utilization delivery schedules with the actual delivery timing and identify any discrepancies.
 - c. Compare the planned utilization sample ground processing timelines with actual execution timelines and identify any discrepancies
10. Return Ground Processing
- a. Compare the planned USG cargo/time-sensitive payload return loading plan with actual as-flown loading and timing.
 - b. Compare the planned post-flight handover timelines with actual handover execution and identify any delays and impacts to utilization
 - c. Compare the planned GSE return readiness with actual readiness and performance during return operations
11. Predicted vs. Actual System Performance
- a. Delivered a comparison of predicted CLDS system/subsystem performance and flight environments against the actual as-flown data, with explanation of any deviations, root-cause drivers, and mission impacts
12. Mishap Investigation Documentation (if applicable)
- a. Compare the expected mishap response (if triggered) with the actual as executed mishap response including a current implementation status of recommendations and status of return-to-flight actions.
13. Corrective Actions and Anomaly Resolutions
- a. List all anomalies experienced during the increment with defined mitigation plans, including risk characterization, forward work, and impacts to future increments
 - b. Summarize the planned anomaly corrective action, resolution schedule, expected resolution path, and fleet-wide system impacts and identify any technical or schedule impacts to future increments.

Remarks: Relevant mission specific Post Increment content may be accelerated to accommodate a pre-undock Mission Management Team Review as needed.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

1. DRD Title: Visiting Vehicle Post Flight Report		
2. DRD No.: CLDC-206	3. Data Type: 2	4. OPR: CDO
5. Solicitation No.: 80JSC025R001	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: This report provides NASA a comprehensive Post Flight Report (PFR) of the Crew Transportation System (CTS) or Cargo Transportation System (CaTS) and the performance of the interfaces on the Commercial Low Earth Orbit (LEO) Destination (CLD) that were utilized to support the CTS or CaTS operations. This post flight report will support the NASA Contracting Officer's mission success determination. As this Data Requirements Description (DRD) applies to the Destination, CVV(s), and CaVV(s), it is broken into multiple DRD sections with different scope, applicability, and unique submittal frequencies. The DRD sections are as follows: DRD CLDC-206.1: Crew Transportation System (CTS) Post Flight Report DRD CLDC-206.2: Cargo Transportation System (CaTS) Post Flight Report Due to the potential transmission of competition sensitive data in this deliverable, the Contractor's Transportation (CVV and CaVV) Provider is allowed, with the Contractor's concurrence, to transmit this deliverable, or portions of this deliverable, directly to NASA electronically. Should this occur, the Contractor Transportation Provider shall notify the Contractor that such delivery has been made to NASA. The Contractor is still responsible for the timeliness and delivery of the entire DRD to the Government. Applicability: This DRD is <i>NOT</i> required if NASA provides Transportation Government Furnished Services (GFS), as NASA will already receive the VIDD through existing contract mechanisms.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: - NASA Contracting Officer (CO) - NASA CDO Contracting Officer Representative (COR) and Alternate COR		
<u>DRD CLDC-206.1: Crew Transportation System (CTS) Post Flight Report</u> Initial Submission: The Contractor shall deliver a Baseline Post Flight Report (PFR) no later than (NLT) fourteen (14) days after the Crew Visiting Vehicle arrives at the Destination or no later than three (3) days before undock for missions shorter than 14 days. Submission Frequency: A final PFR report shall be delivered NLT sixty (60) days after each CTS mission ends (landing). Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the		

beginning of this attachment

Interrelationship: SOW Section 2.19.4 Government Furnished Transportation and Support Services (GFTSS)

Applicable Documents:

- CLD-PLN-2110 Mission Integration Plan
- CLDP-REQ-1130 Requirements and Standards for Commercial Low-Earth Orbit Development Program
- CLDP-STD-1150 Commercial Low-Earth Orbit Development Program Operations Standards

Scope: This report provides NASA a comprehensive post-flight summary of the CTS including flight and ground systems, and Destination Visiting Vehicle interfaces performance. The report will inform NASA of any performance issues, anomalies, or fleet wide concerns that may affect CTS vehicle performance or crew safety.

Contents: The Post Flight Report shall provide the following data as it pertains to the CTS or and Destination Visiting Vehicle interfaces:

1. Predicted and actual vehicle system, subsystem, and component performance data
2. Comprehensive flight reconstructions, to include predicted and actual trajectories and communication coverage
3. Determination of actual flight environments.
4. Explanation of significant differences between the predicted and actual flight environments.
5. When applicable, mishap investigation and resolution documentation, responses and implementations to the mishap board's recommendations and return to flight activities.
6. Problem identification, anomalies, and malfunctions from post Flight Readiness Review (FRR) through landing and recovery or disposal; their impact on the CTS, crew, cargo, and the overall mission.
7. Status of corrective actions and anomaly resolutions. This includes model and predicted environment updates due to collected flight data.
8. Assessment of the adequacy of training, both for flight and ground personnel.
9. Analysis demonstrating that the Mission Success Criteria has been met.

Remarks: None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

DRD CLDC-206.2: Cargo Transportation System (CaTS) Post Flight Report

Initial Submission:

The Contractor shall deliver a Baseline Post Flight Report (PFR) no later than (NLT) fourteen (14) days after the Cargo Visiting Vehicle arrives at the Destination or no later than three (3) days before undock for missions shorter than fourteen (14) days.

Submission Frequency: A final PFR report shall be delivered NLT sixty (60) days after each CaTS mission ends (landing/disposal).

Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment

Interrelationship: SOW Section 2.19.4 Government Furnished Transportation and Support Services (GFTSS)

Applicable Documents:

- CLD-PLN-2110 Mission Integration Plan
- CLDP-REQ-1130 Requirements and Standards for Commercial Low-Earth Orbit Development Program
- CLDP-REQ-1100 Commercial Low-Earth Orbit Destination (CLD) Transportation Interface Requirements Document (IRD)
- CLDP-STD-1150 Commercial Low-Earth Orbit Development Program Operations Standards

Scope: This report provides NASA a comprehensive post-flight summary of the CaTS including flight and ground systems, and Destination Visiting Vehicle interfaces performance. The report will inform NASA of any performance issues, anomalies, or fleet wide concerns that may affect CaTS vehicle performance or crew safety.

Contents: The Post Flight Report shall provide the following data as it pertains to the CaTS or and Destination Visiting Vehicle interfaces:

1. Predicted and actual vehicle system, subsystem, and component performance data
2. Comprehensive flight reconstructions, to include predicted and actual trajectories and communication coverage
3. Determination of actual flight environments.
4. Explanation of significant differences between the predicted and actual flight environments.
5. When applicable, mishap investigation and resolution documentation, responses and implementations to the mishap board's recommendations and return to flight activities.
6. Problem identification, anomalies, and malfunctions from post Flight Readiness Review (FRR) through landing and recovery or disposal; their impact on the CaTS, crew, cargo, and the overall mission.
7. Status of corrective actions and anomaly resolutions. This includes model and predicted environment updates due to collected flight data.
8. Assessment of the adequacy of training, both for flight and ground personnel.
9. Analysis demonstrating that the Mission Success Criteria has been met.

Remarks: None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

1. DRD Title: Utilization Feasibility Assessment		
2. DRD No.: CLDC-207	3. Data Type: 2	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: NASA requires the Commercial Low Earth Orbit (LEO) Destination (CLD) Contractor feedback on the feasibility of proposed United States Government (USG) utilization projects (payloads/facilities) to be integrated and completed successfully, using the CLD assets. This Data Requirements Description (DRD) applies to the CLD Contractor performing a feasibility assessment for the individual payload operating on a Commercial LEO Destination System (CLDS) along with the complement of payloads targeting a given increment on a CLDS and is broken into multiple DRD sections with different scope, applicability, and unique submittal frequencies. The DRD sections are as follows: DRD CLDC-207.1: Individual Payload Feasibility Assessment DRD CLDC-207.2: Payload Complement Feasibility Assessment		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR		
<u>DRD CLDC-207.1: Individual Payload Feasibility Assessment</u> Initial Submission: Baseline Individual Payload Feasibility Assessment provided at six (6) weeks after payload kickoff meeting Submission Frequency: Final Individual Payload Feasibility Assessment provided at Mission Integration Review (MIR). If a payload gets added after MIR, then the Final Payload Feasibility Assessment shall be provided at Utilization Integration Review (UIR). Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment. Interrelationship: SOW 2.15 Utilization Applicable Documents: • CLDP-PLN-3017 CLDP Utilization Integration Plan • DRD CLDC-124 Utilization Integration Plan Scope: The individual payload feasibility assessment provides detailed analysis of integration of an individual United States Government (USG) payload onboard the CLDS, taking into account the various		

resources (e.g., CLD payload facilities, power, data, crew time, conditioned stowage) required to operate the individual payload targeting a given mission and increment.

Contents:

The Contractor's feasibility assessment will address many different aspects to help ensure the proposed USG payload is set up for success. This includes, but is not limited to the following:

1. Topological analysis for the individual activity/effort inclusive of physical connection (location, power, thermal, data) and taking into account constraints such as keep out zones (ex: emergency egress pathways, operational areas of other equipment, etc) as well as the overall USG utilization complement for an increment, including changes throughout the increment/mission.
2. Resource requirement analysis for the individual activity/effort. This should include analysis of all resources (i.e. power, thermal, data, laptops, unique experiment requirements, and proposed interfaces etc.).
3. Analysis of compatibility with transportation systems. This includes up mass and down mass (if applicable) as well as overall availability on Visiting Vehicle mission(s).
4. Facility throughput schedule/analysis and usage agreements (individual activity/effort), ensuring that payload constraints can be met to maximize science return. This should include analysis of removal of hardware from previous activity, installation of new, dwell time in facility, removal from facility, packing for return, etc. Facility evaluation should include conditioned stowage assets.
5. Assessment of critical science timing constraints (during operations or related to VV packing/unpacking) to ensure requirements can be met. This should include turnover requirements and analysis of thermal conditioning time of samples/hardware, if applicable.
6. Crew training requirements for Contractor owned hardware/facilities to ensure appropriate time can be allocated and integrated in crew training schedule.
7. Spatial constraint analysis for individual activity/effort as well as the overall complement to ensure information is understood for planning purposes.
8. Crew time analysis to ensure there are no conflicts during preferred timeframe.
9. Any other mission constraints that are provided by the Payload Developer/Principal Investigator (e.g., launch and return constraints pertaining to turnover, scrubs, and launch to activation timeline; experiment duration; minimum number of runs; and temperature control, etc.)

Remarks: None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

DRD CLDC-207.2: Payload Complement Feasibility Assessment

Initial Submission: Baseline Increment Payload Complement Feasibility Assessment provided at Mission Integration Review (MIR).

Submission Frequency: Final Increment Payload Complement Feasibility Assessment at Mission Certification Review (MCR).

Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment.

Interrelationship: SOW 2.15 Utilization

Applicable Documents:

- CLDP-PLN-3017 CLDP Utilization Integration Plan

- DRD CLDC-124 Utilization Integration Plan

Scope: The payload complement feasibility assessment provides detailed analysis of integration of the complement of USG utilization activities/efforts targeting a given increment within the overall Contractor's complement. Based on the NASA-provided list of proposed payloads/facilities targeting a given increment, the Contractor will perform a feasibility assessment to ensure the feasibility for the overall payload complement for the targeted increment.

Contents:

Similar to the individual payload feasibility assessment, the Contractor's payload complement feasibility assessment will address many different aspects to help ensure the proposed complement of proposed USG payloads targeting a given increment are set up for success. This includes, but is not limited to the following:

1. Topological analysis for the complement of USG payloads inclusive of physical connections (location, power, thermal, data) and taking into account constraints such as keep out zones (ex: emergency egress pathways, operational areas of other equipment, etc), including changes throughout the increment/mission.
2. Resource requirement analysis for the overall USG utilization complement for an increment. This should include analysis of all resources (i.e. power, thermal, data, laptops, unique experiment requirements, and proposed interfaces etc.).
3. Analysis of compatibility with transportation systems. This includes up mass and down mass (if applicable) as well as overall availability on Visiting Vehicle mission(s), integrating the proposed complement of USG payloads into the overall complement to ensure appropriate space and resources are available.
4. Facility throughput schedule/analysis and usage agreements for the overall USG payload complement, ensuring that payload constraints can be met to maximize science return. This should include analysis of removal of hardware from previous activity, installation of new, dwell time in facility, removal from facility, packing for return, etc. Facility evaluation should include cold stowage assets.
5. Assessment of critical science timing constraints (during operations or related to Visiting Vehicle (VV) packing/unpacking) to ensure requirements can be met. This should include turnover requirements and analysis of thermal conditioning time of samples/hardware, if applicable.
6. Crew training requirements for Contractor owned hardware/facilities to ensure appropriate time can be allocated and integrated in crew training schedule.
7. Spatial constraint analysis for the overall complement to ensure information is understood for planning purposes.
8. Crew time analysis to ensure there are no conflicts during preferred timeframe.
9. Any other mission constraints that are provided by the Payload Developer/Principal Investigator (e.g., launch and return constraints pertaining to turnover, scrubs, and launch to activation timeline; experiment duration; minimum number of runs; and temperature control, etc.)

Remarks: None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

1. DRD Title: Payloads Interface Requirements Document (IRD)		
2. DRD No.: CLDC-208	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Payloads Interface Requirements Document (IRD) is designed to provide payload customers with the following: 1) Interface requirements definition between a prospective payload and 1) the Destination and 2) the Visiting Vehicle. The Payload Interface Requirements Document (IRD) will be provided by the Contractor as a “Blank Book” template to be used for assessing applicable interface requirements for each customer payload and ensuring that the hardware/items and activities associated with a specific utilization activity are verified to be safe to be launched and/or operated on the Commercial Low Earth Orbit (LEO) Destination System (CLDS). 2) An Applicability Matrix will also be required by the Contractor to reflect applicable interface requirements and verification methods for closure for each payload based on the Payload/Destination Blank Book IRD. The Applicability Matrix serves to document the agreements between the Contractor and payload customer regarding the applicable interface requirements and verification methods. As this Data Requirements Description (DRD) applies to the Destination and the Visiting Vehicle (Crew Visiting Vehicle (CVV(s)) or Cargo Visiting Vehicle (CaVV(s))), it is broken into multiple DRD sections with different scope. The DRD sections are as follows: DRD CLDC-208.1: Payloads/Destination Interface Requirements Document DRD CLDC-208.2: Payloads/CVV Interface Requirements Document DRD CLDC-208.3: Payloads/CaVV Interface Requirements Document Due to the potential transmission of competition sensitive data in this deliverable, the Contractor’s Transportation (CVV and CaVV) Provider is allowed, with the Contractor’s concurrence, to transmit this deliverable, or portions of this deliverable, directly to NASA electronically. Should this occur, the Contractor Transportation Provider shall notify the Contractor that such delivery has been made to NASA. The Contractor is still responsible for the timeliness and delivery of the entire DRD to the Government.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR		
<u>DRD CLDC-208.1: Payloads/Destination Interface Requirements Document (IRD)</u> <u>Initial Submission:</u> • Baseline Payloads/Destination IRD Blank Book due at Critical Design Review (CDR). • Baseline Applicability Matrix for a given United States Government (USG) payload/facility due six (6) weeks after the payload kickoff meeting.		

Submission Frequency:

- Final Payloads/Destination IRD Blank Book due at Design Certification Review (DCR). Updates are required when capabilities/interfaces are added or modified, such as new or updated payload facilities.
- Final Applicability Matrix shall be submitted no later than Utilization Integration Review (UIR).

Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment.

Interrelationship: SOW 2.15 Utilization

Applicable Documents:

- DRD CLDC-102 Verification, Validation, and Certification Plan (VVCP)
- DRD CLDC-124 Utilization Integration Plan
- CLDP-PLN-3017 CLDP Utilization Integration Plan

Scope:

The Payloads/Destination Blank Book IRD should define the interface requirements for both pressurized and unpressurized payloads operating either in a Commercial LEO Destination (CLD) payload facility, CLD external platform, or CLD cabin volume.

The Applicability Matrix should include identification of those Payload/Destination Blank Book IRD requirements that are applicable for a proposed pressurized or unpressurized payload along with the verification methods that will be used to close out the interface requirement verifications.

Contents:

The Baseline Payloads/Destination Blank Book IRD shall define the following interface requirements for payloads operating in the CLD cabin volume, CLD payload facilities, and CLD external platform:

1. Hardware
2. Software
3. Environmental (including induced environments)
4. Resource requirements
5. Ground Processing
6. Safety requirements
7. Operational requirements and constraints (if applicable)

The Final Payloads/Destination Blank Book IRD shall include verifications methods for closure.

1. The Applicability Matrix shall include:
 - a. The subset of Payload/Destination Blank Book IRD requirements that are applicable for a given customer payload;
 - b. Verification methods to be used for verifying and closing applicable requirements; and
 - c. Signatures by the Contractor, the Payload Developer, and the CLDP Utilization Office representing an agreement on the applicable requirements and verification methods for a given payload.

Remarks: None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined

version showing the updates made since the last submittal.

DRD CLDC-208.2: Payloads/Crew Visiting Vehicle (CVV) Interface Requirements Document (IRD)

Initial Submission:

- Baseline Payloads/CVV IRD Blank Book due at CDR.
- Baseline Applicability Matrix for a given USG payload/facility due 6 weeks after the payload kickoff meeting.

Submission Frequency:

- Final Payloads/CVV IRD Blank Book due at DCR. Updates are required when capabilities/interfaces are added or modified, such as modifications to a Visiting Vehicle.
- Final Applicability Matrix shall be submitted no later than UIR.

Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment.

Interrelationship: SOW 2.15 Utilization

Applicable Documents:

- DRD CLDC-102 Verification, Validation, and Certification Plan (VVCP)
- DRD CLDC-124 Utilization Integration Plan
- CLDP-PLN-3017 CLDP Utilization Integration Plan

Scope:

The Payloads/CVV Blank Book IRD should define the interface requirements for both pressurized and unpressurized payloads launching or returning on a Visiting Vehicle.

The Applicability Matrix should include identification of those Payload/CVV Blank Book IRD requirements that are applicable for a proposed pressurized or unpressurized payload along with the verification methods that will be used to close out the interface requirement verifications.

Contents:

The Baseline Payloads/CVV Blank Book IRD shall define the following interface requirements for payloads launching or returning on a CVV:

1. Hardware
2. Software
3. Environmental (including induced environments)
4. Resource requirements
5. Ground Processing
6. Safety requirements
7. Operational requirements and constraints (if applicable)

The Final Payloads/CVV Blank Book IRD shall include verifications methods for closure.

The Applicability Matrix shall include:

1. The subset of Payload/CVV Blank Book IRD requirements that are applicable for a given customer payload;
2. Verification methods to be used for verifying and closing applicable requirements; and
3. Signatures by the Contractor, the Payload Developer, and the CLDP Utilization Office representing an agreement on the applicable requirements and verification methods for a given payload.

Remarks: None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

DRD CLDC-208.3: Payloads/CaVV Interface Requirements Document

Initial Submission:

- Baseline Payloads/CaVV IRD Blank Book due at CDR.
- Baseline Applicability Matrix for a given USG payload/facility due 6 weeks after the payload kickoff meeting.

Submission Frequency:

- Final Payloads/CaVV IRD Blank Book due at DCR. Updates are required when capabilities/interfaces are added or modified, such as modifications to a Visiting Vehicle.
- Final Applicability Matrix shall be submitted no later than UIR.

Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment.

Interrelationship: SOW 2.15 Utilization

Applicable Documents:

- DRD CLDC-102 Verification, Validation, and Certification Plan (VVCP)
- DRD CLDC -124 Utilization Integration Plan
- CLDP-PLN-3017 CLDP Utilization Integration Plan

Scope:

The Payloads/CaVV Blank Book IRD should define the interface requirements for both pressurized and unpressurized payloads launching or returning on a Visiting Vehicle.

The Applicability Matrix should include identification of those Payload/CaVV Blank Book IRD requirements that are applicable for a proposed pressurized or unpressurized payload along with the verification methods that will be used to close out the interface requirement verifications.

Contents:

The Baseline Payloads/CaVV Blank Book IRD shall define the following interface requirements for payloads launching or returning on a CaVV:

1. Hardware
2. Software
3. Environmental (including induced environments)
4. Resource requirements
5. Ground Processing
6. Safety requirements
7. Operational requirements and constraints (if applicable)

The Final Payloads/CaVV Blank Book IRD shall include verifications methods for closure.

The Applicability Matrix shall include:

1. The subset of Payload/CaVV Blank Book IRD requirements that are applicable for a given customer payload;
2. Verification methods to be used for verifying and closing applicable requirements; and
3. Signatures by the Contractor, the Payload Developer, and the CLDP Utilization Office representing an agreement on the applicable requirements and verification methods for a given payload.

Remarks: None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

1. DRD Title: Unique Payload Interface Control Document (ICD)		
2. DRD No.: CLDC-209	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Unique Payload Interface Control Document (ICD) is designed to provide the requirements definition and interface details (including induced environmental) between the Commercial Low Earth Orbit (LEO) Destination System (CLDS) and the specified payload. An ICD will be required for each individual pressurized and unpressurized payload that has unique interfaces to CLDS not covered by the Payloads Interface Requirements Document (IRD). As this Data Requirements Description (DRD) applies to the Destination, CVV(s), and CaVV(s), it is broken into multiple DRD sections with different scope, applicability, and unique submittal frequencies. The DRD sections are as follows: DRD CLDC-209.1: [Unique Payload] to [Destination] Interface Control Document (ICD) DRD CLDC-209.2: [Unique Payload] to Crew Visiting Vehicle (CVV) Interface Control Document (ICD) DRD CLDC-209.3: [Unique Payload] to Cargo Visiting Vehicle (CaVV) Interface Control Document (ICD) Due to the potential transmission of competition sensitive data in this deliverable, the Contractor's Transportation Provider (CVV and CaVV) is allowed, with the Contractor's concurrence, to transmit this deliverable, or portions of this deliverable, directly to NASA electronically. Should this occur, the Contractor's Transportation Provider shall notify the Contractor that such delivery has been made to NASA. The Contractor is still responsible for the timeliness and delivery of the entire DRD to the Government.		
11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR		
DRD CLDC-209.1: [Unique Payload] to [Destination] Interface Control Document (ICD)		
Initial Submission: Baseline three (3) months after the Payload Kick-Off Meeting		
Submission Frequency: Final at Mission Integration Review (MIR)		
Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment.		
Interrelationship: SOW 2.15 Utilization		
Applicable Documents: • CLDP-PLN-3017 CLDP Utilization Integration Plan • DRD CLDC-102 Verification, Validation, and Certification Plan		

- DRD CLDC-124 Utilization Integration Plan

Scope:

The Unique Payload to Destination ICD is developed for a more complex payload that has unique interfaces or nonstandard interfaces with the CLD, that are not covered in the Payloads IRD. Standard payloads that meet the standard interfaces that are listed in the Payloads IRD can have their requirements and applicability satisfied by only having an Applicability Matrix applied for that payload in relation to the Payloads IRD. An example of a more complex payload that may require a Unique Payload ICD could be an external payload that needs specialized/nonstandard or potentially new hardware to be developed by the Transportation or Destination Provider for the external payload to safely transit to, attach to, or operate on the CLD. The Unique Payload Interface Control Document will be used to ensure that the hardware/items and activities associated with a specific utilization activity are verified to be safe to be operated on the CLDS both in terms of the CLDS system/hardware and to the crew.

Contents:

The Unique Payload to Destination Interface Control Document defines, to the extent required by each specific payload item, the following interface requirements between the payload and the CLD:

1. Hardware interfaces and resource requirements,
2. Software interfaces and resource requirements,
3. Environmental interfaces and requirements (including induced environments),
4. Ground processing requirements,
5. Safety and interface verification requirements, and
6. Operational requirements and constraints.

The final Unique Payload to Destination ICD includes verifications along with the agreed-to method for closure.

Remarks: The Unique Payload to Destination Interface Control Document shall be signed by the Destination Contractor, the Payload Developer, and the CLDP Utilization Office

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

DRD CLDC-209.2: [Unique Payload] to Crew Visiting Vehicle (CVV) Interface Control Document (ICD)

Initial Submission: Baseline three (3) months after the Payload KickOff Meeting

Submission Frequency: Final at MIR

Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment.

Interrelationship: SOW 2.15 Utilization

Applicable Documents:

- CLDP-PLN-3017 CLDP Utilization Integration Plan
- DRD CLDC-102 Verification, Validation, and Certification Plan
- DRD CLDC-124 Utilization Integration Plan

Scope:

The Unique Payload to CVV ICD is developed for a more complex payload that has unique interfaces or nonstandard interfaces with the CVV, that are not covered in the Payloads IRD. Standard payloads that meet the standard interfaces that are listed in the Payloads IRD can have their requirements and applicability satisfied by only having an Applicability Matrix applied for that payload in relation to the Payloads IRD. An example of a more complex payload that may require a Unique Payload ICD could be an external payload that needs specialized/nonstandard or potentially new hardware to be developed by the Transportation or Destination Provider for the external payload to safely transit to, attach to, or operate on the CLD. The Unique Payload Interface Control Document will be used to ensure that the hardware/items and activities associated with a specific utilization activity are verified to be safe to be operated on the CLDS both in terms of the CLDS system/hardware and to the crew.

Contents:

The Unique Payload to CVV Interface Control Document defines, to the extent required by each specific payload item, following interface requirements between the payload and the CVV:

1. Hardware interfaces and resource requirements,
2. Software interfaces and resource requirements,
3. Environmental interfaces and requirements (including induced environments),
4. Ground processing requirements,
5. Safety and interface verification requirements, and
6. Operational requirements and constraints.

The final Unique Payload to CVV ICD includes verifications along with the agreed-to method for closure.

Remarks: The Unique Payload to CVV Interface Control Document shall be signed by the CVV Contractor, the Payload Developer, and the CLDP Utilization Office

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

DRD CLDC-209.3: [Unique Payload] to Cargo Visiting Vehicle (CaVV) Interface Control Document (ICD)

Initial Submission: Baseline 3 months after the Payload KickOff Meeting

Submission Frequency: Final at MIR

Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment.

Interrelationship: SOW 2.15 Utilization

Applicable Documents:

- CLDP-PLN-3017 CLDP Utilization Integration Plan
- DRD CLDC-102 Verification, Validation, and Certification Plan
- DRD CLDC-124 Utilization Integration Plan

Scope:

The Unique Payload to CaVV ICD is developed for a more complex payload that has unique interfaces or nonstandard interfaces with the CaVV, that are not covered in the Payloads IRD. Standard payloads that meet

the standard interfaces that are listed in the Payloads IRD can have their requirements and applicability satisfied by only having an Applicability Matrix applied for that payload in relation to the Payloads IRD. An example of a more complex payload that may require a Unique Payload ICD could be an external payload that needs specialized/nonstandard or potentially new hardware to be developed by the Transportation or Destination Provider for the external payload to safely transit to, attach to, or operate on the CLD. The Unique Payload Interface Control Document will be used to ensure that the hardware/items and activities associated with a specific utilization activity are verified to be safe to be operated on the CLDS both in terms of the CLDS system/hardware and to the crew.

Contents:

The Unique Payload to CaVV Interface Control Document defines, to the extent required by each specific payload item, following interface requirements between the payload and the CaVV:

1. Hardware interfaces and resource requirements,
2. Software interfaces and resource requirements,
3. Environmental interfaces and requirements (including induced environments),
4. Ground processing requirements,
5. Safety and interface verification requirements, and
6. Operational requirements and constraints.

The final Unique Payload to CaVV ICD includes verifications along with the agreed-to method for closure.

Remarks: The Unique Payload Interface Control Document shall be signed by the CaVV Contractor, the Payload Developer, and the CLDP Utilization Office

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

1. DRD Title: Crew Specific Activities		
2. DRD No.: CLDC-210	3. Data Type: 2/3	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: To provide NASA with the Contractor's operational and training documentation that is delivered pre-flight to support flight readiness reviews. This Data Requirements Description (DRD) is divided into multiple DRD sections with different scope, applicability, and unique submittal frequencies. The DRD sections are as follows: DRD CLDC-210.1: Crew Selection Evaluation (Type 2) DRD CLDC-210.2: Crew Mission Evaluation (Type 2) DRD CLDC-210.3: Signed Crew Code of Conduct and Informed Consent (Type 3) 11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR		
<u>DRD CLDC-210.1: Crew Selection Evaluation (Type 2)</u> Initial Submission: Due prior to the start of Crew training. Submission Frequency: Updated deliveries required for each mission Format: Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment. Interrelationship: • Clause Authority and Responsibilities of the Destination Commander, Chain-Of-Command and Succession On-Orbit; Relationship Between Ground and On-Orbit Management • Clause Informed Consent and Assumption of Risk for Non-USG Crew • SOW Sections 2.18 Human Health, Medical and Performance • SOW Section 2.20 Crew Selection and Mission Evaluation • SOW Section 2.21 Crew Code of Conduct (CCoC) Applicable Documents: • CLDP-STD-1150 Commercial Low-Earth Orbit Development Program Operations Standard • CLDP-PLN-1111 Crew Health Operations Concept (CHOC) • CLDP-STD-1123 Commercial Low-Earth Orbit Development Program Medical Standards and Capabilities.		

Scope: The results of the Contractor's Crew Selection Evaluation will be provided.

Contents: The Contractor's crew selection evaluation report shall provide overall rationale for crew selection along with access to the evaluation data collected in accordance with DRD CLDC-130 Crew Selection and Evaluation Plan.

Remarks: Reference information on NASA's approach to astronaut medical standards and certification can be found in Office of Chief Health and Medical Office (OCHMO)-STD-100.1A NASA Astronaut Medical Standards, Selection and Annual Recertification and OCHMO-TB-034 Crew Selection and Recertification Technical Brief.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

DRD CLDC-210.2: Crew Mission Evaluation (Type 2)

Initial Submission: No later than one (1) month prior to Operations Readiness Review (ORR)

Submission Frequency: Final Submission delivered at ORR; Updated deliveries required for each mission

Format: Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment.

Interrelationship:

- Clause Authority and Responsibilities of the Destination Commander, Chain-Of-Command and Succession On-Orbit; Relationship Between Ground and On-Orbit Management
- Clause Informed Consent and Assumption of Risk for Non-USG Crew
- SOW Section 2.18 Human Health, Medical and Performance
- SOW Section 2.20 Crew Selection and Mission Evaluation
- SOW Section 2.21 Crew Code of Conduct (CCoC)

Applicable Documents:

- CLDP-STD-1150 Commercial Low-Earth Orbit Development Program Operations Standard
- CLDP-PLN-1111 Crew Health Ops Con (CHOC)
- CLDP-STD-1123 Commercial Low-Earth Orbit Development Program Medical Standards and Capabilities.

Scope: The process for crew mission evaluation is used to determine readiness for a crewmember to fly on a specific mission and this evaluation will be provided for review.

Contents: The Contractor shall complete and deliver the Crew Mission Evaluation data as noted below in accordance with DRD CLDC-130 Crew Selection and Evaluation Plan:

- Confirmation that all required training is complete. If any training is outstanding, identify completion date.
- Medical and behavioral assessment data.
- Confirmation of English language proficiency using the American Council on the Teaching of Foreign Languages (ACTFL) scale at Intermediate to High for safety purposes.
- Confirmation of any additional requirements levied by the Contractor are complete.

Remarks: Reference information on NASA's approach to astronaut medical standards and certification can be found in OCHMO-STD-100.1A NASA Astronaut Medical Standards, Selection and Annual Recertification, and OCHMO-TB-034 Crew Selection and Recertification Technical Brief.

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

DRD CLDC-210.3: Signed Crew Code of Conduct and Informed Consent (Type 3)

Initial Submission: No later than one (1) month prior to Operations Readiness Review (ORR).

Submission Frequency: Updated deliveries required for each mission

Format: Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment.

Interrelationship:

- Clause Authority and Responsibilities of the Destination Commander, Chain-Of-Command and Succession On-Orbit; Relationship Between Ground and On-Orbit Management
- Clause Informed Consent and Assumption of Risk for Non-USG Crew
- SOW Section 2.18 Human Health, Medical and Performance
- SOW Section 2.20 Crew Selection and Mission Evaluation
- SOW Section 2.21 Crew Code of Conduct (CCoC)

Applicable Documents: None

Scope: The Contractor will require signature as acknowledgement of the CCoC from each crewmember and store this signature for future reference.

Contents: The Contractor shall provide NASA with access to the signed versions of the CCoC and all required informed consent documents as noted in Clause Liability and Insurance Requirements for Private Astronauts and Commercial Cargo and Payloads and in accordance with DRD CLDC-129 Crew Code of Conduct.

Remarks: None

Maintenance: Updates to this document shall be incorporated by resubmission of the document. Changes shall be incorporated by complete reissue with a change log in the front matter of the document.

1. DRD Title: Destination to Visiting Vehicle (VV) Integration (DVVI) Documentation		
2. DRD No.: CLDC-211	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>To be filled in by CO at award</u>	8. Date Revised: <u>To be filled in by CO following first revision after at award</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: This documentation describes the Commercial LEO Destination (CLD) Contractor's execution plan, interface documentation, and the data exchanges needed to verify and validate the Destination to Crew and Cargo Visiting Vehicle (VV) interfaces through all mission phases, including proximity operations (i.e. free flight) and attached operations (i.e. berthed or docked). This includes the development of joint integration and requirements documents, physical and functional interface documents, review plans, and review processes. This Data Requirements Description (DRD) is only applicable when NASA is providing crew and cargo transportation services as Government Furnished Service (GFS) and is broken into multiple DRD sections with different scope, applicability, and unique submittal frequencies. The DRD sections are as follows: DRD CLDC-211.1: DVVI Plan DRD CLDC-211.2: DVVI Interface Requirements Document (IRD) DRD CLDC-211.3: DVVI Data Set DRD CLDC-211.4: DVVI Interface Control Document (ICD) 11. Distribution: One (1) Electronic Copy to the Commercial Destination Office (CDO) Authorized Repository. Send a Program Authorized Repository Upload Notification to: 1. NASA Contracting Officer (CO) 2. NASA CDO Contracting Officer Representative (COR) and Alternate COR		
<u>DRD CLDC-214.1 DVVI Plan</u> Initial Submission: Baseline at Preliminary Design Review (PDR) (if PDR is required) or Final at Critical Design Review (CDR), and updates as necessary thereafter. Submission Frequency: Final at CDR. Updates as required Format: The contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment. Interrelationship: • CLDC-102 Verification, Validation, and Certification Plan (VVCP) and Annex, • SOW Section 2.17 Transportation Applicable Documents: • CLDP-STD-1101 Commercial Low-Earth Orbit Development Program Common Docking System Standard		

- CLDP-STD-1170 Commercial Low-Earth Orbit Development Program (CLDP) Common Communications for Commercial Destinations in Low-Earth Orbit (C3DL) Radio Frequency (RF) Interface Standard
- CLDP-REQ-1130 Requirements and Standards for the Commercial Low-Earth Orbit Development Program
- CLDP-PLN-2000 Commercial Low-Earth Orbit Destination System Certification Plan

Scope:

The DVVI plan shall define the data and products by which a crew or cargo VV will achieve technical integration with the Destination. The particular focus shall be on development of joint products and closure of verification requirements through Commercial LEO Destination (CLD) Contractor defined integration reviews, analyses, and tests. Further, the documentation shall identify the data the contractor is expected to provide to the crew and cargo VV Provider to be able to effectively develop their respective vehicles, mission support, and ground support systems and to be able to verify and validate the Destination to VV interface.

Contents:

The DVVIP shall define and manage the activities (ex., testing, analysis) required to verify and validate the hardware, software and radio frequency interfaces between the destination and the VV. The plan shall include the following:

1. Roles and responsibilities for the Destination Contractor, VV Contractor, and NASA.
2. Description of major reviews and associated success criteria, outside those identified in CLDC-102, Verification, Validation, and Certification Plan (VVCP) and Annex.
3. Identification and description of plans and process that control the destination contractor's management of the DVVIP (ex. Program plan, Safety and Mission Assurance (S&MA) Plan). These items will need to be made available to the VV Contractor and NASA.
4. Description of managing boards, panels, and/or working groups.
5. Identification of the hardware, software, and data that will be exchanged between Destination Contractor and the VV Contractor to facilitate the Destination Contractor's tasks for integration of the total Commercial Low Earth Orbit Development Services (CLDS) and the VV Contractor's completion of the VV design and verification.
6. Identification of NASA hardware and software necessary to facilitate the Destination Contractor's tasks for integration of the total CLDS.
7. Identification and definition of the technical data that will be exchanged between Destination Contractor and the VV Contractor to facilitate the Destination Contractor's tasks for integration of the total CLDS and the VV Contractor's completion of the VV design and verification. The description shall include.
 - a. Data delivery date
 - b. Entity responsible for development and delivery of the data
 - c. Detailed description of the data
 - d. Format
 - e. Scope/purpose of the data
8. Description of joint analysis co-conducted between the CLD contractor and the VV Contractor to confirm compliance with interface requirements. Description should include:
 - a. Purpose of the analysis
 - b. any controlling documentation
 - c. Verification statement
 - d. Data exchange requirements

- e. SW exchange requirements
- f. Effectivity, including if test is reoccurring (aka required for each mission)
9. Description of joint verification tests including for each test:
 - a. Purpose of the test
 - b. Successor and precursor
 - c. Source or requirement(s)
 - d. Test Parameters and success criteria.
 - e. Schedule of events including development activities
 - f. Roles and responsibilities of each party
 - g. Expected equipment each party is responsible for
 - h. Test facilities.
 - i. Expected products and recipients.
 - j. HW and SW maturity expectations
 - k. Effectivity, including if test is reoccurring (aka required for each mission)
10. Requirements management and Verification and Validation (V&V) plans unique to the Destination VV relationship.

Remarks: Multiple IRDs and ICDs may be needed to support different mission phases (ex, attached and free flight), system specific design interfaces (ex: software, RF, structures), and/or visiting vehicle type (Ex, crew, cargo, docking berthing).

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

DRD CLDC-214.2 DVVI Interface Requirements Document (IRD)

Initial Submission: Baseline at Certification Baseline Review (CBR).

Submission Frequency: Final at Preliminary Design Review (PDR) or Critical Design Review (whichever occurs earlier), and updates as necessary thereafter.

Format: The contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment.

Interrelationship:

- CLDC-102 Verification, Validation, and Certification Plan (VVCP)
- SOW Section 2.17 Transportation
-

Applicable Documents:

- CLDP-STD-1101 Commercial Low-Earth Orbit Development Program Common Docking System Standard
- CLDP-STD-1170 Commercial Low-Earth Orbit Development Program (CLDP) Common Communications for Commercial Destinations in Low-Earth Orbit (C3DL) Radio Frequency (RF) Interface Standard
- CLDP-REQ-1130 Requirements and Standards for the Commercial Low-Earth Orbit Development Program
- CLDP-PLN-2000 Commercial Low-Earth Orbit Destination System Certification Plan

Scope: The DVVI documentation shall define the data and products by which a crew or cargo VV will achieve technical integration with the Destination. The particular focus shall be on development of joint products and closure of verification requirements through Commercial LEO Destination (CLD) Contractor defined integration reviews, analyses, and tests. Further, the documentation shall identify the data the contractor is expected to provide to the crew and cargo VV Provider to be able to effectively develop their respective vehicles, mission support, and ground support systems and to be able to verify and validate the Destination to VV interface.

Contents: The CLD Contractor shall develop and maintain IRD(s) defining the Destination to Visiting Vehicle interface requirements during proximity operations and attached operations. The documentation should address the following:

1. Requirements defining the physical, data, software, and RF interfaces between the Destination vehicle and any crew or cargo vehicle. The requirements shall include requirements derived from NASA documentation including CLDP-REQ-1130, CLDP-STD-1101, and CLDP-STD-1170
2. Verification statements for each requirement clearly identifying a specific measure of success and verification method.

Remarks: Multiple IRDs and ICDs may be needed to support different mission phases (ex, attached and free flight), system specific design interfaces (ex: software, RF, structures), and/or visiting vehicle type (Ex, crew, cargo, docking berthing).

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

DRD CLDC-214.3 DVVI Data Set

Initial Submission: To be negotiated with the VV Contractor to support design development and potentially mission unique updates.

Submission Frequency: Updates as required.

Format: To be negotiated with the Government Furnished Service (GFS) VV Contractor to ensure compatibility.

Interrelationship:

- CLDC-102 Verification, Validation, and Certification Plan (VVCP)
- SOW Section 2.17 Transportation
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Applicable Documents:

- CLDP-STD-1101 Commercial Low-Earth Orbit Development Program Common Docking System Standard
- CLDP-STD-1170 Commercial Low-Earth Orbit Development Program (CLDP) Common Communications for Commercial Destinations in Low-Earth Orbit (C3DL) Radio Frequency (RF) Interface Standard
- CLDP-REQ-1130 Requirements and Standards for the Commercial Low-Earth Orbit Development

Program

- CLDP-PLN-2000 Commercial Low-Earth Orbit Destination System Certification Plan

Scope:

The DVVI documentation shall define the data and products by which a crew or cargo VV will achieve technical integration with the Destination. The particular focus shall be on development of joint products and closure of verification requirements through Commercial LEO Destination (CLD) Contractor defined integration reviews, analyses, and tests. Further, the documentation shall identify the data the contractor is expected to provide to the crew and cargo VV Provider to be able to effectively develop their respective vehicles, mission support, and ground support systems and to be able to verify and validate the Destination to VV interface.

Contents:

The CLD Contractor shall provide the necessary Destination data set to support of the VV Contractor's design development, integration, and verification. This data may need to be updated and resubmitted as part of mission milestones based on the CLD design approach and external configuration changes. This data should include:

1. Destination Computer-Aided Design (CAD) models
 - a. As-built data on the location and orientation of all Destination navigation aids, including lighting used during Rendezvous, Proximity Operations, Docking (RPOD).
 - b. Docking interface, including thermal, power, data, environmental interfaces
 - c. Destination configuration, including external appendage configuration during VV proximity operations.
2. Destination Space-to-Space Communication link budget data.
3. Results of Destination Provider analysis
 - a. Docking loads and soft capture performance report from docking loads and capture performance analysis
 - b. Destination plume impingement loads assessment report including solar array keep-out-zone plots, operational constraints and recommendations on jet firing sequences for VV proximity operations. Report should also include an assessment of the Destination plume impingement on the VV.
4. Destination attributes and characteristics
 - a. Maximum and minimum destination air drag conditions.
 - b. Destination attitude control mathematical models covering all planned Destination attitude behaviors during proximity operations.
 - c. Destination thruster characteristics data and jet firing histories.

Remarks: Multiple IRDs and ICDs may be needed to support different mission phases (ex, attached and proximity operations), system specific design interfaces (ex: software, RF, structures), and/or visiting vehicle type (Ex, crew, cargo, docking, berthing).

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

DRD CLDC-214.4 DVVI Interface Control Document (ICD)

Initial Submission: Baseline at Preliminary Design Review (PDR) (if PDR is required) or Final at Critical

Design Review (CDR), and updates as necessary thereafter.

Submission Frequency: Final at CDR. Updates as required.

Format: The contractor's format is acceptable and shall be in accordance with Data Format section at the beginning of this attachment.

Interrelationship:

- CLDC-102 Verification, Validation, and Certification Plan (VVCP)
- SOW Section 2.17 Transportation

Applicable Documents:

- CLDP-STD-1101 Commercial Low-Earth Orbit Development Program Common Docking System Standard
- CLDP-STD-1170 Commercial Low-Earth Orbit Development Program (CLDP) Common Communications for Commercial Destinations in Low-Earth Orbit (C3DL) Radio Frequency (RF) Interface Standard
- CLDP-REQ-1130 Requirements and Standards for the Commercial Low-Earth Orbit Development Program
- CLDP-PLN-2000 Commercial Low-Earth Orbit Destination System Certification Plan

Scope: The DVVI documentation shall define the data and products by which a crew or cargo VV will achieve technical integration with the Destination. The particular focus shall be on development of joint products and closure of verification requirements through Commercial LEO Destination (CLD) Contractor defined integration reviews, analyses, and tests. Further, the documentation shall identify the data the contractor is expected to provide to the crew and cargo VV Provider to be able to effectively develop their respective vehicles, mission support, and ground support systems and to be able to verify and validate the Destination to VV interface.

Contents: The CLD Contractor shall develop and maintain ICDs defining the Destination to Visiting Vehicle interfaces during rendezvous, docking/undocking, berthing/unberthing and attached operations. The documentation should address the following:

1. Details of the hardware interfaces during docked operations, including:
 - a. Utility (e.g., power, thermal, data) including any pin configuration and connector keying/clocking.
 - b. Active mechanisms (e.g., latching mechanisms, bolts)
 - c. VV docking orientation clocking information.
2. Detailed destination configuration, including:
 - a. Destination Navigation Aids / Targets
 - i. Specification for all Destination rendezvous navigation and docking/alignment aids. Examples: retro-reflectors, fiducials, piloting cues.
 - ii. Location and orientation data.
 - b. Description of destination assets (e.g., Light Intensification Detection and Ranging (LIDARs), cameras, radiometric ranging, lighting locations, etc.) used to perform tracking and/or state estimation of VVs during RPOD.
3. Details of Destination orbit constraints, including:
 - a. Destination control modes, and associated performance, possible during Rendezvous and Proximity Operations.
 - i. Account for all possible target vehicle control modes/methods.

- ii. Commanded/Targeted attitude ranges (bounding angular offset from Local Vertical/Local Horizontal (LVLH))
 - iii. Attitude error sources (attitude knowledge, bias/mean off of the commanded/targeted attitude, structural misalignment of docking port, etc.)
 - iv. Amplitude (+/- off of commanded) and type of motion (sinusoidal, bang-bang, etc.), attitude rates, accelerations (may be needed to model transient responses)
 - v. Target attitude response to chasing vehicle pluming – chasers will chase the docking port and extended docking axis by definition.
- b. Destination configurations that may have different drag (e.g., solar array configuration).
 - i. Drag specifications (e.g., drag coefficients, acceleration, etc.).
- 4. Description and details of the software interfaces during all mission phases, including:
 - a. Description and details of the Destination to VV data interfaces.
 - b. Definition of destination commands of the VV.
 - c. Details on telemetry exchanged between VVs and Destination.
 - i. Destination and VV Telemetry data definitions
 - ii. Description of telemetry required from VVs necessary to support Destination crew monitoring (e.g., points of reference for relative state data, reference frames, Euler angle sequence, etc.
 - iii. Description of Destination navigation data that will be made available to the VVs for their relative navigation. Examples: attitude, GPS, translational state estimate, etc.
 - (1) Examples of information that will need to be documented: operating modes, performance metrics (e.g., how to model bias, noise, drift, unique characteristics, etc.), fault tolerance and Failure, Detection, Isolation and Recovery (FDIR) (e.g., what FDIR checks exist and what are the associated metrics, how many strings exist and is swapping possible, etc.), telemetry (e.g., data and quality indicators), etc.
- 5. Description and details of the space-to-space RF communications interface, including:
 - a. Implementation of CLDP-STD-1170, Common Communications for Commercial Destinations in LEO (C3DL) Radio Frequency (RF) Interface Standard
 - b. Application of Space-Space communications security and cryptographic processing
 - c. Definition of the data content, network layer, data link layer, and physical layer
 - d. Fault detection, isolation, and recovery

Remarks: Multiple IRDs and ICDs may be needed to support different mission phases (ex, attached and free flight), system specific design interfaces (ex: software, RF, structures), and/or visiting vehicle type (Ex, crew, cargo, docking berthing).

Maintenance: Updates to this document shall be incorporated by resubmission of the document. DRD deliverable submittals shall include two versions 1) a clean copy with redlines incorporated 2) and Redlined version showing the updates made since the last submittal.

1. DRD Title: Crew Accommodations Plan		
2. DRD No.: CLDC-212	3. Data Type: 1	4. OPR: CDO
5. Solicitation No.: 80JSC026R0021	6. Contract No.: <i>(Insert contract number)</i>	
7. Date Issued: <u>Insert the date the baseline was issued.</u>	8. Date Revised: <u>Include the revision date (if this DRD has been revised)</u>	9. DRD Category: Technical ☒ Administrative ☐ S&MA ☐
10. Description/Use: The Crew Accommodations Plan will be used for each Increment to define the Contractor's processes and interaction with NASA for planning the Increment-specific crew accommodations.		
11. Distribution: 1 Electronic Copy to the Commercial Destination Office (CDO) Program Authorized Repository Send a Program Authorized Repository Upload Notification to: - NASA CO - NASA CDO COR and Alternate COR		
Initial Submission: Baseline at MBR		
Submission Frequency: Final at MIR, updates as required		
Format: The Contractor's format is acceptable and shall be in accordance with the Data Format section at the beginning of this attachment.		
Interrelationship: SOW 2.14 Mission Integration		
Applicable Documents: CLDP-REQ-1130 <i>Requirement and Standards for the Commercial Low-Earth Orbit Development Program.</i>		
Scope: The Contractor's Crew Accommodations Plan is specific to each RFTOP and includes all information needed to plan for crew accommodations for USG crew on a specific mission.		
Contents: The Crew Accommodations Plan shall: - Describe how the Contractor plans to supply the on-orbit crew with Common Use and Crew Provision Items. The Contractor shall meet the intent of the items and usage rates described in the table below. - Describe how the Contractor plans to allow the USG crew to select standard crew accommodations for each mission, including a crew accommodations catalogue - Define the catalog of available crew accommodation items, including clothing, hygiene supplies, personal entertainment, and others as decided by the Contractor.		

Items	Usage Rate
Disinfectant Wipes	3 pkg / 5 days / Crew complement
Wet Wipes	1 pkg / 5 days / Crew member
Dry Wipes (tissues)	1 pkg / 3 days / Crew member
Hygiene Towels	1 / 3 days / Crew member
Towels	1 / 7 days / Crew member
Washcloths	1 / 7 days / Crew member
Large Nitrile Gloves	1 pkg/60 days/Crew member
Medium Nitrile Gloves	1 pkg/60 days/Crew member
Shampoo	1 bottle / 60 days / Crew member
and Shave Cream	1 tube / 60 days / Crew member
Gray Tape (1" & 2" rolls)	1 roll 1" / 45 days / Crew complement
	1 roll 2" / 30 days / Crew complement
Kapton Tape (1" & 2" rolls)	1 roll ea / 30 days / Crew complement
Printer Paper	1 ream / 90 days / Crew complement
and Cartridges	1 ea black and color cartridge / 90 days / Crew complement
Alkaline Batteries (AAAA, AAA, C, D, 9V)	1 AAAA / 60 days / Crew complement
	1 pkg 30 AAAs / 39 days / Crew complement
	1 pkg 6 Cs / 54 days / Crew complement
	1 pkg 6 Ds / 34 days / Crew complement
	1 pkg 4 9Vs / 23 days / Crew complement
AA Batteries	1 pkg (qty 36) / 13 days / Crew complement

AA Batteries Lithium	1 pkg (qty 36) / 13 days / Crew complement
Office Supply - Consumables	as needed
Office Supply - Spares	as needed
Contingency Suitcases	as needed
Feminine Hygiene - Contingency	as needed

Crew Provision Items

Items	Usage Rate / Crew Member
Cargo/Tactical Pants	1/30 days
Cargo/Tactical Shorts	1/30 days
T-Shirts (Daily Wear)	1/7 days
Shirts	1/15 days
Sweaters	1/90 days
Men's Underwear	1/3 days
Women's Underwear	1/2 days
Daily Wear Bra	1/14 days
Crew / Ankle Socks	1/5 days
Sleepwear	1/60 days
Synthetic Fleece Socks	1/Mission
Athletic Shorts	1/7 days
Exercise Shirts	1/5 days
Athletic Sports Bra	1/7 days
Exercise Socks	1/7 days
Athletic Shoes	1/Mission
Cycling Shoes	1/Mission
US Sleeping Bag Insert	1/60 days
Body Bath Soap Pouch	1/14 days
Deodorant	1/60 days
Toothbrush	1/21 days

Toothpaste	1/90 days
Floss	1/60 days

Remarks: SSP 50477 Joint Crew Provisioning Catalog Revision C and the embedded file (items marked Crew Provisions) can be used as reference material.



Crew Provisions
Hardware List.pdf

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