

Omnibus Multidiscipline Engineering Services (OMES)

Task Order 2 - Systems Engineering Services to JPSS Flight Project

Period of Performance: 56 months

Modifications: 9

Task Value: \$25.7M

Scope of Work:

Risk Management

1) Support in the planning, organizing, scheduling, managing and directing of risk management efforts assessing the procurement, development, fabrication and assembly, integration and test, launch, and on-orbit activation of the JPSS-1 flight segment; 2) Participate in program status meetings, telecons, peer reviews, and major project reviews for spacecraft, instruments, launch vehicle, mission operations system, and science data system. 3) Actively lead and conduct the JPSS Flight Risk boards. Identify risk elements, develop and execute mitigation steps; coordinate the JPSS Flight Project risk board activities including [REDACTED] database development, tracking, reporting and scheduling of risk board and pre-board activities. 4) Analyze contractor cost, schedule and technical performance 5) Provide written and oral reports [REDACTED].

Periodic Travel is Required in Support of Activity approximately 1 trip per quarter. Travel is to be Pre-Approved by Project Travel Locations shall Include, [REDACTED], following locations: 1. Semiannual Trips to Satellite Provider (Boulder, CO) [REDACTED] 2. Semiannual Trips to Instrument Provider (Assume Asuza, CA for costing) [REDACTED] Trip Reports in Contractor Format required within seven (7) days of completion of trip.

Verification Engineering Support

1) Support in the planning, organizing, scheduling, managing and directing of system engineering verification efforts associated with the assembly, integration and test, launch, and on-orbit activation of the JPSS-1 observatory, as well as the individual spacecraft and instrument elements and related subsystems. 2) Participate in program status meetings, telecons, peer reviews, and major project reviews for spacecraft, instruments, launch vehicle, mission operations system, and science data system. 3) Actively conduct the system engineering activities associated with requirements definition, flow-down, validation and verification of all JPSS Observatory elements; 4) Support with requirements management activities associated with the DOORs databases including routine functions within the DOORs database for requirements verification and tracking. 5) Review project requirements and verification documentation and submit comments and recommendations; 6) Prepare and present technical information for technical meetings / reviews / briefings; 7) Analyze configuration, design, and procedural changes submitted to the Project change control boards; 8) Identify risk elements,

develop and execute mitigation steps; participate in the JPSS Flight Project risk board 9) Analyze contractor cost, schedule and technical performance 10) Provide written and oral reports

Recurring Travel is Required in Support of Activity approximately 1 trip per month Travel is to be Pre-Approved by Project Travel Locations shall Include following locations: 1. Bimonthly trips to Satellite Provider (Boulder, CO) 2. Quarterly Trips to Instrument Providers (Assume Azusa, CA for costing purposes) Trip Reports in Contractor Format required within seven (7) days of completion of trip.

Observatory Systems Engineering

1) Support in the planning, organizing, scheduling, managing and directing of efforts from procurement, development, fabrication and assembly, integration and test, launch, and on-orbit activation of the spacecraft's guidance navigation and control subsystem and associated hardware and software; 2) Participate in program status meetings, telecons, peer reviews, and major project reviews for spacecraft, instruments, launch vehicle, mission operations system, and science data system. 3) Support with requirements definition, flow-down, validation and verification; 4) Support with Project trade-studies; 5) Review project documentation and submit comments and recommendations; 6) Prepare and present technical information for technical meetings / reviews / briefings; 7) Analyze configuration, design, and procedural changes submitted to the Project change control boards; 8) Identify risk elements, develop and execute mitigation steps; participate in the JPSS Flight Project risk board 9) Analyze contractor cost, schedule and technical performance 10) Participate in Test / Failure Review Boards for instruments, space and ground segments.

1) Support in the planning, organizing, scheduling, managing and directing of efforts from fabrication and assembly, integration and test, launch, and on-orbit activation of the JPSS -1 Observatory - particularly in areas of electrical systems engineering and integration and test. 2) Participate in program status meetings, telecons, peer reviews, and major project reviews for spacecraft, instruments, launch vehicle, mission operations system, and science data system. 3) Support with requirements definition, flow-down, validation and verification; 4) Support with Project trade-studies; 5) Review project documentation and submit comments and recommendations; 6) Prepare and present technical information for technical meetings / reviews / briefings; 7) Analyze configuration, design, and procedural changes submitted to the Project change control boards; 8) Identify risk elements, develop and execute mitigation steps; participate in the JPSS Flight Project risk board 9) Analyze contractor cost, schedule and technical performance 10) Participate in Test / Failure Review Boards for instruments, space and ground segments.

1) Support in the planning, test requirement and procedure development, and execution of EMI/EMC testing efforts during the integration and test of the JPSS Observatory hardware. Include in the scope are tests performed at the spacecraft component, instrument and spacecraft levels, and integrated observatory level. 2) Participate in program status meetings,

telecons, peer reviews, and major project reviews for spacecraft, instruments, and launch vehicle. 3) Support with EMI/EMC requirements definition, flow-down, validation and verification; 4) Support with Project trade- studies; 5) Prepare and present technical information for technical meetings / reviews / briefings; 6) Identify risk elements, develop and execute mitigation steps; participate in the JPSS Flight Project risk board.

Environmental testing support for the JPSS-1 observatory. This includes [REDACTED] dynamics testing; EMI/EMC and thermal vac testing. This would include travel to the observatory vendor and to the launch site. This would include shift work.

Recurring Travel is Required in Support of Activity approximately 1 trip per month Travel is to be Pre-Approved by Project Travel Locations shall Include [REDACTED] following locations: 1. Monthly trips to Satellite Provider (Boulder, CO) [REDACTED] 2. Quarterly Trips to Vandenberg AFB (NASA KSC Resident Office) [REDACTED] 3. Quarterly Trips to Instrument Providers [REDACTED] (Assume Azusa, CA) Trip Reports in Contractor Format required within seven (7) days of completion of trip.

Launch Vehicle Integration

Provide launch vehicle integration management to manage the launch vehicle integration process between the spacecraft vendor and the NASA/Kennedy Space Center (KSC) Launch Services Program (LSP) including: Development of launch vehicle interface requirements; Participation in the LSP launch vehicle procurement process; Tracking of launch vehicle design, manufacturing, and certification for the JPSS Flight Project launches; Coordination of the launch environment specifications between KSC and the spacecraft and instrument vendors; Planning for the spacecraft launch site processing operations.

Recurring Travel is Required in Support of Activity approximately 1 trip per month Travel is to be Pre-Approved by Project Travel Locations shall Include [REDACTED] following locations: 1. Bimonthly trips to Satellite Provider (Boulder, CO) [REDACTED] 2. Quarterly Trips to Kennedy Space Center (KSC) [REDACTED] 3. Bimonthly trips to Vandenberg AFB (NASA KSC Resident Office) [REDACTED] 4. Quarterly Trips to Launch Vehicle Provider (Colorado) Trip Reports in Contractor Format required within seven (7) days of completion of trip.

Mission Operations and Data Trending Support

1) Support in the planning, organizing, collection, and reporting of instrument and spacecraft performance trending during the integration and test, launch, and on-orbit activation of the JPSS-1 integrated observatory. 2) Support in the planning, organizing, collection, and reporting of instrument and spacecraft performance trending of the SNPP observatory. 3) Participate in program status meetings, telecons, peer reviews, and major project reviews for spacecraft, instruments, launch vehicle, mission operations system, and science data system. 4) Prepare and present technical information for technical meetings / reviews / briefings; 5) Participate in Test / Failure Review Boards for instruments, space and ground segments as related to on-orbit

anomalies for the SNPP observatory. 6) Participate in Test / Failure Review Boards for instruments, space and ground segments as related to integration and test anomalies for the JPSS-1 observatory. 7) Provide written and oral reports [REDACTED].

Infrequent Travel is Required in Support of Activity approximately 1 trip per year Travel is to be Pre-Approved by Project Travel Locations shall include [REDACTED] following locations: 1. Annual trips to Satellite Provider (Boulder, CO) [REDACTED] Local Travel to NOAA Satellite Operations (Suitland, MD) may be done as required to support trending and analysis activities. Trip Reports in Contractor Format required within seven (7) days of completion of trip.

Science Data Analysis Infrastructure Development

Contractor will secure the necessary IT hardware and software necessary for the development of deployable science data analysis capability for first use in the NASA VIIRS [REDACTED] Resident Office, the NASA CrIS Exelis Resident Office, then finally the NASA [REDACTED] Resident Office during JPSS-1 observatory integration and test. The contractor will procure, configure, install and test the data analysis system as well as provide the software engineering and analysis support to develop and implement robust, automatic, and near-real-time telemetry trending routines to enable the NASA JPSS VIIRS science teams to effectively monitor JPSS VIIRS instrument engineering performance as well as health and safety performance throughout the pre-launch ground test events. The support on this task governs the initial deployment of the data analysis system to the VIIRS resident office in El Segundo, CA.

Episodic Travel may be Required in Support of Activity not to exceed two fact-finding trips and one system acceptance trip over the period of performance. Travel is to be Pre-Approved by Project. Travel Locations shall include [REDACTED] following locations: 1. Fact Finding: NASA VIIRS Resident Office (assume El Segundo, CA for costing) [REDACTED] 2. System Acceptance: Installation/checkout and government acceptance of data analysis system - [REDACTED]. Trip Reports in Contractor Format required within seven (7) days of completion of trip. NOTE: Detailed Science Data Analysis Support for Instrument Thermal Vacuum testing will be covered under separate sub-task modification.

Mechanical Engineering Services JPSS Flight

The contractor shall plan, monitor and control the development of integration and test procedures with the spacecraft vendor and the instrument vendors. The contractor shall support instrument science data flow to the NOAA N-Wave system and coordinate verification of requirements with the NASA and NOAA Science team.

J2/3/4 Observatory Systems Engineering Support

1. Support in the planning, organizing, scheduling, managing and directing of efforts from fabrication and assembly, integration and test, launch, and on-orbit activation of the JPSS -2/3/4 Observatory including on-site resident activities.
2. Support in the planning, organizing, scheduling, managing and directing of efforts from procurement, development, fabrication and assembly, integration and test, launch, and on-orbit activation of the spacecraft's guidance navigation and control subsystem and associated hardware and software.
3. Participate in program status meetings, telecons, peer reviews, and major project reviews for spacecraft, instruments, launch vehicle, mission operations system, and science data system.
4. Support with requirements definition, flow-down, validation and verification;
5. Support Project trade-studies.
6. Review project documentation and submit comments and recommendations.
7. Prepare and present technical information for technical meetings/reviews/briefings.
8. Analyze configuration, design, and procedural changes submitted to the Project change control boards.
9. Identify risk elements, develop and execute mitigation steps; participate in the JPSS Flight Project risk board.
10. Participate in Test / Failure Review Boards for instruments, space and ground segments.
11. Plan, monitor and control the development of integration and test procedures with the spacecraft vendor and the instrument vendors.

Data trending

1) Support in the planning, organizing, collection, and reporting of instrument and spacecraft performance trending during the integration and test, launch, and on-orbit activation of the JPSS-1 integrated observatory. 2) Participate in program status meetings, telecons, peer reviews, and major project reviews for spacecraft, instruments, launch vehicle, mission operations system, and science data system. 3) Prepare and present technical information for technical meetings / reviews / briefings; 4) Participate in Test / Failure Review Boards for instruments, space and ground segments as related to integration and test anomalies for the JPSS-1 observatory. 5) Provide written and oral reports [REDACTED]

Infrequent Travel is Required in Support of Activity approximately 1 trip per year Travel is to be Pre-Approved by Project Travel Locations shall Include [REDACTED] following locations: 1. Annual trips to Satellite Provider (Boulder, CO) [REDACTED] Local Travel to NOAA Satellite Operations (Suitland, MD) may be done as required to support trending and analysis activities. Trip Reports in Contractor Format required within seven (7) days of completion of trip.

Deliverables

Monthly Report in Contractor Format: 1. Summary of Work Performed during Period (Current Month) 2. Plans for Work for Next Period(s)(Month and Quarter) 3. Summary of Travel/Meeting Support.

Omnibus Multidiscipline Engineering Services (OMES)

Task Order 3 - Mechanical Engineering Services to JPSS Flight

Period of Performance: 56 months

Modifications: 8

Task Value: \$10.7M

Scope of Work:

Mechanical Analysis Support

Provide Mechanical/Structural Analysis support including [REDACTED] the following: 1) Support in the planning, managing, and execution of mechanical and structural analysis efforts associated with the design, development, integration and test, and launch of the JPSS-1 Observatory. Analysis support includes areas of Finite Element Analysis (FEA) including; Static and Dynamic FEA such as stress analysis, thermal distortion, modal analysis, transient analysis, steady-state/base drive analysis, and integrated coupled loads analysis. 2) Lead the efforts in the development, submission, and subsequent analysis of the integrated instrument reduced Finite Element Models(FEM's) including individual instrument reduced FEM development, coordination, and independent validation (prior to submission to spacecraft contractor). Provide an independent assessment capability for the spacecraft-level analyses, including the review and assessment of the results. 3) Lead the efforts in the development, submission, and subsequent analysis of the integrated observatory reduced Finite Element Models(FEM's) (integrated instrument reduced FEM's and the spacecraft FEM) development, coordination, and independent validation (prior to submission to launch vehicle contractor). Provide an independent assessment capability for the observatory-level analyses, including the review and assessment of the results. 4) Participate in program status meetings, telecons, peer reviews, and major project reviews for spacecraft, instruments, and launch vehicle. 5) Review project documentation and submit comments and recommendations; 6) Prepare and present technical information for technical meetings / reviews / briefings; 7) Participate in instrument and spacecraft mechanical environments testing including the planning, test procedure development, conduct, and post-test analysis of the result. 8) Participate in anomaly resolution activities associated with the instruments and/or spacecraft related to mechanical environments as required.

Recurring Travel is Required in Support of Activity approximately 1 trip per quarter. Travel is to be Pre-Approved by Project. Travel Locations shall Include [REDACTED] following locations: 1. Bimonthly trips to Satellite Provider (Boulder, CO) [REDACTED] 2. Bimonthly trips to Instrument Provider (assume Asuza, CA for costing) [REDACTED] Trip Reports in Contractor Format required within seven (7) days of completion of trip.

Mechanical Engineering Support

Provide mechanical system engineering support, including [REDACTED] 1) Support in the planning, organizing, scheduling, managing and directing of mechanical engineering related activities during the design, development, fabrication and assembly, integration and test, and launch of the JPSS observatory. 2) Provide detailed engineering support in the development of engineering drawings related to the JPSS Instruments mechanical interfaces, including the instrument science field-of-view (FOV), thermal FOV, instrument stay-out-zones (SOZ) and other critical interface requirements. Provide support in the development of generic mechanical interfaces and associated performance requirements in support of the JPSS-234 Trade studies and associated acquisition activities. 3) Provide engineering support during instrument and spacecraft related mechanical verification activities including mechanical environment test support. 4) Participate in program status meetings, telecons, peer reviews, and major project reviews for spacecraft, instruments, and launch vehicle as requested. 5) Support with requirements definition, flow-down, validation and verification; 6) Prepare and present technical information for technical meetings / reviews / briefings;

Periodic Travel is Required in Support of Activity approximately 1 trip per Quarter. Travel is to be Pre-Approved by Project Travel Locations shall Include [REDACTED] following locations: 1. Bimonthly trips to Satellite Provider (Boulder, CO) [REDACTED] 2. Bimonthly trips to Instrument Provider (assume Asuza, CA for costing) [REDACTED] Trip Reports in Contractor Format required within seven (7) days of completion of trip.

Thermal Engineering Support

Provide Thermal Engineering Discipline Support including [REDACTED] the following: 1) Support in the planning, organizing, scheduling, managing and directing of thermal engineering efforts from design, assembly, integration and test, launch, and on- orbit activation of the JPSS spacecraft's thermal control systems and associated hardware and software; 2) Support in the planning, organizing, scheduling, managing and directing of thermal engineering efforts from design, assembly, integration and test, launch, and on- orbit activation of the JPSS instrument's thermal control systems and associated hardware and software; 3) Actively lead project thermal analysis activities by being a focal point for collecting, reviewing, and working revisions to the instrument reduced thermal models (RTM's) and manage the deliver of the RTM's to the spacecraft contractor. 4) Participate in program status meetings, telecons, peer reviews, and major project reviews for spacecraft, instruments, launch vehicle, mission operations system, and science data system. 5) Provide thermal vacuum test guidance and support to both the instrument vendors and spacecraft thermal vacuum test programs. 6) Support with thermal system related requirements definition, flow-down, validation and verification activities, trade studies and associated documentation; 7) Prepare and present technical information for technical meetings / reviews / briefings; 8) Identify risk elements, develop and execute mitigation steps; participate in the JPSS Flight Project risk board

Recurring Travel is Required in Support of Activity [REDACTED]. Travel is to be Pre-Approved by Project Travel Locations shall Include [REDACTED] following locations: 1. Bimonthly trips to Satellite Provider (Boulder, CO) [REDACTED] 2. Bimonthly trips to Instrument Provider (assume Asuza, CA for costing) [REDACTED]. Trip Reports in Contractor Format required within seven (7) days of completion of trip.

Contamination Engineering Support

Provide Contamination Engineering Discipline Support including [REDACTED] the following: 1) Support in the planning, organizing, scheduling, managing and directing of contamination engineering efforts during the design, assembly, integration and test, and launch processing of the JPSS Spacecraft and associated hardware and integrated activities. 2) Support in the planning, organizing, scheduling, managing and directing of contamination engineering efforts during the design, assembly, integration and test, and launch processing of the JPSS instruments and associated hardware and activities; 3) Actively lead project contamination control analysis activities by being a focal point for collecting, reviewing, and working revisions to both the instrument and spacecraft specific contamination control plans and manage the development, release and maintenance of the JPFF Flight Projects Contamination Control plan and associated efforts. 4) Participate in program status meetings, telecons, peer reviews, and major project reviews for spacecraft, instruments, and launch vehicle. 5) Provide thermal vacuum test guidance and support to both the instrument vendors and spacecraft thermal vacuum test programs, particularly in the areas of bake-out and cleanliness. 6) Support with contamination related requirements definition, flow-down, validation and verification activities, trade studies and associated documentation; 7) Prepare and present technical information for technical meetings / reviews / briefings; 8) Identify risk elements, develop and execute mitigation steps; participate in the JPSS Flight Project Risk board

Recurring Travel is Required in Support of Activity [REDACTED]. Travel is to be Pre-Approved by Project Travel Locations shall Include [REDACTED] following locations: 1. Bimonthly trips to Satellite Provider (Boulder, CO) [REDACTED] 2. Bimonthly trips to Instrument Provider (assume Asuza, CA for costing) [REDACTED]. Trip Reports in Contractor Format required within seven (7) days of completion of trip.

Sensor MICD CAD Support

Provide a set of simplified 3D CAD models of the existing JPSS Sensors (ATMS, CrIS, OMPS-N, OMPS-L, CERES-C, and VIIRS) for instrument accommodation studies in support of JPSS Light 2 studies.) Produce labelled overall volume and sensor field-of-view allocation diagrams for each of the JPSS sensors (ATMS, CrIS, OMPS-N, OMPS-L, CERES-C, and VIIRS). Prepare a simplified finite element model for each JPSS Sensor (ATMS, CrIS, OMPS-N, OMPS-L, CERES-C, and VIIRS) to be included in launch vehicle interface loads and observatory structural frequency analyses.

OMES Mechanical Engineering Services JPSS Flight

Provide Mechanical analysis support for J1 observatory jitter environment through FY 15 2. Provide mechanical drafting support for the development of the J1 and J2 ICDs, through award of the J2 spacecraft. 3. Provide additional thermal support for instrument Thermal Vacuum Testing, spacecraft support and Observatory level support. This includes additional travel and realtime support at the vendor facilities. 4. Provide in the factory resident support [REDACTED] [REDACTED] in Haupague, Long Island, New York. This is in support of the spacecraft Gimbal development.

Deliverables:

Monthly Report in Contractor Format: 1. Summary of Work Performed during Period (Current Month) 2. Plans for Work for Next Period(s)(Month and Quarter) 3. Summary of Travel/Meeting Support

Omnibus Multidiscipline Engineering Services (OMES)

Task Order 4 - Electrical Engineering Support to JPSS Flight

Period of Performance: 56 months

Modifications: 7

Task Value: \$10.3M

Scope of Work:

Subtask 1 J1 Electrical Systems Support (including EMI/EMC & C&DH)

Provide Electrical Systems Engineering Support for JPSS-1 including:

1. Support in the planning, organizing, scheduling, managing and directing of efforts from fabrication and assembly, integration and test, launch, and on- orbit activation of the JPSS-1 Observatory - particularly in areas of electrical systems engineering and integration and test.
2. Participate in program status meetings, telecons, peer reviews, and major project reviews for spacecraft, instruments, launch vehicle, mission operations system, and science data system.
3. Support with requirements definition, flow-down, validation and verification;
4. Support with Project trade-studies;
5. Review project documentation and submit comments and recommendations;
6. Prepare and present technical information for technical meetings / reviews /briefings;
7. Analyze configuration, design, and procedural changes submitted to the Project change control boards;
8. Identify risk elements, develop and execute mitigation steps; participate in the JPSS Flight Project risk board
9. Participate in Test / Failure Review Boards for instruments, space and ground segments

Subtask 3 J2/3/4 Electrical Systems Support (including EMI/EMC)

Provide Electrical Systems Engineering Support for JPSS-2/3/4 including:

10. Support in the planning, organizing, scheduling, managing and directing of efforts from fabrication and assembly, integration and test, launch, and on- orbit activation of the JPSS-2/3/4 Observatories - particularly in areas of electrical systems engineering and integration and test.
11. Participate in program status meetings, telecons, peer reviews, and major project reviews for spacecraft, instruments, launch vehicle, mission operations system, and science data system.
12. Support with requirements definition, flow-down, validation and verification;
13. Support with Project trade-studies;
14. Review project documentation and submit comments and recommendations;
15. Prepare and present technical information for technical meetings / reviews /briefings;
16. Analyze configuration, design, and procedural changes submitted to the Project change control boards;

17. Identify risk elements, develop and execute mitigation steps; participate in the JPSS Flight Project risk board
18. Participate in Test / Failure Review Boards for instruments, space and ground segments

Omnibus Multidiscipline Engineering Services (OMES)

Task Order 6 - JPSS Instrument Resident Office Technical Support

Period of Performance: 54 months

Modifications: 11

Task Value: \$32.7M

Scope of Work: JPSS 1 and JPSS 2

Instrument Systems

Provide management and engineering technical services to oversee JPSS instrument development, including [REDACTED] the following; 1) Support in the planning, organizing, scheduling, managing and directing of efforts for fabrication and assembly, integration and test, launch, and on-orbit activation of the JPSS Instruments. Monitor VIIRS, CrIS, OMPS, CERES/CERES-C, and ATMS contractors in execution of instrument build and test activities. 2) Participate in program status meetings, telecons, peer reviews, and major project reviews for JPSS Instruments, and appropriate spacecraft and observatory-level reviews and activities. Participate in (internal) JPSS Instrument progress meetings; design reviews; test readiness reviews; anomaly boards; parts/material boards; etc as appropriate. 3) Support with requirements definition, flow-down, validation and verification activities associated with the JPSS Instruments for JPSS-234 acquisition activities. 4) Review verification plans and test procedures. Support in problem resolution. Participate in Test / Failure Review Boards for instruments, space and ground segments pertaining to the performance of the JPSS instruments. 5) Prepare and present technical information for technical meetings / reviews / briefings; 6) Analyze configuration, design, and procedural changes submitted to the Project change control boards; 7) Identify risk elements, develop and execute mitigation steps; participate in the JPSS Flight Project Level and JPSS Instrument risk boards. 8) Analyze contractor cost, schedule and technical performance.

Recurring Travel is Required in Support of Activity [REDACTED]. Travel is to be Pre-Approved by Project. Travel Locations shall include [REDACTED] following locations: Monthly trips to Instrument Providers [REDACTED] a) Assume 1 Monthly Trip to Boulder, CO b) Assume 1 Monthly Trip to Los Angeles, CA c) Assume 1 Monthly Trip to Fort Wayne, IN Trip Reports in Contractor Format required within seven (7) days of completion of trip.

VIIRS Instrument Technical Support

Provide management and engineering technical services to oversee the VIIRS instrument development, including but not limited to the following; 1) Support in the planning, organizing, scheduling, managing and directing of efforts for fabrication and assembly, integration and test, launch, and commissioning of the JPSS VIIRS Instrument. Monitor VIIRS contractor(s) in execution of the VIIRS instrument build and test. 2) Participate in program status meetings, telecons, peer reviews, and major project reviews for VIIRS instrument, and appropriate

spacecraft and observatory-level reviews and activities. Participate in (internal) VIIRS instrument progress meetings; design reviews; test readiness reviews; anomaly boards; parts/material boards; etc. 3) Support with requirements definition, flow-down, validation and verification activities associated with the VIIRS instrument. Review verification plans and test procedures. Support in problem resolution. Review instrument test data for specification compliance. Participate in Test / Failure Review Boards for instruments, space and ground segments pertaining to the performance of the VIIRS instrument. 4) Provide support to develop test equipment and methodologies for characterization of the VIIRS instruments. Support the government by developing test requirements and procedures; designing test equipment; and support in test execution. 5) Review SNPP VIIRS performance. Support in analyzing on-orbit anomalies, developing mitigations, and identifying reach forward to JPSS. 6) Prepare and present technical information for technical meetings / reviews / briefings; 7) Analyze configuration, design, and procedural changes submitted to the Project change control boards; 8) Identify risk elements, develop and execute mitigation steps; participate in the JPSS Flight Project and Instrument risk boards 9) Analyze contractor cost, schedule and technical performance. Support with contract document preparation and proposal evaluation. A portion of this work shall be conducted by personnel resident at instrument contractor facilities in El Segundo CA.

Recurring Travel is Required in Support of Activity. Travel is to be Pre-Approved by Project. Resident Office Personnel (Based in El Segundo, CA) 1. Quarterly travel to NASA GSFC (Greenbelt, MD) [REDACTED] 2. Quarterly travel to component vendor facilities. (Assume GSFC for costing purposes.) [REDACTED] Project Office Personnel (Based at GSFC) 1. Bimonthly travel to VIIRS Instrument contractor (El Segundo, CA) [REDACTED] 2. Semiannual travel to JPSS Quarterly Reviews (assume Boulder, CO) [REDACTED]

CrIS Instrument Technical Support

Provide management and engineering technical services to oversee the CrIS instrument development, including [REDACTED] the following; 1) Support in the planning, organizing, scheduling, managing and directing of efforts from fabrication and assembly, integration and test, launch, and on- orbit activation of the JPSS CrIS Instrument. Monitor CrIS contractor(s) in execution of the CrIS instrument build and test. 2) Participate in program status meetings, telecons, peer reviews, and major project reviews for CrIS instrument, and appropriate spacecraft and observatory-level reviews and activities. Participate in (internal) CrIS instrument progress meetings; design reviews; test readiness reviews; anomaly boards; parts/material boards; etc. 3) Support with requirements definition, flow-down, validation and verification activities associated with the CrIS instrument. Review verification plans and test procedures. Support in problem resolution. Review instrument test data for specification compliance. Participate in Test / Failure Review Boards for instruments, space and ground segments pertaining to the performance of the CrIS instrument. 4) Provide support to develop test equipment and methodologies for characterization of the CrIS instruments. Support the government by developing test requirements and procedures; designing and manufacturing test equipment; deploying test equipment to instrument contractor facilities; and supporting in

test execution. 5) Prepare and present technical information for technical meetings / reviews / briefings; 6) Analyze configuration, design, and procedural changes submitted to the Project change control boards; 7) Identify risk elements, develop and execute mitigation steps; participate in the JPSS Flight Project Instrument risk board 8) Analyze contractor cost, schedule and technical performance. 9) Provide independent consultation for detector and focal plane array development. A portion of this work shall be conducted by personnel resident at instrument contractor facilities in Fort Wayne, IN.

Provide management and engineering technical services to oversee the JPSS 2 CrIS instrument development, including [REDACTED] the following; 9) Provide independent consultation for detector and focal plane array development, including expertise in ROIC hybrid design and detector life testing and long term detector storage and degradation.

Recurring Travel is Required in Support of Activity [REDACTED]. Travel is to be Pre- Approved by Project. Resident Office Personnel (Based in Fort Wayne, IN) 1. Quarterly travel to NASA GSFC (Greenbelt, MD) [REDACTED] 2. Quarterly travel to component vendor facilities. (Assume Boulder, CO for costing purposes.) [REDACTED] Project Office Personnel (Based at GSFC) 1. Bimonthly travel to CrIS Instrument contractor (Fort Wayne, IN) [REDACTED] 2. Quarterly travel to JPSS Spacecraft Contractor (Boulder, CO) [REDACTED] Independent detector consultants 1. 2 quarterly trips to Cypress, CA.

OMPS Instrument Technical Support

Provide management and engineering technical services to oversee the OMPS instrument development, including but not limited to the following; 1) Support in the planning, organizing, scheduling, managing and directing of efforts for fabrication and assembly, integration and test, launch, and commissioning of the JPSS OMPS Instrument. Monitor OMPS contractor(s) in execution of the OMPS instrument build and test. 2) Participate in program status meetings, telecons, peer reviews, and major project reviews for OMPS instrument, and appropriate spacecraft and observatory-level reviews and activities. Participate in (internal) OMPS instrument progress meetings; design reviews; test readiness reviews; anomaly boards; parts/material boards; etc. 3) Support with requirements definition, flow-down, validation and verification activities associated with the OMPS instrument. Review verification plans and test procedures. Support in problem resolution. Review instrument test data for specification compliance. Participate in Test / Failure Review Boards for instruments, space and ground segments pertaining to the performance of the OMPS instrument. 4) Provide support to develop test equipment and methodologies for characterization of the OMPS instruments. Support the government by developing test requirements and procedures; designing test equipment; and support in test execution. 5) Review SNPP OMPS performance. Support in analyzing on-orbit anomalies, developing mitigations, and identifying reach forward to JPSS. 6) Prepare and present technical information for technical meetings / reviews / briefings; 7) Analyze configuration, design, and procedural changes submitted to the Project change control boards; 8) Identify risk elements, develop and execute mitigation steps; participate in the JPSS Flight Project and Instrument risk boards 9) Analyze contractor cost, schedule and technical

performance. Support with contract document preparation and proposal evaluation. A portion of this work shall be conducted by personnel resident at instrument contractor facilities in Boulder, CO.

Recurring Travel is Required in Support of Activity. Travel is to be Pre-Approved by Project. Resident Office Personnel (Based in Boulder, CO) 1. Quarterly travel to NASA GSFC (Greenbelt, MD) [REDACTED] 2. Quarterly travel to component vendor facilities. (Assume GSFC for costing purposes.) [REDACTED] Project Office Personnel (Based at GSFC) 1. Bimonthly travel to OMPS Instrument contractor (Boulder, CO) [REDACTED] 2. Semiannual travel to JPSS Quarterly Reviews (assume GSFC) [REDACTED]

ATMS Instrument Technical Support

Provide management and engineering technical services to oversee the ATMS instrument development, including [REDACTED] the following; 1) Support in the planning, organizing, scheduling, managing and directing of efforts for fabrication and assembly, integration and test, launch, and commissioning of the JPSS ATMS Instrument. Monitor ATMS contractor(s) in execution of the ATMS instrument build and test. 2) Participate in program status meetings, telecons, peer reviews, and major project reviews for ATMS instrument, and appropriate spacecraft and observatory-level reviews and activities. Participate in (internal) ATMS instrument progress meetings; design reviews; test readiness reviews; anomaly boards; parts/material boards; etc. 3) Support with requirements definition, flow-down, validation and verification activities associated with the ATMS instrument. Review verification plans and test procedures. Support in problem resolution. Review instrument test data for specification compliance. Participate in Test / Failure Review Boards for instruments, space and ground segments pertaining to the performance of the ATMS instrument. 4) Provide support to develop test equipment and methodologies for characterization of the ATMS instruments. Support the government by developing test requirements and procedures; designing test equipment; and support in test execution. 5) Review SNPP ATMS performance. Support in analyzing on-orbit anomalies, developing mitigations, and identifying reach forward to JPSS. 6) Prepare and present technical information for technical meetings / reviews / briefings; 7) Analyze configuration, design, and procedural changes submitted to the Project change control boards; 8) Identify risk elements, develop and execute mitigation steps; participate in the JPSS Flight Project and Instrument risk boards 9) Analyze contractor cost, schedule and technical performance. Support with contract document preparation and proposal evaluation. A portion of this work shall be conducted by personnel resident at instrument contractor facilities in Azusa, CA.

Recurring Travel is Required in Support of Activity. Travel is to be Pre-Approved by Project. Resident Office Personnel (Based in Azusa, CA) 1. Quarterly travel to NASA GSFC (Greenbelt, MD) [REDACTED] 2. Quarterly travel to component vendor facilities. (Assume GSFC for costing purposes.) [REDACTED] Project Office Personnel (Based at GSFC) 1. Bimonthly travel to ATMS Instrument contractor (Azusa, CA) [REDACTED] 2. Semiannual travel to JPSS Quarterly Reviews (assume Boulder, CO) [REDACTED]

Deliverables:

Monthly Report in Contractor Format: 1. Summary of Work Performed during Period (Current Month) 2. Plans for Work for Next Period(s)(Month and Quarter) 3. Summary of Travel/Meeting Support

Omnibus Multidiscipline Engineering Services (OMES)

Task Order 7 - NGXO Technology Development

Period of Performance: 56.5 months

Modifications: 1

Task Value: \$5.7M

Scope of Work:

Provide general engineering and design support for X-ray optics development. This support will include thermal and mechanical design and analysis. This support will also include fabrication, assembly and testing of fixtures for mirror fabrication processes. In GSFC labs, perform all stages of reflector production, including glass sheet preparation, glass slumping in custom ovens, epoxy replication of thin-film reflector surfaces, and precision metrology of the finished reflector surfaces and optical figures. Assist the Code 662 scientist to establish mounts, fixtures, and controls for x-ray optics and an x-ray CCD camera at the GSFC Area 200 x-ray beamline. This task will allow for travel and for procurement of off-the-shelf and fabricated items in support of the project, [REDACTED]. Contractor shall deliver monthly reports of accomplishments.

Omnibus Multidiscipline Engineering Services (OMES)

Task Order 8 - JPSS Program Systems Engineering Support

Period of Performance: 56 months

Modifications: 9

Task Value: \$14.9M

Scope of Work:

This task is to provide engineering support services in accordance the OMES SOW (Function 3B) to the JPSS Program in the areas of mission systems engineering. The contractor shall provide cognizant engineering support to:

1. Support JPSS Program preparations for and conduct of the JPSS-1 Mission Critical Design Review (MCDR), the JPSS Program System Definition Review (PSDR), the Ground Segment Integration Review (SIR) - Part 2 and the J-1 Mission SIR . JPSS-1 MCDR products are to be completed by January 15, 2014. The GSIR-II products are to be completed by September 30, 2014. The J-1 Mission SIR products are to be completed by December 15, 2014.
 - 1) Provide technical insight into the integrated schedule and exchange planning between the JPSS Flight and Ground Projects (i.e. giver/receiver) needed to support the JPSS-1 mission.
 - 2) Provide technical insight into Flight and Ground Projects simulator development and integration efforts.
 - 3) Track Program-level technical metrics including system operational availability, data availability, and data latency.
2. Define and lead flight dynamics studies [REDACTED] to define and manage the JPSS satellite constellation. Reports are required by January 15, 2014 for JPSS-1 MCDR and by September 30, 2014 for GSIR-II and December 15, 2014 for J-1 Mission SIR.
3. Prepare and maintain JPSS-2 Mission System Specification. Baseline version to be delivered to Program Configuration Control Board by September 15, 2013.
4. Maintain JPSS-1 Mission System Specification document. Maintenance shall include change management, DOORS entry, tracing, and verification.
5. Maintain JPSS-2 Mission System Specification document. Maintenance shall include change management, DOORS entry, tracing, and verification.
6. Maintain JPSS Ground System Requirements Document, Volume 1 & 2. Maintenance shall include change management, DOORS entry, tracing, and verification.
7. Populate and manage the content of the DOORs Database for all Program Level Requirements. (Previously Task 11, Subtask 2).

8. Manage the verification and validation activities and sell off of Level 2 science performance requirements.
 - 1) Complete the traces from Level 2 specifications to the Level 3 specifications for requirements and verification attributes. Ensure requirements flow of Level 1 requirements to Level 2. Coordinate changes with key NASA and NOAA Stakeholders.
 - 2) Review JPSS sensor characterization testing plans, and test data interfaces to ensure completeness and data sufficient for supporting the production of compliant sensor data records.
 - 3) Track the artifacts and Verification Decision Authority sign-off of Level 2/Level 3 science performance requirements.
 - 4) Participate in the Level 3 science performance verification and validation test activities in support of the Program.
9. Manage the verification and validation activities and sell off of Level 2 functional requirements.
 - 1) Complete the traces from Level 2 specifications to the Level 3 specifications for requirements and verification attributes. Ensure requirements flow of Level 1 requirements to Level 2. Coordinate changes with key NASA and NOAA Stakeholders.
 - 2) Ensure the verification activities as described by the L2/L3 verification attributes, namely Verification descriptions, events, methods are sufficient to sell-off Level 2 requirements. Identify additional tests for areas that are not.
 - 3) Track the artifacts and Verification Decision Authority sign-off of Level 2/Level 3 functional requirements and system performance.
 - 4) Participate in the Level 3 Functional Verification and Validation test activities in support of the Program.
 - 5) Run the Mission Systems Working Group(s).
 - 6) Run the Integration Issue Resolution Tiger Team Meetings.
 - 7) Track and manage Flight/Ground and ESPDS/Ground Giver Receiver items
 - 8) Plan, oversee the development and execute a Ground Segment Acceptance Test; align test with the Ground Project Acceptance Test approach
 - 9) Participate in the Integrated Scenario Teams; support the development and execution Test Cases and Test Procedures
10. Maintain JPSS-1 Mission Concept of Operations document.
11. Maintain JPSS-2 Mission Concept of Operations document.
12. Maintain JPSS Program Document Tree.

13. Maintain the JPSS Program Verification and Validation Plan. JPSS-1 Mission Critical Design Review version to be delivered to the Program Configuration Control Board by December 1, 2013. Provide any updates [REDACTED]. Ensure the Program V&V Plan is consistent with Project Plans (Level 3).
14. Support JPSS Program studies to determine the optimal post JPSS-2 system architecture. Final study plan to be completed by January 2013. Actual study will continue through FY16. Develop cost analysis of different architecture options in support of study.
 - 1) Support JPSS Program Systems Engineering studies to determine the optimal Enterprise Architecture for the Ground Segment, Block 3. High priority studies (Priority 1) are to be completed by May 2015. Lower priority studies (2 & 3) will complete by October, 2015.
 - 2) Analysis to include architecture analysis and incorporation into Magic Draw and development of cost analysis models for different architecture options.
15. Deleted.
16. Support JPSS Program and Ground Project preparations for and conduct of the JPSS Ground System Critical Design Review. Products are to be completed by December 15, 2013.
 - 1) Work with JPSS Program and Project Systems Engineering to identify ground system areas for improvement to optimize operational capabilities and performance.
 - 2) Assess plans for future development and sustainment of the ground system to ensure Program objectives and requirements for all JPSS supported missions are met.
 - 3) Support Ground Project Systems Engineering to resolve issues associated with interfaces external to the JPSS Ground System.
 - 4) Perform analysis of the soundness and completeness of ground system concept of operations, architecture, interfaces, requirements, and design.
 - 5) Develop options and support implementation of selected option for transporting JPSS data from the back-up data processing facility to the NOAA archive facility.
 - 6) Assess facilities plan for accommodation of JPSS ground systems at NOAA primary and back-up facilities, including provisions for upgrades and plans for transition. Site integration for Block 2.0 is scheduled to begin in February 2013.
17. Support JPSS Program and Ground Project preparations for transition of JPSS data distribution from AFWA to NSOF data processing node.
18. Facilitate the integration of the NOAA elements required for JPSS (ESPC and CLASS) through requirements definition, requirements traceability, requirements verification and validation, configuration management, and mission assurance to address the end-to-end systems engineering responsibility of Program Systems Engineering.

19. Develop and track plans and schedules associated with Program Systems Engineering work on the JPSS Ground Segment.
20. Develop a technical assessment of all data networking currently in place and required to support JPSS operations through JPSS-2.
21. Support the JPSS Chief Systems Engineer to: review technical documentation; ensure software engineering processes conform to agency standards; review software metrics; perform requirements analysis; prepare programmatic and technical documents and briefs; convene and participate in special studies and review boards; lead development of JPSS system architecture and concept of operations; provide subject matter expertise on operations, direct broadcast services, and frequency management.
22. Support the JPSS Program on-going responsibility to maximize the productivity and life of the S-NPP mission. A basic knowledge of Systems Engineering, particularly as it pertains to satellite and ground systems is required. While considerable expertise in many aspects of the S-NPP spacecraft and operations resides in the NOAA Office of Satellite and Product Operations (OSPO), the JPSS Flight Project, and the JPSS Ground Project, Program Systems Engineering requires a resident expert with ready access to the relevant technical information and subject matter experts. Specific areas of required support include:
 - a) Provide Program insight and support in anomaly resolution, management, and documentation.
 - b) Provide Program insight and support in Flight/Ground/OSPO coordination, preparation, and briefing of any operational changes to the S-NPP satellite (flight software updates, orbital maneuvers, instrument calibrations, instrument operational changes, etc.).
 - c) Understand the potentially life-limiting components within S-NPP (batteries, propulsion system, consumables, solar arrays, instrument scan motors and detectors, etc.), work with the Flight and Ground projects to identify possible ways to extend the life of the satellite, support background and decision briefings to NASA and NOAA management, and coordinate Flight/Ground/OSPO implementation of any life extension measures that are chosen for implementation.
23. Procure and maintain 2 copies of the Recon Tool (from separate SOW).
24. Establish an eRooms / DOORs requirements sell-off tracking tool. Collect and link verification artifacts with DOORs requirements. Maintain metrics on requirements sell-off.
25. Support the calibration, validation, and monitoring of the Suomi NPP and JPSS-1 mission, including sensors and ground algorithms affecting mission system science performance.

Deliverables:

1. Weekly Status Report
 - a) The reports will briefly status issues, action items, trips, progress of ongoing assignments and priorities for next month. Contractor will coordinate and prepare content.
2. Trip Reports/Meeting minutes [REDACTED].
3. One of kind documentation [REDACTED].

Travel: [REDACTED].

1. Estimate 52 round trips [REDACTED] to Denver, CO area during the period from October 1, 2013 to May 31, 2017.
2. Estimated 37 round trips [REDACTED] from Minneapolis, MN to Greenbelt, MD during the period July 15, 2014 to May 31, 2017.
3. Estimated 1 round 2trip [REDACTED] from Minneapolis, MN to Los Angeles, CA during the period July 15, 2014 to May 31, 2017.
4. Estimated 1 round trip [REDACTED] from Minneapolis, MN to Fort Wayne, IN during the period July 15, 2014 to May 31, 2017.

OMES Task 8, Sub-Task 1: JPSS Program Systems Engineering (PSE) Polar Follow-On (PFO) Technical Baseline Updates

Support JPSS PSE in the development of PFO technical baseline updates. Develop multi-mission requirements and architecture concept updates based on driving scenarios. Provide updates to the technical baseline for the System Architecture & Concept of Operations (SACO) and the JPSS-3/4 RF Interface Requirements Document.

Deliverables:

- 1) PFO Proposed Multi-Mission Requirements and SACO updates
- 2) Weekly Status Report
 - a) The reports will briefly status issues, action items, trips, progress of ongoing assignments and priorities for next month. Contractor will coordinate and prepare content.

Omnibus Multidiscipline Engineering Services (OMES)

Task Order 9 - GSFC System Review Support

Period of Performance: 48 months

Modifications: 5

Task Value: \$926K

Scope of Work:

Provide systems engineering and project/program management support as described below. Support includes pre-review activities (reviewing documents, technical interchange meetings, executive sessions, and teleconferences) and post-review activities (RFA disposition, trip report development, team caucuses, teleconferences, and final report development and review). The review timeframes contained within the SOW are estimated dates only. The responsible [REDACTED] will provide actual dates in advance of the reviews for which support is required as part of the progression through the current performance period. Reviews are to be attended by the appointed experts [REDACTED] in support of the Systems Review Office, Code 301. Deliverables to be developed in association with the tasked support include Requests for Action (RFAs), trip reports, written inputs to final review board summary reports, and final disposition of RFAs once acceptable responses are received from the project.

Specific review support requirements include:

Review Preparation

- Coordinate with System Review Office (SRO) on review agenda and activities.
- Coordinate with SRO to support review agenda, timing, duration and content.
- Coordinate with the SRO and other organizations in identifying appropriate review team members.
- Support SRO Review Chair or project as spaceflight systems and/or management expert.
- Support peer reviews and SRO reviews via telecom or travel [REDACTED].
- Review Project-provided materials in advance (as available).

Participation in the Review

- Conduct and/or attend review as scheduled.
- Exercise recognized leadership during development lifecycle milestone reviews as a designated expert.
- Prepare and submit Requests for Action (RFAs) during reviews.
- Plan travel and implement travel arrangements relative to the venue for each review.

Post-Review Activities

- Attend follow-up caucus of the review team following each review.
- Prepare and/or comment on sections of review report pertinent to expertise.
- Follow-up, evaluate, and record disposition of project responses to RFAs.
- Support SRO Review Chair as expert at relevant technical and management meetings and telecons.

Provide 533 report by subtask and monthly progress report.

Omnibus Multidiscipline Engineering Services (OMES)

Task Order 11 - Requirements Management Support to JPSS Flight Project

Period of Performance: 55 months

Modifications: 6

Task Value: \$4.2M

Scope of Work:

Flight Project Requirements Management Support

Provide Requirements Management and Verification Systems Engineering Support: 1) Support in the planning, organizing, scheduling, managing and directing of efforts associated establishing, maintaining, and verifying the requirements baseline JPSS Flight Project Observatory - particularly in areas of DOORs Relational Database Operations and Development. 2) Participate in program status meetings, telecons, peer reviews, and major project reviews for spacecraft, instruments, launch vehicle, mission operations system, and science data system; 3) Support with requirements definition, flow-down, validation and verification; 4) Prepare/Review project documentation and submit comments and recommendations; 6) Prepare and present technical information for technical meetings / reviews / briefings; 7) Analyze configuration, design, and procedural changes submitted to the Project change control boards;

Periodic Travel is Required in Support of Activity [REDACTED]. Travel is to be Pre-Approved by Project Travel Locations shall include, [REDACTED], following locations: 1. Quarterly trips to Satellite Provider (Boulder, CO) [REDACTED] 2. Quarterly trips to Instrument Provider (assume Asuza, CA for costing) [REDACTED] Trip Reports in Contractor Format required within seven (7) days of completion of trip.

599 Branch Support - Requirements Management Database Capabilities

Provide Requirements Management and Verification Systems Engineering Support: 1) Support in the planning, organizing, scheduling, managing and directing of efforts associated establishing, maintaining, and verifying the requirements baseline of various projects [REDACTED] of the 599 Mission System Engineering Branch. 2) Support with requirements definition, flow-down, validation and verification; 3) Prepare/Review project documentation and submit comments and recommendations; 4) Prepare and present technical information for technical meetings / reviews / briefings; 5) Procure (as directed) and Maintain the DOORs Requirements Database licenses and associated software tools and equipment necessary to maintain the independent 599 Branch DOORs licensing capabilities. 6) Develop general templates, requirements scripting, and associated requirements management backbone capabilities as needed for the support of GSFC managed projects.

Requirements Management Support to JPSS FreeFlyers

Provide Requirements Management and Verification Systems Engineering Support: 1) Support in the planning, organizing, scheduling, managing and directing of efforts associated establishing, maintaining, and verifying the requirements baseline JPSS Free Flyer Project Observatory - particularly in areas of DOORS Relational Database Operations and Development. 2) Participate in program status meetings, telecons, peer reviews, and major project reviews for spacecraft, instruments, launch vehicle, mission operations system, and science data system; 3) Support with requirements definition, flow-down, validation and verification; 4) Prepare/Review project documentation and submit comments and recommendations; 6) Prepare and present technical information for technical meetings / reviews / briefings; 7) Analyze configuration, design, and procedural changes submitted to the Project change control boards;

Periodic Travel is Required in Support of Activity [REDACTED]. Travel is to be Pre-Approved by Project. For purposes of costing, assume travel location as follows: [REDACTED]: 1. Quarterly trips to (Boulder, CO) [REDACTED]. Trip Reports in Contractor Format required within seven (7) days of completion of trip

J2 Flight Requirements Management Support

Provide Requirements Management and Verification Systems Engineering Support for the JPSS-2 effort: 1) Support in the planning, organizing, scheduling, managing and directing of efforts associated establishing, maintaining, and verifying the requirements baseline JPSS Flight Project Observatory - particularly in areas of DOORS Relational Database Operations and Development. 2) Participate in program status meetings, telecons, peer reviews, and major project reviews for spacecraft, instruments, launch vehicle, mission operations system, and science data system. 3) Support with requirements definition, flow-down, validation and verification; 4) Prepare/Review project documentation and submit comments and recommendations; 6) Prepare and present technical information for technical meetings / reviews / briefings; 7) Analyze configuration, design, and procedural changes submitted to the Project change control boards; 18 Month(s) Monthly Report in Contractor Format: 1. Summary of Work Performed during Period (Current Month) 2. Plans for Work for Next Period(s)(Month and Quarter) 3. Summary of Travel/Meeting Support 1 Month(s) Periodic Travel is Required in Support of Activity approximately 1 trip per Quarter. Travel is to be Pre-Approved by Project Travel Locations shall Include, [REDACTED] following locations: 1. Quarterly trips to Satellite Provider (TBD) [REDACTED] 2. Quarterly trips to Instrument Provider (assume Asuza, CA for costing) [REDACTED] Trip Reports to be included in the monthly progress information.

DOORS support

Support J1/J2/Program with routine verification status reporting including updating DOORS database with eRooms exports, updating DOORS database with vendor information and writing custom dxl scripts. 2) Support J2 procurement documentation, which includes synchronization

efforts between J1/J2, creating multi-mission processes to utilize one DOORS module to multiple missions and routine database updates.

Deliverables

Monthly Report in Contractor Format: 1. Summary of Work Performed during Period (Current Month) 2. Plans for Work for Next Period(s)(Month and Quarter) 3. Summary of Travel/Meeting Support

Omnibus Multidiscipline Engineering Services (OMES)

Task Order 12 - JPSS Program Support

Period of Performance: 56 months

Modifications: 13

Task Value: \$3.3M

Scope of Work:

The SOW requires Risk Management and general Systems Engineering support in the following areas for the JPSS Program:

1. Support Risk Management planning, organization, scheduling, management, and direction.
2. Participate in Program status meetings, telecons, peer reviews, and major Project reviews.
3. Actively lead and conduct JPSS Program and Free Flyers Project Risk Boards.
4. Maintain JPSS Program Risk Management Plan.
5. Collect and coordinate Risk Management Database enhancements.
6. Maintain coordination of Risk Management with Center Risk Management practices.
7. Provide written and oral reports [REDACTED].

Modification 0

Task initiated with 10/1/2012 start date, 9/30/13 end date.

Modification 1

Modified scope of work to split into new subtasks 1 and 2.

Subtask 1 – Risk Management and General Systems Engineering Support

1. Support in the planning, organizing, scheduling, managing and directing of risk management efforts assessing the procurement, development, fabrication and assembly, integration and test, launch, and on-orbit activation of JPSS-1, and Free Flyer 1.
2. Participate in program status meetings, telecons, peer reviews, and major project reviews for spacecraft, instruments, launch vehicle, mission operations system, and science data system.
3. Actively lead and conduct the JPSS Program and Free Flyer Risk boards. Identify risk elements, develop and execute mitigation steps; coordinate the JPSS risk board activities including but not limited to database development, tracking, reporting and scheduling of risk board and pre-board activities.
4. Maintain the JPSS Program Risk Management Plan.

5. Collect changes to the Risk Management database, [REDACTED], and coordinate these changes with the programmers.
6. Maintain coordination with the Center Risk Management practices; provide updates and training [REDACTED].
7. Provide written and oral reports [REDACTED].

Subtask 2 – Senior-Level Program Office Support

1. Answer calls for JPSS Program Office senior personnel.
2. Manage conference room scheduling and usage. This includes conference room management for routine meetings as well as scheduling conference rooms, teleconferences, and WebEx's for major reviews.
3. Review outgoing correspondence from JPSS Program Office senior personnel for content and grammatical errors.
4. Review documents from JPSS Program Office senior personnel for content and grammatical errors.
5. Develop and maintain document templates for reviews, presentations, and for JPSS Program Office generated documents.
6. Pull together presentations and other documentation for major reviews.

Modification 2

Modified scope of work.

Added the following to Subtask 2:

1. Support JPSS Information Technology Manager in security processes development and improvement.

Modification 3

Administrative mod

Modification 4

Added the following to Subtask 1:

8. Periodic travel is required in support of JPSS activities. The estimated number of trips is two per year. Travel is to be pre-approved by JPSS Program Office.

Added Subtask 3 – Risk Management and General Systems Engineering Support; Code 490.

Provide the following support to the Instrument Projects Division (Code 490):

1. Support Code 490 in the development of an on-line Risk Management System to identify,

- analyze, plan, track, and document/communicate risks per GPR 7120.4.
2. Provide guidance to Instrument Projects to ensure “best practices” and standard products are developed and implemented throughout the Division. Guidance shall comply with NPR 8000.4 and with GPR 7120.4NPR 7120.5. Work with the projects to set up on-line risk management systems.
 3. Provide on-call risk management support to Instrument Projects [REDACTED], especially as they get ready for major reviews and occasionally running RMB’s.
 4. Provide independent assessment of Instrument Project risk management processes and procedures to include identifying deficiencies and following up with the Instrument Project PM or risk coordinator to resolve issues.

Modification 5

Added Subtask 4, Systems Engineering Security Documents Review; Code 470.

Provide the following support to the JPSS Program Office, Systems Engineering, Code 470.

1. Review and update the front matter of the System Engineering Security documents such as the GSSRD.
2. Identify latest versions of the Applicable documents. Determine if additional applicable or reference documents are needed.
3. Document changes needed to update the GSSRD to comply with the most recent versions of NIST SP800-53, the applicable documents, and the current and proposed tailoring for NOAA 5042.
4. Review and update all requirement table fields.
5. Prepare and submit update CCR.
6. Prepare a summary of the changes to the document and impacts to current Common Ground System.
7. With customer, related documents impacted by the change to the Program document, and prepare CCR's.
8. Disposition of CCR comments.
9. [REDACTED].

Modification 6

Administrative Mod

Modification 7

Contractor-initiated descope mod to recapture under-run. No other changes made.

The SOW requires participation in the review and preparation of a CCR for the update of the JPSS Ground System Security Requirements Document (GSSRD). Related documents may be reviewed and additional CCR's prepared.

1. Review and update the front matter of the System Engineering Security documents such as the GSSRD.
2. Identify latest versions of the Applicable documents. Determine if additional applicable or reference documents are needed.
3. Document changes needed to update the GSSRD to comply with the most recent versions of NIST SP800-53, the applicable documents, and the current and proposed tailoring for NOAA 5042.
4. Review and update all requirement table fields.
5. Prepare and submit update CCR.
6. Prepare a summary of the changes to the document and impacts to current Common Ground System.
7. With customer, related documents impacted by the change to the Program document, and prepare CCRs.
8. Disposition of CCR comments.
9. [REDACTED].

Modification 8

Subtask 3 – Risk Management; Code 490 end date extended from 08/31/14 to 08/31/15.

Modification 9

Mod 9 adds additional scope to Subtask 4 and extends it through 5/31/2017.

Addition of the following scope to Subtask 4:

[REDACTED] IT Security support includes managing the IT Security needs for the Program and Flight Project GSFC computing resources. This includes maintaining IT Security plan, A&A effort and POA&M monitoring. Support [REDACTED] includes [REDACTED] IT policy reviews, support [REDACTED] in maintaining the Ground System Security Requirements Document and responding to Center data calls.

Modification 10

Added Subtask 5 – Risk Management [REDACTED]

1. Support the development of a Risk Management Awareness class.
2. Participate in status review meetings, telecons, and development meetings on a Risk Management Awareness class.
3. Actively participate a Code 300 sponsored class [REDACTED] on Risk Management.

Modification 11

Add to Subtask 4 – Security System Engineering [REDACTED]

Performance Requirements Delivery Schedule: System Engineering Support for GSSRD Update:

- 1) Support the Book Boss on the development of the new version of the Ground System Security Requirements (GSSRD);
- 2) Participate in status review meetings, telecons, and development meetings on a GSSRD with the GSSRD BookBoss [REDACTED];
- 3) Support the modification of the DOORS elements of the GSSRD and related configuration management/change tracking activities.

Deliverables and Delivery Schedule:

1 – status report of accomplishments – Description of work for the previous week should be submitted on a weekly basis.

2 – Financial report for this subtask – 533 Financial Report should be submitted with the Monthly OMES report for Task 12.

Place of Performance shall be at the JPSS Project annex location in Greenbelt, MD or the Goddard Space Flight Center in Greenbelt, MD.

Period of Performance is NTE 1 year level of effort.

Travel – there are no travel requirements for this subtask.

Skill Set/Knowledge Required –

Personnel who perform on this subtask are required to have the following skills:

Basic understanding of NIST 800-53 IT Security requirements

Proficiency in Doors

Excellent interpersonal skills

Strong organization, oral and written communications skills

Materials and Equipment – Personal computers for on-site personnel will be provided by the JPSS Program Office.

Modification 12

Subtask 5 – Risk Management [REDACTED] end date extended from June 30, 2015 to May 31, 2017.

Modification 13

Add Subtask 6 – Information Management System study and Assessment – Code 400, Flight Projects Directorate (FPD)

Provide Business Analytics and Information Management System (IMS) support to FPD as follows:

- 1 – Support any trade studies as directed by the FPD Business Change Initiative Lead.
- 2 – Perform risk assessment of Information Management System for projects for incorporation in decision package.
- 3 – Support assessment of IMS by project(s) as directed, including CAD and PLM systems.
- 4 – Assess IMS startup and interoperability cost for projects including ongoing sustainment expenses to projects.
- 5 – Recommend a strategic cost effective solution for GSFC projects.
- 6 – Support development of a decision package [REDACTED] by the FPD Business Change Initiative Lead.

Travel – possible local travel

Skill Set/Knowledge Required –

Strong risk management skills

Prior experience in assessing Information Management Systems

Materials and Equipment – none beyond ACES computer seat

Omnibus Multidiscipline Engineering Services (OMES)

Task Order 13 - JPSS C3S Ground Systems Engineering Support

Period of Performance: 56 months

Modifications: 9

Task Value: \$11.2M

Scope of Work:

A. Background

The Suomi-National Polar Partnership (S-NPP) weather satellite is the first of several spacecraft planned under the National Oceanographic and Atmospheric Agency (NOAA) next generation weather satellite initiative. S-NPP was launched on October 28, 2011 in the so-called afternoon orbit to primarily provide civil weather forecasting and climate monitoring data. NOAA's new satellite program, the Joint Polar Satellite System (JPSS), is managed by NASA's Goddard Space Flight Center (GSFC), Greenbelt, MD.

The S-NPP spacecraft was placed in a low polar Earth orbit (LEO) approximately 824 kilometers above the Earth at 98.7 degrees inclination. In this location, S-NPP has contact every orbit with the Svalbard ground station within the Arctic Circle and downlink science data in X-band at rates up to 300 megabits per second (Mbps) for the 5-year life of the mission. The S-NPP satellite consists of the spacecraft [REDACTED] plus five instruments (ATMS, CERES, CrIS, OMPS, and VIIRS) built by various developers. The S-NPP mission collects and distributes remotely-sensed land, ocean, and atmospheric data to the meteorological and global climate change communities as the responsibility for these measurements. It will provide atmospheric and sea surface temperatures, humidity sounding, land and ocean biological productivity, and cloud and aerosol properties.

The JPSS-1 weather satellite is the first in a series of spacecraft leveraging the work done by S-NPP. It will have a similar compliment of instruments and science team members and similar orbital attributes but will downlink instrument data in the Ka-band at 150 Mbps. [REDACTED] [REDACTED] It is tentatively scheduled for launch in late 2016.

The Global Change Observation Mission – Water (GCOM-W) satellite was launched on May 15, 2012 by the Japanese Aerospace Exploration Agency (JAXA). Data from one of the sensors is downlinked at the Svalbard ground station and multi-cast back to JAXA and to NOAA Space Operations Facility (NSOF). Testing of this interface will continue even after launch with modifications to the interface occurring that require further testing prior to going operational.

The NOAA will operate S-NPP and JPSS-1 spacecraft at the mission operations center at the NSOF at Suitland, MD and coordinate spacecraft operations with the science team members. Ground station assets provided by JPSS C3S directly or through agreements include Svalbard, Norway; McMurdo Station, Antarctica; Troll, Antarctica and Fairbanks, Alaska. In addition, ground system modifications were required to support the Defense Meteorological Satellite Program (DMSP) with its receptors at McMurdo Station. GCOM-W satellite at Svalbard is managed by the station providers through a NOAA-JAXA agreement.

Modifications to the C3S of the S-NPP/JPSS ground system are in work to accommodate the JPSS-1 and follow-on satellites including JPSS-2. These modifications include the addition of a new polar network of telemetry-receive only Ka-band ground stations dedicated to the JPSS mission set.

Future activities for the JPSS program may be the inclusion of the operations and system engineering of existing weather satellites, such as, the Polar Operational Environmental Satellite (POES) missions and the Defense Meteorological Satellite Program (DMSP). Engineering studies to support the European Meteorological Satellite Program's (EUMETSAT) Second Generation weather satellite series may also be supported.

B. Skill Set / Knowledge Required

The contractor shall have a strong technical base in the following areas:

- Spacecraft technical information engineering

Ground system development and operations engineering. At a minimum, the personnel shall have the following skills:

- Earth observing mission system engineering skills
- Knowledge of system engineering and integration tools
- Experience in system and schedule integration
- Experience in ground system development, installation and test
- Experience in ground stations, communications and radio frequency interface testing
- Task management
- Direct, relevant experience and familiarization with NASA/NOAA system architecture and organizational structures
- Strong ability to lead and interact with distributed team members and different corporate cultures
- Flight system engineering information management
- Flight software database and table management

C. Summary of Work to be Performed

The objective of this task is to provide S-NPP ground system engineering and test services during the continued implementation of upgrades to the C3S ground system for the S-NPP and GCOM missions as well as implementation of the JPSS-1 mission. Key task activities include prototyping new ground station interfaces improving data completeness and availability involving space link extension. Key JPSS-1 and future JPSS missions focus on C3S-related task activities include life-cycle ground system engineering services with particular emphasis on ground system implementation, database management, test and operations support functions. Key GCOM C3S-related task activities include mission readiness testing. In addition, radio frequency (RF) analysis and spectrum management activities for S-NPP, JPSS-1 and future JPSS missions need support to ensure these spacecraft have and maintain authorization to transmit at their designated frequencies over ground stations supporting these missions. Ground station engineering and RF testing support with flight and ground systems are required for JPSS-1 and future JPSS missions.

The Contractor shall perform requirements analysis, ground system implementation oversight, including: Block 3 trade studies, ground station trade studies, ground station design, installation, test and operations support, communications networks, and mission control centers. In addition, support of ground system readiness testing, operations engineering, system documentation, reviews and presentation package generation, and conducting ground system and Project reviews is required. This support includes technical management and systems engineering involving C3S requirements change analysis, development support, ground system schedules reviews, ground operations support, representing the ground system engineering team to the JPSS Project engineering staff and leading special assessment activities including risk assessment and trade studies. Documentation functions including editing, publishing and distribution support will be performed for technical documents and ground system review materials. Furthermore, support in overall ground system management and direct reporting to the JPSS C3S Manager is expected.

The S-NPP/JPSS/GCOM Mission Readiness Team ensures that systems, processes, personnel, and procedures across the S-NPP/JPSS/GCOM Mission System (flight and ground) achieve pre-launch readiness for early orbit, nominal, and contingency operations, and is responsible for post-launch activation, checkout, and calibration of flight and ground systems.

Project Management

Provide the technical and functional activities at the contract level needed for administrative, clerical, documentation, quality assurance, and related functions.

Prepare a task management plan describing the technical approach, organizational resources and management controls to be employed to meet the cost, performance and schedule requirements throughout task execution.

Provide monthly financial reports to document plan versus actual expenditures.

Provide weekly status reports describing task performance and identify any issues.

Integration, Test, and Verification Services

- Provide integration, test, and verification services including mission systems engineering, systems engineering, RF system engineering, independent software verification and validation, software support, sustainment and test engineering, and system-level support of products during box, instrument, spacecraft and observatory I&T including:
 - Major program reviews
 - Spaceflight subsystems
 - Spaceflight instruments
 - Spaceflight payloads

Travel as appropriate for engineering related activities.

Systems Engineering

Provide systems engineering support for project development, reporting progress and conformance to appropriate practices and specifications (GPG 7120.5 Systems Engineering)

Provide key mission and spacecraft-level systems engineering functions that include:

- operations concept development
- architecture and design development,
- requirements analysis, identification and management,
- validation and verification,
- interfaces and interface control documents (ICDs),
- risk analysis, reduction and management,
- configuration management and documentation,
- sustainment and test engineering and,
- trade studies for the insertion of the following missions into the JPSS CGS without adding impact to the JPSS-1 mission:
 - Polar Operational Environmental Satellite (POES) missions
 - Defense Meteorological Satellite Program (DMSP)
 - Joint Polar Satellite System 2 (JPSS-2)

Travel [REDACTED] for engineering related activities.

D. Deliverables / Milestones

SOW Work Summary Section	Deliverable Title	# Calendar Days After Award or Relative to Mission Schedule
C.1	Task Management Plan	Draft – 15, Final – 30
C.1	Status / Financial Report	Monthly
C.1	Weekly Status Reports	Weekly
C.2	Spacecraft Ops Meetings	Weekly
C.2	Ground System Technical Interchange Meetings	
C.3	C3S Ground System Engineering Meetings	Weekly
C.3	DMSP/McMurdo Engineering Meetings	Weekly
C.3	GCOM Engineering Meetings	
C.3	C3S Work Request Planning (WRRP) Meetings	Weekly
C.3	C3S CCB Meeting	Weekly
C.3	C3S Engineering Trade Study Reports	(POES,DMSP,J2, Block 3 - June 2017)
C.3	C3S Engineering Trade Study Meetings	(POES,DMSP,J2, Block 3)

E. Other Direct Costs and Special Considerations

E.1 Travel

The following non-local travel is anticipated to support team meetings and other pertinent conferences:

- Trips to Aurora, CO for JPSS Ground Project Management Reviews (PMRs), C3S working group meetings, engineering reviews and test reviews (monthly)

[REDACTED]

- Trips to Aurora, CO for Operations-Based Site Acceptance Test (OBSAT) test and verification assessment (VDA) support (weekly in October)

[REDACTED]

- Trips to Fairbanks, Alaska for engineering implementation and site testing, one trip a year

[REDACTED]

- Trips to Svalbard, Norway for engineering implementation and site testing, one trip a year

[REDACTED]

- Trips to CBU, Fairmont WV for site testing, two trips a year

[REDACTED]

Local travel should be planned for meetings held at the NOAA Satellite Operations Facility (NSOF) in Suitland, Maryland.

- Trips to Suitland, Maryland for JPSS Ground Project Reviews, C3S working group meetings, engineering reviews and test reviews (weekly)

[REDACTED]

E.2 Materials and Equipment

The place of performance will be on site at GSFC. Personal computers for on-site personnel will be provided by the JPSS Project.

No Government Furnished Equipment is planned. Local systems (GSFC on site) will be accessible for initial test procedure generation and pre-tests.

No Government Furnished Equipment is planned, although facility accommodations will be provided by NOAA at the NSOF for engineering support personnel. Facility taxes (telephone, IT support) will be provided by JPSS Project.

E.3 Special Considerations

This work may require access to other contractor proprietary information. Company-to-company non-disclosures agreements will be required.

Task members directly involved with test activities at secure facilities may require security clearances. The contractor will coordinate and obtain concurrence from the task monitor (TM) for individuals requiring clearances. Additionally, the contractor will be compliant with the NASA security requirements and guidelines.

F. Applicable Documents

The applicable documents for this task include:

- NPP Schedule (Level 1 and Detailed Schedule to Launch)
- NPP Mission Requirements Specification
- NPP System and Operations Concept
- NPP System Engineering Management Plan
- NPP Risk Management Plan
- NPP Performance Verification Plan
- NPP System Integration and Test Plan
- JPSS Schedule (Level 1 and Detailed Schedule to Launch)
- JPSS Mission Requirements Specification
- JPSS System and Operations Concept
- JPSS System Engineering Management Plan
- JPSS Risk Management Plan
- JPSS Performance Verification Plan
- JPSS System Integration and Test Plan
- Applicable NPGs and GPGs
- NPR 7120.5D, NASA Space Flight Program and Project Management Requirements
- NPR 8000.4, Risk Management Procedures and Guidelines
- (FVS and FVTS documentation (ops manuals, ICDs, etc.)

Omnibus Multidiscipline Engineering Services (OMES)

Task Order 14 - JPSS Ground System Engineering

Period of Performance: 56 months

Modifications: 6

Task Value: \$22.5M

Scope of Work:

The Joint Polar Satellite System (JPSS) is the National Oceanic and Atmospheric Administration's (NOAA) next-generation operational Earth observation program that acquires and distributes global environmental data primarily from multiple polar-orbiting satellites. The program plays a critical role to NOAA's mission to understand and predict changes in weather, climate, oceans and coasts, and the space environment, which support the Nation's economy and protect lives and property. The JPSS provides operational continuity of satellite-based observations and products for NOAA Polar-orbiting Operational Environmental Satellites (POES) and the Suomi National Polar-orbiting Partnership (S-NPP) satellite. The first of two JPSS satellites, JPSS-1, is planned for launch in FY2017 with JPSS-2 to follow around the 2021 timeframe.

In addition to the JPSS Program's own satellites operating in the 1330 Local Time of the Ascending Node (LTAN) orbit, NOAA also leverages partner assets for better global coverage. This includes the Department of Defense (DoD) operational weather satellites (in the 1730 – 1930 LTAN orbit), European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) Meteorological Operational (Metop) satellites (in the 2130 LTAN orbit) and Japanese Aerospace Exploration Agency (JAXA) Global Change Observation Mission (GCOM) satellites (in the 1330 LTAN orbit). For EUMETSAT, JPSS provides data routing support from McMurdo to Darmstadt, Germany. For GCOM, JPSS provides data routing from Svalbard, Norway and Raw Data Record (RDR) processing.

The JPSS Program also provides data acquisition and routing support to the Defense Meteorological Satellite Program (DMSP), the Coriolis/WindSat, National Science Foundation (NSF), the NOAA POES, as well as the National Aeronautics and Space Administration (NASA) Space Communication and Navigation (SCaN) supported missions, which include the Earth Observing System (EOS). Moreover, the JPSS Program will operate free flyer satellites to accommodate Total and Spectral solar Irradiance Sensor (TSIS) and service instruments such as Advanced Data Collection System (A-DCS), Search and Rescue Processor (SARP) and Search and Rescue Repeater (SARR). It is still to be determined whether the Free Flyer satellites will use the JPSS Ground System or their own ground system. As part of the agreements for the use of McMurdo Station, JPSS will provide internet service for the National Science Foundation between McMurdo, Antarctica and Centennial, Colorado.

As a shared ground infrastructure, the JPSS Ground System supports the heterogeneous constellation of the before-mentioned polar-orbiting satellites both within and outside the JPSS program through a comprehensive set of services.

Table: 0-1 JPSS Ground System Services

Service	Description
Enterprise Management and Ground Operations	Provides mission management, mission operations, ground operations, contingency management and system sustainment
Flight Operations	Provides launch support and early orbit operations, telemetry and commanding, orbital operations, mission data playback, payload support, flight software upgrade, flight vehicle simulation, and disposal at the end of mission life
Data Acquisition	Provides space/ground communications for acquiring mission data
Data Routing	Provides routing of telemetry, mission and/or operations data through JPSS' global data network
Data Product Generation	Provides the processing of mission data to generate and distribute raw, sensor, environmental, and ancillary data products
Data Product Calibration and Validation	Provides calibration and validation of the data products
Field Terminal Support	Provides development and operational support to the Field Terminal users

Description

This task provides engineering support to the NASA Goddard Space Flight Center (GSFC) for the Joint Polar Satellite System (JPSS) program. This support is for the ground segment of the JPSS program. The general areas of this support include systems engineering, requirements management, interface management, concept of operations and architecture development and sustainment. Identification and tracking of Key Performance Parameters (KPPs), technical Performance Measures (TPMs) metrics and system modeling and analysis are to be performed to ensure the system meets user needs.

Scope and Specific Tasks

Provide Systems Engineering support to the JPSS Ground Project. Specific tasks include [REDACTED] the following:

- Develop and maintain the concept of operations for the JPSS Ground System
- Develop and maintain the architecture model and description document for the JPSS Ground System
- Develop and maintain the Lexicon for the JPSS Ground System
- Develop and maintain the JPSS Ground Project requirements. Establish the baseline in DOORS, traceability to the JPSS mission level requirements and down to the GS segment specifications and contractor lower element requirements
- Develop and maintain the DOORS database and perform administrative functions on the system
- Develop verification descriptions and provide traceability to requirements
- Generate and support the development of JPSS Ground Project interface requirements and interface control documentation
- Lead and oversee specific Block development for JPSS Ground System as designated, act as the key Ground Project representative for each Block
- Provide system engineer for each major mission (JPSS-x, NPP, GCOM,FF) providing a single point of contact for the program and flight project for management of the specific mission technical baseline, reviews, giver/receivers, interface and mission unique ground system capabilities.
- Support CGS Change order process and documentation
- Develop and review flight/ground giver receiver list and documentation
- Support working groups and Technical Interchange Meetings (TIMs) with the JPSS Flight Project and Flight Project vendors and JPSS Ground System data users and external interfaces.
- Provide the JPSS Ground Project risk management and support the JPSS Program risk management process
- Develop and maintain required JPSS Ground System KPPs and TPMs as identified in the CONOPs
- Perform system modeling and analysis to support system development and performance requirements
- Review, evaluate, and provide input to JPSS Ground segment/element designs, development and planning activities
- Support JPSS Ground Project review preparations
- Contribute and/or review JPSS mission level and Ground Project plans, designs, specifications, requirements, and other documents [REDACTED].
- Review, evaluate, and provide input to the JPSS mission readiness test planning
- Review, evaluate, and provide input to the Level 4 and Level 5 requirements, verification descriptions, OpsCons and the associated designs.

Deliverables and Delivery Schedule

ID	Title	Description	Periodicity
1	Weekly Status Reports	Description of accomplishments, issues/concerns for the previous week and plans for the following month	Weekly
2	Monthly Status Report	Description of accomplishments, issues/concerns for the previous month and plans for the following month	Monthly
3	Financial Report	533 financial report	Monthly, submitted with OMES report
4	Trip Report for international Travel	Summary of discussion or results from any international travel conducted in support of this task	Within one work week of trip end
5	Analytical Products	Documents a position, an issue, a proposal, trade study, risk analysis, strategic alignment, etc., and is the primary ongoing deliverable mechanism for the task	tracked in weekly and monthly reports
6	Requirements data	Requirements updates to DOORS or extracts from DOORS into other MS Office products	tracked in weekly and monthly reports
7	Communications Materials	Artifacts as required to support outreach and communications (e.g., presentations, handouts, blog/wiki/web updates, announcements)	tracked in weekly and monthly reports
8	Meeting minutes	Summary of results and actions from TIMs or other meetings that occur on this task.	Within one week of the completion of the meeting.

Place of Performance

The work performed under this TO shall primarily be performed at the main GSFC campus or the JPSS Project annex location in Greenbelt, MD except for travel as noted in the travel section of this SOW.

Travel

Travel in support of technical meetings will be required in support of Program Management Reviews (PMRs) and TIMs for interfaces, user interfaces, and ground system requirements. Travel will be to meet with the ground system development contractor, observatory providers, instrument providers, at contractor facilities, JPSS program facilities, and at the data processing centrals.

- Anticipated number of trips during the task: 1 every two months for PMR, [REDACTED], [REDACTED], design reviews at prime contractor for Common Ground System (CGS) – 2 major reviews, [REDACTED], [REDACTED] to Boulder, Co for S/C provider – [REDACTED], 2-4 trips to Consolidated Back-Up (CBU) facility, [REDACTED], 3-4 days each trip .
- Anticipated locations for each trip: Aurora, CO (CGS provider), Boulder, Co (BATIC – S/C provider) , CBU facility at Fairmont, WV, [REDACTED]
- Local travel to NSOF, Suitland, Maryland [REDACTED]

Special Considerations

Additional considerations for the task:

8.1 Skill Set / Knowledge Required

- (1) Candidates are required to have experience in the design, development and operations preparations of NASA ground systems.
- (2) Requirements manager is required to have experience with the DOORS requirements database tool.
- (3) Risk Manager is required to have experience in NASA risk management processes and procedures.
- (4) NDA agreements with vendors may be required: Expected number of NDA's is based on number of subcontractors
- (5) Contractor shall comply with NASA's identity and credential issuance requirements. Staff may not begin working under this TO until a validated NASA identity with favorable background investigation adjudication is complete.
- (6) The Contractor may be required to travel during the period of the Task Order (TO).
- (7) Contractor will use computing resources supplied by NASA (e.g., networks, servers).

- (8) Candidates are required to comply with NASA's training requirements including but not limited to security, environmental awareness, and safety.
- (9) DOORS System Administration skills will be required.

8.2 Materials and Equipment

Personal computers for on-site personnel will be provided by the JPSS Ground Project. Local systems (GSFC main campus and/or JPSS annex) will be accessible for initial test procedure generation and pre-tests. DOORS license will be required.

8.3 Proprietary Information

This work may require access to other contractor proprietary information. Company-to-company non-disclosures agreements will be required.

Task members directly involved with test activities at secure facilities may require security clearances. The contractor will coordinate and obtain concurrence [REDACTED] for individuals requiring clearances. Additionally, the contractor will be compliant with the NASA security requirements and guidelines.

Interchanges with the Norwegian Space Centre (NSC) and their contractor, Kongsberg Satellite Services (KSAT) will be required. Appropriate agreements and arrangements will be required and information exchange will be assessed via the GSFC Export Control Office through the JPSS Ground Project.

This SOW identifies the OMES contractor's responsibilities to the broader engineering roles and responsibilities to NASA. The JPSS ground system is a distributed system that serves the weather prediction and climate research needs of NASA and NOAA. Interactions with foreign persons, specifically members of the Norwegian Space Centre (NSC) / Kongsberg Satellite Services (KSAT) is limited to planning, scheduling ground station assets for test events, execution of tests and troubleshooting of test issues. The scope of this interaction is limited to ensuring that all the system resources required for end-to-end mission system testing are available and ready to operate in an orchestrated fashion. More to the point, interaction is limited to ensuring that U.S. government property that is operated by KSAT under contract to both NASA and the ground system development contractor is available at specific dates and times [REDACTED] in order to support activities performed in CONUS.

Any technical issue arising from these requests falls under the responsibility of a separate and distinct U.S. Government contract.

Applicable Documents

The applicable documents for this task include:

- JPSS Ground System Schedule and Technical Baseline
- JPSS Ground System Requirements Document
- JPSS Common Ground System Requirements Document
- JPSS Concept of Operations Document
- JPSS Ground System Interface Requirements Documents
- JPSS Program System Engineering Management Plan
- JPSS Ground System Verification and Validation Strategy Documents
- Applicable NPGs and GPGs
- NPR 7120.5D, NASA Space Flight Program and Project Management Requirements

**Applicable Section from Omnibus Multidiscipline Engineering Services (OMES) Contract
Statement Of Work**

The applicable sections from the OMES contract SOW are provided below:

B. Mission Systems Engineering

1. Architecture & Design Development:

- a. Defining systems and conducting trade-off studies/design studies for spacecraft, suborbital craft, instruments, space segments and ground segments
- b. Reviewing software development and software system test activities
- c. Generating and maintaining and/or reviewing system block diagrams

2. Requirements Analysis, Identification and Management:

- a. Generating and managing and/or reviewing Level 1 and 2 requirements
- b. Conducting requirements traceability
- c. Documenting specified and lower level derived requirements to demonstrate that performance requirements are met
- d. Reviewing/performing independent design and development requirements analyses, and submitting comments and recommendations
- e. Reviewing technical specifications, and submitting comments and recommendations
- f. Providing specification of Requirements for Design, non-flight fabrication, and checkout of ground support equipment
- g. Reviewing contamination control requirements
- h. Reviewing operating plans and procedures for cryogenics, fuels, and other hazardous materials

5. Interfaces and Interface Control Documents (ICDs):

- a. Reviewing and analyzing design interfaces
- b. Identifying interface control requirements for engineering and design of components for launch, on orbit servicing, or retrieval of flight hardware
- c. Preparing, reviewing, and analyzing interface documentation for mission systems
- d. Preparing interface control documents and verifying proper implementation for flight and ground subsystems and systems
- e. Controlling external interface documentation and requirements

8. Risk Analysis, Reduction, and Management:

- a. Identifying high risk elements and developing/executing contingency plans for controlling the high risk elements
- b. Reviewing contractor risk management plans and commenting on alternate approaches

Omnibus Multidiscipline Engineering Services (OMES)

Task Order 15 - JPSS Ground System Integration, Test and Verification

Period of Performance: 56 months

Modifications: 5

Task Value: \$16.8M

Scope of Work:

The Joint Polar Satellite System (JPSS) is the National Oceanic and Atmospheric Administration's (NOAA) next-generation operational Earth observation program that acquires and distributes global environmental data primarily from multiple polar-orbiting satellites. The program plays a critical role to NOAA's mission to understand and predict changes in weather, climate, oceans and coasts, and the space environment, which support the Nation's economy and protect lives and property. The JPSS provides operational continuity of satellite-based observations and products for NOAA Polar-orbiting Operational Environmental Satellites (POES) and the Suomi National Polar-orbiting Partnership (S-NPP) satellite. The first of two JPSS satellites, JPSS-1, is planned for launch in FY2017 with JPSS-2 to follow around the 2021 timeframe.

In addition to the JPSS Program's own satellites operating in the 1330 Local Time of the Ascending Node (LTAN) orbit, NOAA also leverages partner assets for better global coverage. This includes the Department of Defense (DoD) operational weather satellites (in the 1730 – 1930 LTAN orbit), European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) Meteorological Operational (Metop) satellites (in the 2130 LTAN orbit) and Japanese Aerospace Exploration Agency (JAXA) Global Change Observation Mission (GCOM) satellites (in the 1330 LTAN orbit). For EUMETSAT, JPSS provides data routing support from McMurdo to Darmstadt, Germany. For GCOM, JPSS provides data routing from Svalbard, Norway and Raw Data Record (RDR) processing.

The JPSS Program also provides data acquisition and routing support to the Defense Meteorological Satellite Program (DMSP), the Coriolis/WindSat, National Science Foundation (NSF), the NOAA POES, as well as the National Aeronautics and Space Administration (NASA) Space Communication and Navigation (SCaN) supported missions, which include the Earth Observing System (EOS). Moreover, the JPSS Program will operate free flyer satellites to accommodate Total and Spectral solar Irradiance Sensor (TSIS) and service instruments such as Advanced Data Collection System (A-DCS), Search and Rescue Processor (SARP) and Search and Rescue Repeater (SARR). It is still to be determined whether the Free Flyer satellites will use the JPSS Ground System or their own ground system. As part of the agreements for the use of McMurdo Station, JPSS will provide internet service for the National Science Foundation between McMurdo, Antarctica and Centennial, Colorado.

As a shared ground infrastructure, the JPSS Ground System supports the heterogeneous constellation of the before-mentioned polar-orbiting satellites both within and outside the JPSS program through a comprehensive set of services.

Table: 3-1 JPSS Ground System Services

Service	Description
Enterprise Management and Ground Operations	Provides mission management, mission operations, ground operations, contingency management and system sustainment
Flight Operations	Provides launch support and early orbit operations, telemetry and commanding, orbital operations, mission data playback, payload support, flight software upgrade, flight vehicle simulation, and disposal at the end of mission life
Data Acquisition	Provides space/ground communications for acquiring mission data
Data Routing	Provides routing of telemetry, mission and/or operations data through JPSS' global data network
Data Product Generation	Provides the processing of mission data to generate and distribute raw, sensor, environmental, and ancillary data products
Data Product Calibration and Validation	Provides calibration and validation of the data products
Field Terminal Support	Provides development and operational support to the Field Terminal users

1. Description

This task order defines the tasks required for mission system test and analysis support for the JPSS Ground System Project

- Perform mission system integration and test planning and execution
- Develop system verification plans/status and the development of detailed test plan, procedures, and timeline, periodic system analyses.
- Provide test director(s) for each defined mission test, including the flight / ground JPSS Compatibility Tests (JCTs) and other mission level test events, including interface and performance tests.
- [REDACTED]
- Support mission level Discrepancy Review Board (DRB) and related activities.
- Support mission level reviews and meetings with various NASA, agency partners, NASA, agency contractors, and customers.

- Develop Verification Requirements, Plan and execute testing of the Ground System Security requirements

2. Scope and Specific Tasks

The objective of this task is to provide mission system engineering services during the continued implementation and evolution of the JPSS Ground System. Key task activities include the verification of the JPSS Ground System and overall JPSS missions including satellite and ground and mission level requirements and interfaces. The JCTs are the lynchpin tests serving as the incremental flight/ground compatibility tests. The interface, block ground system and system performance tests are the events used to verify mission level requirements.

The OMES contractor will develop ground system level tests required to verify the readiness of the JPSS Ground System to meet specific Block releases or sustainment release readiness. The OMES contractor will participate and /or monitor the ground system test and sustainment activities in preparation for mission level testing. The ground system and mission level tests events are performed using a federated test team consisting of members from across the programs and development contractors' organizations. Supporting working group meetings and mission level reviews are required under this task.

3.1 Task Management

Provide the technical and functional activities at the contract level needed for administrative, clerical, documentation, quality assurance, and related functions.

Prepare a task management plan describing the technical approach, organizational resources and management controls to be employed to meet the cost, performance and schedule requirements throughout task execution.

Provide monthly financial reports to document plan versus actual expenditures.

Provide weekly status reports describing task performance and identify any issues.

3.2 System Integration and Test Planning and Execution

Generate required JPSS Ground Test Plans and products for each required Ground System or Mission level event and update the JPSS Ground System test previous plans and products periodically as necessary to perform ground system regression testing as necessary.

Develop detailed integration and test plans, products, schedules and test procedures and reports for each ground system and mission level tests (flight / ground compatibility, interface, and performance as well as engineering tests); identify and coordinate all system and personnel assets in support of those test events.

Develop requirements for test data and review test data specifications and test data to ensure the test data will meet the objectives of the planned tests. Test data sets should include:

- Mission formatted data;

- Representative of JPSS missions orbit, sensors, and satellite downlink;
- Multi-orbit and multi-day durations (operational / system loading);
- Error injection (error handling operations).

Identify verification methods for mission system requirements and ensure the associated interface tests are exercised with actual end-to-end system components (mission/launch configurations).

Serve as integration/test director for formal and engineering tests and JPSS Compatibility Tests (JCTs).

Generate test reports, discrepancy reports, test / metric status summaries.

Lead specific integration and test focus group meetings with representation from the various agency and contractor organizations and generate meeting minutes.

Support / participate in various developer integrated product team and working group meetings, development / segment / security level testing and certification.

3.3 System Engineering and Integration Services

Maintain/update engineering support documents, including [REDACTED] the System I&T Plan and Verification & Validation Plan.

Support mission level discrepancy reporting including DRB activities.

Coordinate the NASA institutional integration services for JPSS Ground System.

Support the Project level configuration management process.

3.4 System Integration Scheduling

Maintain the system integration philosophy defined during mission implementation and utilize the approach to evaluate mission integration schedule and incorporate schedule adjustments in order to achieve mission launch target.

Identify integration and test dependencies and incorporate these into the master Project schedule.

Coordinate and schedule NASA institutional assets to execute functional communication tests.

Interact with project management regarding the integration and engineering activities (e.g., risk, integration and test, schedule).

Represent the project as lead support of the integration and test activities.

Participate in management and mission level reviews, meetings and audits.

Travel as appropriate for integration and engineering related activities.

3. Deliverables / Milestones

The deliverables for this task include the following:

SOW Section	Deliverable Title	Deliverable Description	Delivery Frequency
3.1	Financial Reports	533 for this task	Monthly, submitted with OMES MPR report
3.1	Monthly Progress Report (MPR)	Description of accomplishments, issues/concerns for the previous month and plans for the following month	Monthly
3.1	Weekly Report	Description of accomplishments, issues/concerns for the previous week and plans for the following week	Weekly
3.2	Test reports	Summary of test results	Nominally one week post event for quick look report and four weeks for detailed reports
3.2	Test Plans and Procedures	Test Plans and detailed Test Procedures for each planned test	Four months and two months, respectively, prior to each major test event
3.2	Requirements Verification Summary/ Status	Summary report of requirements that were verified and those that were not successfully verified	Periodic, per test events

3.3	Engineering management document updates (e.g., SI&T Plan)	Updates to overall test planning documents	Periodic [REDACTED]
3.4	SI&T Schedule Inputs	Schedule Status for upcoming tests	Monthly [REDACTED]
All	Trip Report for international Travel	Summary of discussion or results from any international travel conducted in support of this task	Within one work week of trip end
All	Communications Materials	Artifacts as required to support outreach and communications (e.g., presentations, handouts, blog/wiki/web updates, announcements)	[REDACTED] tracked in weekly and monthly reports
All	Meeting minutes	Summary of results and actions from TIMs or other meetings that occur on this task.	Within one week of the completion of the meeting

4. Place of Performance

The work performed under this TO shall primarily be performed at the main GSFC campus or the JPSS Project annex location in Greenbelt, MD except for travel as noted in the travel section of this SOW.

5. Period of Performance

Period of Performance: Oct 1, 2012 thru May 31, 2017

6. Travel

For travel cost estimating, the planned major test events during the PoP include testing for Block 1. 2, 2.0, 2.1 and 3.0.

Local Travel

Local travel should be planned for meetings and major test event held at the NOAA Satellite Operations Facility (NSOF) in Suitland, Maryland

Travel to Consolidated Backup Facility

Travel to Consolidated Backup Facility (CBU) in Fairmont, WVa for Block specific testing. [REDACTED] per test event for each major test event. [REDACTED] per test event for each thread test event. It is anticipated that one major test event will be required for each block at the CBU. It is anticipated that there will be 2 to 3 thread test events prior to the Block Ground System Test at the CBU for each Block.

Travel [REDACTED]

Travel to [REDACTED] Boulder Colorado for JPSS-1 Spacecraft and Mission level tests

[REDACTED] per test event for each major test event. There are three defined flight to ground interface tests where travel [REDACTED] will be required.

Travel [REDACTED]

Travel to [REDACTED] Aurora, Colorado for monthly Program monthly meeting and Factory Testing for each major Block release

[REDACTED] monthly for PMR or TIM's and [REDACTED] to support each major Factory level test

It is anticipated that two major test event will be required for each block at the [REDACTED] facility in Auroa, CO.

Travel to Ground Stations

Travel to JPSS Ground Stations as necessary to support deployments, installations and certification

[REDACTED] per for each ground station test per each major test event
Svalbard, Norway, Fairbank, Alaska, Troll, Antartica, McMurdo, Antarctica, WSGT in New Mexico, Vandenberg AFB, California

It is anticipated that one major test event will be required for each block at the ground stations, as well as minor test events for subsequent major builds.

7. Special Considerations

7.1 Skill Set / Knowledge Required

The contractor shall have a strong technical base in the following areas:

- Mission system engineering, integration and test (mission and flight system)
- Satellite operations
- Mission security
- Data format analysis and test data generation
- Earth Science data processing and archiving

At a minimum, the personnel shall have the following skills:

- Earth observing mission system engineering skills
- Knowledge of system engineering and integration tools
- Task management
- Direct, relevant experience and familiarization with NPP system architecture and organizational structure
- Strong ability to lead and interact with distributed team members and different corporate cultures

7.2 Materials and Equipment

Personal computers for on-site personnel will be provided by the JPSS Ground Project. Local systems (GSFC main campus and/or JPSS annex) will be accessible for initial test procedure generation and pre-tests.

7.3 Proprietary Information

This work may require access to other contractor proprietary information. Company-to-company non-disclosures agreements will be required.

Task members directly involved with test activities at secure facilities may require security clearances. The contractor will coordinate and obtain concurrence [REDACTED] for individuals requiring clearances. Additionally, the contractor will be compliant with the NASA security requirements and guidelines.

Interchanges with the Norwegian Space Centre (NSC) and their contractor, Kongsberg Satellite Services (KSAT) will be required. Appropriate agreements and arrangements will be required and information exchange will be assessed via the GSFC Export Control Office through the JPSS Ground Project.

This SOW identifies the OMES contractor's responsibilities to the broader engineering roles and responsibilities to NASA. The JPSS ground system is a distributed system that serves the weather prediction and climate research needs of NASA and NOAA. Interactions with foreign persons, specifically members of the Norwegian Space Centre (NSC) / Kongsberg Satellite Services (KSAT) is limited to planning, scheduling ground station assets for test events,

execution of tests and troubleshooting of test issues. The scope of this interaction is limited to ensuring that all the system resources required for end-to-end mission system testing are available and ready to operate in an orchestrated fashion. More to the point, interaction is limited to ensuring that U.S. government property that is operated by KSAT under contract to both NASA and the ground system development contractor is available at specific dates and times as requested in order to support activities performed in CONUS.

Any technical issue arising from these requests falls under the responsibility of a separate and distinct U.S. Government contract.

8. Applicable Documents

The applicable documents for this task include:

- JPSS Ground System Schedule and Technical Baseline
- JPSS Ground System Requirements Document
- JPSS Common Ground System Requirements Document Mission Requirements Specification
- JPSS Concept of Operations Document
- JPSS Ground System Interface Requirements Document
- JPSS Program System Engineering Management Plan
- JPSS Ground System Verification and Validation Strategy Documents
- Applicable NPGs and GPGs
- NPR 7120.5D, NASA Space Flight Program and Project Management Requirements

9. Applicable Section / Paragraph Number from the OMES SOW for this Task

The applicable sections from the OMES contract SOW are provided below:

Function B Mission Systems Engineering

SubFunction 4 Verification and Validation:

- a. Generating and/or reviewing Verification Plans
- b. Performing design, drawing, and specification reviews
- c. Providing comments and/or recommendations to ensure: 1) that designs meet specification and interface requirements, 2) that appropriate parts standards are compatible with specified mission requirements and risk levels, 3) that detailed specifications are compatible with mission requirements, including margin and error budgets, 4) and that proper consideration is given to cost, reliability, safety, non-flight fabrication requirements, contamination control, magnetic

materials/interference, launch requirements, and space environmental requirements.

- d. Documentation and/or review of system qualification requirements
- e. Preparing and/or reviewing hardware and software integration plans and procedures, and witnessing execution
- f. Preparing and/or reviewing detailed functional and environmental test plans and procedures, and witnessing test execution
- g. Ensuring that the technical aspects of shipping requirements and equipment are met
- h. Preparing and/or reviewing plans for launch site checkout, integration and testing of flight systems, including adequacy of the launch site facility
- i. Analyzing data from spacecraft telemetry data sources to ensure total system compatibility
- j. Analyzing Flight performance from flight data

Function H. Integration, Test, and Verification Services

The Contractor shall provide management, engineering and test-conductor services that include integrating and verifying the flight, ground systems, and science data system/applications in accordance with applicable documentation and specifications, preparing test procedures, documenting all nonconformances and dispositions, calibrating the system and its ground support equipment, and providing operating manuals, reference documents, training, and launch site support.

Subfunction 1. Integration, Test and Verification Specific Tasks – The Contractor shall provide integration, test, and verification services, including:

- a. Major program reviews
- b. Space flight subsystems
- c. Space flight instruments
- d. Space flight payloads
- e. Suborbitalcraft instruments
- f. Ground instrumentation
- g. Ground support systems
- h. Science data systems/applications

- i. Spacecraft and science operations control rooms
- j. Suborbitalcraft subsystems

Integration and test services may need to be supported at various locations, including vendor sites, NASA Centers, and Military sites.

Omnibus Multidiscipline Engineering Services (OMES)

Task Order 16 - Robotics Facility

Period of Performance: 55 months

Modifications: 5

Task Value: \$20.3M

Scope of Work:

The purpose of this task is to provide engineering, technical, and procurement support to allow for the daily operations of the robotic simulation platforms located in building 27N and building 29, room 150, and other facilities, for the Satellite Servicing Capabilities Office (SSCO), Code 408. This task will allow for the day to day operations of all the robotic activities, wherever they are conducted, for the project including general operations, tours, facility reconfigurations, multiprogram technology development, and development of new capabilities. Responsibilities include managing, maintaining, controlling, and ensuring all robotic system safety procedures and policies are maintained and followed. Mission specific operations will be conducted under other tasks.

I. Subtask Description

a. Robotics engineering: Provide discipline robotic engineering support to operate, maintain and develop new capability with SSCO robotic systems. Engineering disciplines include systems, operations, mechanical, electrical, software and robotics. This effort also includes providing access to outside robotic consultants that have unique expertise that cannot be identified with the Goddard workforce.

b. Procurement and manufacturing: Provide the procurement support to acquire the need systems and components needed to support the operations of the robotics team. Provide electrical/mechanical fabrication and assemble support to the robotic team.

Deliverable Items and Schedules

Deliverables for these tasks shall include reports, test reports, and presentations describing activities conducted by the robotics team including system trade studies, design evaluations, and support for the program weekly and monthly reports. Also included is a monthly labor hour report [REDACTED]

[REDACTED]. Deliverables include the above items [REDACTED] all of which will be produced by multi-disciplinary team from multiple contracting sources, and thus not a direct deliverable from this task.

II. Management Approach

a. Staff Allocation, Expertise, and Skill Mix

The contractor shall staff this work item with the appropriate skill mix and staffing level for the work.

b. Configuration Management

Systems and documents will be covered under the Servicing Capabilities Office Configuration Management Plan.

c. Facilities

Appropriate Information Technology devices to support the analyses, specification development, and report development are required. It shall be the contractor's responsibility to provide and set up local workstations and network connections at the contractor's off-site facilities as required, and to install any required tools and utilities on the contractor's equipment.

d. Risk Management and Best Practices

The contractor shall manage schedule, cost, and technical risk through monitoring and reporting of progress and performance metrics, identifying issues well in advance of negative consequences, recommending corrective action [REDACTED], and implementing corrective actions with the compliance [REDACTED].

e. Government Furnished Facilities, Equipment, Software and Other Resources

The Government will provide account and passwords to government-furnished workstations where existing versions of various relevant software packages shall be maintained. It shall be the contractor's responsibility to complete any GSFC required security-related training courses.

III. Travel

Non-local travel is required for this task. Travel requirements will include [REDACTED] Naval Research Laboratory, NASA/Johnson Space Center, and West Virginia Robotic Technology Center. Travel reports are required for domestic travel.

IV. Work Location

This work shall be performed primarily on-site at the Goddard Space Flight Center, but the contractor may be required to perform some work at the contractor's facility, and at other NASA/non-NASA facilities.

V. Reporting Requirements

The contractor shall report status in person or via teleconference [REDACTED] on a weekly basis. Reports shall include informal presentation of interim results, status of development activities, and action item status. The contractor shall provide all reports at least one day in advance of the quarterly meeting via email, and maintain an email distribution list with the concurrence [REDACTED]. The contractor shall also support [REDACTED] in the preparation of status reviews for internal and external funding agencies. The contractor shall comply with any and all additional requests for status meetings and reports. The contractor shall deliver all documents in electronic form [REDACTED].

VI. Security Requirements

This task shall comply with IT security requirements as documented in the Omnibus Multidiscipline Engineering Services IT security plan. This task shall also comply with IT security requirements as documented in the Servicing Study IT security plan for all systems.

VII. Rights

This SOW shall adhere to the RIGHTS IN DATA – special works (FAR 52.227-17) as modified by NFS 1852.227-17.

Omnibus Multidiscipline Engineering Services (OMES)

Task Order 17 - Support for JPSS IDPS

Period of Performance: 55 months

Modifications: 4

Task Value: \$11.2M

Scope of Work:

I. Background

- a. **Background** – The Joint Polar Satellite System (JPSS) mission is to provide military and civilian agencies with environmental, meteorological, and climatological data and products. The Common Ground System (CGS) provides command and control of the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) and JPSS spacecraft and instruments. The CGS transports commands, telemetry, and mission data between the space, ground control, and processing facilities and the Customer locations, and enables mission planning, asset management, and delivery of the mission products. Interface Data Processing Segment (IDPS) is part of the Common Ground System (CGS). The Interface Data Processing Segment (IDPS) is responsible for the receipt of raw mission data from the Command, Control, and Communications Segment (C3S) and for creating and delivering useable environmental products to Users. IDPS ingests Stored Mission Data (SMD) received from C3S – the artifacts from satellite on-board storage and ground communication routing are removed prior to arrival at the IDPS. The initial ingest processing provides raw data records (RDR; per sensor/channel raw bits) that are subsequently processed to create Sensor Data Records (SDR; geolocated and calibrated samples), Temperature Data Records (TDR), deliverable Intermediate Products (IP), and Environmental Data Records (EDR; higher level products). The RDR, SDR, TDR, deliverable IP, and EDR products are made available to user systems, for use in application specific, weather related predictions.
- b. **Summary of work** – The contractor shall provide support as identified in the following sub-tasks. Contractor shall perform support services in the coordination and execution of IDP prototyping efforts.

Subtask 1: Descoped

Subtask 2: The contractor shall provide operate the mission data analysis tool (CPERT) as becomes available, as well as functionally manage mission data analysis and coordination of support for between external customers and evaluation of data anomalies.

Subtask 3: The contractor shall provide test engineering support to create test cases, evaluate test material, and participate in tests.

Subtask 4: The contractor shall provide segment engineers to oversee corrective maintenance of the operational system and support the ground system in the modularization effort of the IDPS software.

Subtask 5: The contractor shall provide system engineer to perform operability engineering functionality, in order to coordinate between the mission operations team, the mission support team, the mission data coordination team, and the JPSS IDPS team.

II. Subtask Description

Subtask 1: Descoped

Subtask 2: The contractor shall provide engineering services to operate and support in supplying situational awareness of data downlinked, processed, and delivered, as well as verify, track, and manage discrepancies associated with the data delivered from JPSS IDPS.

The NPP / JPSS mission data analysis objectives include:

- Operate the CPERT system operationally
- Participate in test events, including review of test material and verification of SOPs Report generation of situational awareness information retrieved from the operational systems
- Analysis of data delivered from the IDPS
- Address users' mission data situational awareness needs
- Participate in the discrepancy management process for mission data issues

Subtask 3: The contractor shall provide test engineers to generate, manage, monitor and evaluate test cases necessary to support ground system testing. To coordinate, generate, manage, and witness tests associated with the JPSS IDPS as necessary to support ground system events. Shall review provided test cases for requirement validation and determine that the test cases accurately test the requirement.

The NPP / JPSS test engineering objectives include:

- Coordinate with IDPS/Sustainment team to review regression tests and test cases to meet the program expectations
- Generate and manage IDPS test cases based on the CGS requirements
- Evaluate/participate in test events
- Coordinate with the all test teams (project, unit, external) to ensure the IDPS meets expected standards.

- Evaluate test cases/procedures provided to support ground system development, mission integration and test, and segment test.
- Provide test analysis reports
- Support mission level reviews and meetings with NASA, various agency partners, agency contractors, and customers.

Subtask 4: The contractor shall provide software development engineering support and technical oversight to the development, integration, sustainment and operations of the IDPS ground system segments.

The NPP / JPSS software development engineering objectives include:

- Coordinate with Sustainment/IDPS segment developers to evaluate code, perform peer reviews, participate in design discussions
- Evaluate coding standards and provide feedback at areas of improvement and areas not being met.
- Perform peer reviews in accordance to NPR 7150.2
- Evaluate and/or support prototyping efforts to evaluate changes in the architecture/design of IDPS.
- Provide insight to project team of issues related to software, configuration management, or other problems.
- Support mission level reviews and meetings with NASA, various agency partners, agency contractors, and customers.

Subtask 5: The contractor shall provide system engineering support and technical oversight to the operations development, integration, sustainment and operations of the IDPS ground system segments. .

III. Deliverables/Schedules/Milestones

At a minimum, the contractor shall deliver the items specified below:

<i>Ref#</i>	<i>Deliverables</i>	<i>Due Date</i>
1	Monthly Technical Progress & Financial Reports	Monthly, by the 15 th
2	Weekly Status Reports	Weekly
3	Data Accounting & Analysis Reports	Daily
4	Test Data Working Group Minutes/Actions	Monthly
5	Test Data Analysis Tools Identification / Enhancements (varies)	Varies, as identified
6	Schedule inputs for test Data Generation	

7	Technical/managerial meetings as requested (e.g. Customer forums, technical interchanges, design reviews)	Periodic, as necessary
8	Special Studies Summaries/ Recommendations	██████████
9	Test Cases -- creation, review, maintenance	Periodic, as necessary
10	Test analysis reports	Periodic, as necessary

IV. Management Approach

a. Staff Allocation, Expertise, and Skill Mix

The contractor shall staff these work items with the appropriate skill mix and staffing level for the work. Staff will be a mix of technical task lead with work breakdown structure (WBS) & scheduling experience, senior and junior system engineers, programmers, testers, software engineers, data analysts, and requirements engineers.

b. Configuration Management

Systems and documents will be covered under the Project Configuration Management Plan.

c. Facilities

Subtask 1: Staff are planned to be housed at ██████████ Aurora to enable close relationship with contractor for test development.

Subtask 2,3,4,5: Staff are planned to be housed onsite in Building 40. Appropriate IT devices to support the analyses, specification development, and report development are required and provided by GSFC.

d. Risk Management and Best Practices

The contractor shall manage schedule, cost, and technical risk through oversight, monitoring and reviewing progress and performance metrics, identifying issues well in advance of negative consequences, recommending corrective action to the TM, and implementing corrective actions ██████████.

e. Government Furnished Facilities, Equipment, Software and Other Resources

The Government will provide account and passwords to government-furnished workstations where existing versions of various relevant software packages shall be maintained. It shall be the contractor's responsibility to complete any GSFC required security-related training courses.

V. ODC (Travel and Procurement)

For Subtask 1: Descoped

For Subtask 2:

<u>Location</u>	<u>Duration</u>	<u>Dates</u>
NA		

For Subtask 3:

<u>Location</u>	<u>Duration</u>	<u>Dates</u>
Support test events meetings	██████	10 trips (as needed)
Support meetings	██████	6 trips

For Subtask 4:

<u>Location</u>	<u>Duration</u>	<u>Dates</u>
Support to planning meetings, CUT reviews	██████	4 trips (as needed)

For Subtask 5:

<u>Location</u>	<u>Duration</u>	<u>Dates</u>
Support PMR meetings	██████	2 trips (as needed)
Support to meetings in Auroroa as appropriate	██████	4 trips (as needed)

VI. Work Location

Subtask 1: Descoped.

Subtask 2-5: This work shall be performed primarily onsite at Government provided facilities.

VII. Skill Set/ Knowledge Required

The contractor shall have a strong technical base in the following areas:

- Space mission system engineering (mission and flight system)
- Spacecraft, instrument and satellite data and associated formats
- Earth Science ground data systems, processing and archiving.

At a minimum, all the personnel shall have the following skills:

- Earth observing mission system engineering skills

- Knowledge of system engineering and integration and data analysis tools
- Knowledge of system engineering standards
- Strong ability to independently lead and interact with distributed team members and different corporate cultures

Additional preferred skills include:

- Experience in system integration and mission data formats; test data generation and system propagation
- Direct, relevant experience and familiarization with NPP / JPSS system architecture and organizational structure

VIII. Security Requirements

The contractor shall comply with Information Technology Security procedures and requirements as defined by NPG 2810.1A in the performance of this task. In addition, the contractor shall comply with all applicable federal rules and regulations and agency directives. The contractor will not be required to handle classified data.

IX. Special Considerations

This work may require access to other contractor proprietary information.

Company-to-company non-disclosures agreements will be required.

Task members directly involved with test activities at secure facilities may require a security clearance. The contractor will coordinate and obtain concurrence [REDACTED] for individuals requiring clearances. Additionally, the contractor will be compliant with the NASA security requirements and guidelines.

Interchanges with the various stakeholders may require appropriate agreements and arrangements with other contractors and/or international partners. Appropriate arrangements will be required and information exchange will be assessed via the GSFC Export Control Office through the JPSS Ground Project.

Any technical issue arising from these requests falls under the responsibility of a separate and distinct U.S. Government contract.

X. Applicable Documents

The contractor providing technical services shall comply with all CMMI Level 2 processes established for the Project and deliverable products. Applicable requirements include, but not limited to:

- a. NPR 7150.2A NASA Software Engineering Requirements
- b. NPR 7120.5D NASA Space Flight Program and Project Management Requirements

- c. NPR 7123.1A NASA Systems Engineering Processes and Requirements
- d. GPR 7120.5A System Engineering Requirement
- e. GPR 7150 Goddard Software Engineering Requirements
- f. JPSS Ground System Requirements Document
- g. JPSS System Integration and Test Plan
- h. Mission Level Interface Control Documents (ICDs)
- i. JPSS Level 1 Requirements

XI. **References**

Omnibus Multidiscipline Engineering Services (OMES)

Task Order 20 - Hosted Payloads and Advanced Concepts

Period of Performance: 48 months

Modifications: 8

Task Value: \$16.1M

Scope of Work:

I. Summary of Work

The purpose of this task is to provide management, engineering, and technical support to SSCO to design, develop, test and operate payloads on the International Space Station and for other mission of opportunities in addition to conducting conceptual development, technology demonstrations and mission concept designs for potential future joint missions between HEOMD and SMD. Elements of the work on this task may require TS//SCI clearance in order to perform the work.

II. Subtask Description

1) OPTIIX: Complete December 2012

2) FARMS Mission: The activities to develop the FARMS instrument concept is complete as of March 2015.

3) Advanced concepts and systems engineering support: Provide systems engineering support for ISS-Hosted Payload and advanced concepts efforts in support of new concepts and potential redesigns of existing concepts for applications on the ISS or for a mission of opportunity or as relate strategically or directly to satellite servicing. Provide analysis and design efforts to assess the viability of the potential concepts and provide systems engineering support to advance the concept to a viable design. Provide project management support to the SSCO.

1. Assess potential concepts for implementation onto the ISS or as a mission of opportunity as identified.

2. New Worlds Telescope/Modular Serviceable Spacecraft: Provide mechanical engineering and design support to develop conceptual designs for future serviceable spacecraft and telescope payloads such as the Earth Venture instruments. Work with the AFTA-WFIRST Telescope team to provide expertise on servicing for incorporation into the design. Support product development of products that can be used to script the virtual modeling in the CAVE as required.

3. Support the design, development and build of mock-ups [REDACTED].

4) Provide support to the Advanced Concept work to be performed on ROSE. ROSE study activities are closed out due to lack of funding for the activity.

5) Modeling and Analysis – asteroid specific

1. This subtask includes support for generating synthetic imagery of the Bennu asteroid from height field data format, commonly referred to as mallets. Terrain will be generated using appropriate tessellation and geometry shaders in the Freespace toolchain (geomod, nviewer, cenic). New capabilities are required to simulate the imagery for the entire mission profile, including simulation of stellar imagery appropriate for navigation algorithm processing. Additionally, this task deliverables should include synthetic imagery for the appropriate mission phases necessary to support ground system testing for a NASA mission (OSIRIS-REx), to be identified [REDACTED]. Additional work items may also be assigned that relate to a NASA mission in this area of synthetic imagery, as well as enhancements to the CAVE, [REDACTED]. The contractor shall utilize the Freespace toolset and code specifically for integration of these capabilities into that code base, and utilize the version control software systems (CVS) and documentation systems (wiki).

6) Near-Earth Object Focal Plane Assembly (NEO FPA) technical demonstration Project. The NEO FPA is a technical demonstration mission of opportunity project to design, develop, integrate and test a large format focal plane array for the purpose of detecting and characterizing near-Earth objects from space. It is a do-no-harm risk classification project. The Project is approved for Phase 1, which is the development and testing of a subarray to demonstrate that the detectors perform and that the FPA design is viable. There is a small effort in Phase 1 that supports the science and simulation effort to predict how well the NEO instrument will detect NEOs with predicted apparent magnitude values. The Phase 1 effort will focus on the detector development, testing and characterization as well as the electronics development to operate the detector.

The NEO Project team will be comprised of civil servants and contractors from multiple disciplines. The team will need to work in a collaborative environment to assure mission success. The contractor shall support the NEO Phase 1 effort in the following way.

1. The NEO project effort is a need-to-know effort and the contractor shall not share information outside of the project without permission.
2. Provide discipline engineering support for NEO.
 - a. Large format FPA experience and expertise from an instrument design, fabricate, integrate and test perspective. Systems engineering support for the instrument.

- b. Specific knowledge of the [REDACTED] detector testing [REDACTED]. [REDACTED] engineer will assess the performance of the detectors through the design and development of a detector test plan.
- c. Optical instrument design and packaging engineering as well as mechanical analysis support of the opto-mechanical design.
- d. Thermal systems support for at the system and the instrument level.
- e. Electrical support to include the ability to support the following tasks.
 - Xilinx FPGA design with embedded processing requirements, gigabit data processing requirements, and complex science data processing requirements (i.e. algorithm porting to FPGA)
 - Electrical analysis and design, i.e. Hyperlinx signal integrity, pSpice
 - Printed Circuit Board design including schematic capture, parts selection with derating analysis, and layout of high-speed (>1Gbps) and sensitive analog power planes
 - Card-level packaging and thermal analysis and design
 - Harness design and fabrication including impedance controlled twisted-shielded pairs, proper shielding of > 1 Gbps signaling and sensitive power delivery
 - Parts engineering and procurement support
 - Electrical review support of analysis and design at TBD milestones

7) Detector Engineering Support for NEO module development and testing.

The NEO Project requires engineering support for the development of the focal plane modules. The contractor shall collaborate with the NEO Project contractor and civil service team to assure mission success. The hardware that is to be supported under this subtask will be acquired by another Program and under a separate contract.

1. **Operational Concept:** The contractor shall support the development of the NEO focal plane operational concept. This includes the control words and operational tuning methods needed to operate SB500 parts at the mission frame rates with the modes appropriate to achieve the lowest noise levels. The SB500 is to be operated using LVDS video output with separate video reference clock (not 8b/10b encoded) with master clock frequency and video output.

Tasks to be completed include:

Detector vendor Integrated Circuit (IC) designer to support GSFC personnel on-site [REDACTED] to develop GSFC test electronics for GSFC-specific operational modes of the SB500 ROIC including [REDACTED] the following:

- a. Reduced master clock frequency band width tuning for various elements internal to the SB500 ROIC
- b. Synchronization of LVDS output video using a single LVDS output clock

- c. Serial data word settings to perform up-the-ramp, Fowler, and other sampling at multiple frame rates and numbers of samples.
2. **Focal Plane Module (FPM) Packaging Development:** Support the development of the NASA-GSFC FPM package (pedestal and IFC) for the NEO FPM.

Tasks to be completed include:

Detector vendor IC designer and Electronics Engineer to support GSFC personnel in the development of the flight-candidate FPM IFC (schematic and layout) for the GSFC-specific package given the different operating conditions (speed and LVDS video) and geometry of a multiple-FPM Focal Plane Array (e.g. buttability).

To support the design of the IFC (printed circuit board), the detector vendor experts will supply and or make the following information available:

- a. Provide the ROIC pad layout and the detector pad layout for the appropriate device
- b. Provide decoupling recommendations including the recommended capacitance and a priority encoded proximity to ROIC pads (for example if a decoupling capacitor for each R1CL block Phase Lock Loop (PLL) power may be more critical than the decoupling for a digital supply)
- c. Recommended wire bond size, wire length, and quantity of wires per ROIC pad
- d. Decoupling and capacitor placement requirements used to develop the standard SB500 TFA
- e. Lessons learned from the TFA design and any resulting changes/ recommendations to the decoupling and grounding scheme
- f. Provide high speed oscilloscope power form measurements take at the TFA decoupling capacitors while the readout is operating

The detector vendor will support design reviews of the FPM packaging which is expected to include table top reviews, requirements review, a preliminary design review, and a critical design review. These reviews are to be supported [REDACTED] and are expected to be no longer than 4 hours each.

The detector vendor will support the GSFC pedestal design by providing [REDACTED] interface control document that specifies fiducial targets and their relationship to the active optical area as well as mechanical tolerances on the ROIC.

The detector vendor will supply an [REDACTED] mechanical interface control drawing for the TFA.

3. **Test Development:** The detector vendor Systems Engineer, Software Engineer and Test Engineer to support GSFC personnel on-site [REDACTED] in the cryogenic testing of packaged FPMs using GSFC-supplied test dewar and FPMACQ test electronics at the GSFC-specific operating conditions. Tests include [REDACTED] the following:

- a. Dark current characterization at various operating temperatures
- b. Modulation Transfer Function (MTF) test on one device using RVS-supplied Opto-Aligner test equipment
- c. Gain measurements using various methods (e.g. flat fields, X-ray, etc.)

It is expected that detector vendor personnel may want to understand the capabilities of the NASA-specific test system, and NASA/GSFC will support transferring any test knowledge that may be useful.

4. **Test Development:** Support the development of the FPM command, control and data ACQquisition ground test equipment, herein referred to as the FPMACQ, that is part of the focal plane module characterization test setup. The objective of phase one is to have an FPMACQ system in place and to start integration of the system with a sample focal plane array. It is anticipated that two sets of the FPMACQ hardware will be procured as part of Phase 1 and that one set will be available to support development and debug in Goleta, CA.

5. **General Support:** The design and development activities are to be performed [REDACTED] and GSFC. Ideally, GSFC personnel will have unescorted access to the test labs [REDACTED] to perform tests. Access to [REDACTED] network for the purposes of data transfer to GSFC is desired [REDACTED].

- a. Detector vendor to mount, align, and wirebond the Partner/NASA-GSFC/[REDACTED] selected (selection as specified in the Other Program contract) SB500 detector/readouts and temperature sensor to the NASA-GSFC FPM package that will be GFE'd FPM package.
- b. Detector vendor IC design, Systems, Software, and Test Engineers to provide post delivery support [REDACTED]
- c. Detector vendor IC design and Systems Engineers to provide EMI/EMC test support (at GSFC), specifically tests of conducted susceptibility on power lines [REDACTED]
- d. Detector vendor IC design, detector vendor IC design, Systems, Software, and Test Engineers to support design reviews and program reviews [REDACTED] is necessary

- e. Provide NASA-GSFC with the complete list of changes being implemented in the revision of the SB500 part. The list provides the reason and expected impact of the changes as it applies to the NEO performance.
 - f. Provide NASA-GSFC with all test data developed for the partner contract
 - g. Notify of any changes in the partner contract or statement of work
 - h. Provide technical insight and guidance on the use of SB500 in a low-background astronomy application
6. SB500p ROIC GLOW Risk Reduction Study: The contractor shall complete a study that is consistent with the Barry Starr whitepaper dated August 12, 2015.

The initial phase is proposed in two parts Phase 1A and 1B. Phase 1A will begin by refinement of our initial design concept based on results of the current testing and evaluation of the Yater VisSWIR FPA and SB500 operational characterization. Potential materials and thicknesses required for the desired glow attenuation characteristics will be evaluated. Candidate solutions will be reviewed for compatibility with our standard DBH fabrication processes. Specific attention will be placed with regard to high yield fabrication and high interconnect operability. Complete 2 and 3 layer optical designs will be evaluated and selected. Components will be fabricated and tested at a component of subassembly level to demonstrate performance and compatibility with our fabrication processes.

Upon successful completion of Phase 1A, Phase 1B will be approved for implementation. Phase 1B will be fabrication of an actual 3-D test structure and the measurement of optical attenuation performance.

Phase 1: Material verification – 1A: 3mos, \$(TBR); 1B: 3mos, \$ (TBR)

- 1. Conceptual development (1A)
- 2. Optical design(s) and performance assessment with material section (1A)
- 3. Fabricate light shield wafer and measure transmission (1B)
- 4. Fabricate full 3D stack components (1B)
- 5. DBH full proxy detector/light shield/ROIC stack and measure effectiveness (1B)

8) Compact Thermal Infrared – Pathfinder (CTI-P) development

The CTI-P is a technology development project designed to fly on the International Space Station (ISS) as a subsystem on the RRM3 payload. The instrument utilizes existing hardware that will be packaged and optimized for data collection from the ISS. The success of the instrument is based on the use of existing hardware that leverages previously flown hardware like the TIRS asic and board design. The goal of this project is to minimize changes to the leveraged hardware in order to achieve the programmatic goals for cost and schedule. Final delivery of the instrument will be consistent with the payload schedule. Currently the delivery

date is October 2016 delivery of the instrument to the payload for system level integration and test. The work to be supported includes:

- 1) Design and development of a mechanical packaging design for the sensor. The design will incorporate the existing hardware and will assure due no harm to the host.
- 2) Build the warm electronics that utilizes the existing hardware and board design from the TIRS design. The build will incorporate minimal modifications to tune the electronics to the CTI-P application.
- 3) Work with the host payload for accommodation engineering analysis is complete and is consistent with the host payload development milestones.
- 4) Support instrument level testing to support the “do-no-harm” documentation for the payload.
- 5) Support operation concept for the instrument, working with the science team and payload team [REDACTED].

9) Satellite Servicing Sustainability and Spacecraft Resiliency

The SSCO is developing servicing capabilities. There is a need to develop elements that can enable the sustainability of servicing for the future such that space missions will adopt and incorporate into vehicle and payload designs that will enable servicing or reduce the risk of servicing. One element of this effort is to advance technologies and assure that the technologies are designed for serviceability and are also manufactureable. The sustainability of servicing relies on the manufacturability and affordability of the spacecraft and payload elements. The contractor will support the technology identification and development efforts as prioritized by the SSCO.

- 1) Support activities that lead toward the sustainability of servicing. This includes the study and buy-down of risk and non-recurring costs for spacecraft or space vehicle elements for future flight qualification and implementation of servicing on flight missions. An example of this is to support the SSCO activity to identify a series of viable connectors that are robotically serviceable and readily manufactured.
- 2) Support hardware and testing design and development for elements that are prioritized efforts for servicing sustainability and spacecraft resiliency,

The star tracker work remains open.

1. The contractor shall conduct star tracker development activities in support of a New Technology concept project. Specifically, the contractor will evaluate if new hardware,

software and FPGA logic to be developed under the Staring Technology for Enhanced Linear Line-of-Sight Angular Recognition (STELLAR) program can be applied to the Dextre Pointing Package (DPP) star tracker, which is planned to be re-manifested on a new technology development concept. In support of this activity, SSCO provided the DPP star tracker hardware to the contractor. SSCO assumes that the hardware will be used for reference only and no work shall be conducted on the hardware until a forward plan has been developed and agreed to [REDACTED]. The contractor should assume that any future agreement will require a task modification. At the end of this effort, the contractor shall return the star tracker hardware to the US government, along with any improvements or developments that were attempted or completed under this work. The contractor shall report on subtask progress to the task monitor on a bi-weekly basis once an application is identified via a medium agreed to by both parties, as well as prepare a final summary report at the conclusion of this effort. Receivables: DPP star tracker hardware (1)

III. Deliverable Items and Schedules

Deliverables for these tasks shall include reports, test reports, recommendations and presentations describing activities conducted by the ISS-Hosted Payloads and Advanced Concepts team including system trade studies, design evaluations and support for the program weekly and monthly reports. Also included is a weekly labor hour report, which is delivered [REDACTED]. Deliverables include the above items [REDACTED] all of which will produced by multi-disciplinary team from multiple contracting sources, and thus not a direct deliverable from this Task.

Subtask 2 (FARMS) --

1. DPP star tracker hardware (1);
 - hardware, software, or FPGA logic updates;
 - bi-weekly reports;
 - final report

Subtask 3 (AC-PM-SE) -- Six Deliverables and Milestones:

1. Support bimonthly meetings as required;
2. Support CAVE mockup of ROSE and other spacecraft servicing as required.
3. Complete assembly of a single foot that can be used to demonstrate grappling the spacecraft. 07/30/2015
4. Complete design of the Terra full scale mockup to be delivered by November 30 or when Room 150 is prepared to receive it.
5. Complete final report in support of the electrical connector IRAD study for Center servicing approach that uses ROSE and WFIRST. 09/20/2015.

Subtask 4 (ROSE) -- This effort is complete and replaced by Subtask 9.

Subtask 5 (Modeling and Analysis – Asteroid Specific) – [REDACTED].

Subtask 6 (NEO FPA) -- Six Deliverables and Milestones:

1. Provide engineering products in support of the NEO technical development hardware.
2. Update the detector Test Plan by 10/1/2015.
3. Provide support for the development of a technical review at the PDR level in 06/1/2016
4. Provide expert recommendation to support an ATP meeting by 02/15/2016
5. Support [REDACTED] with on site testing based on the completion of detector module assembly under another contract. Estimated to be 11/15/2015
6. Support briefings to the management team every other month beginning May 2015

Subtask 7 (Detector Engineering Support) -- Four Deliverables and Milestones:

1. Support a kickoff meeting and Action completion in (NET) June 2015.
2. Support design efforts of the Focal Plane Module projected to be completed 11/15/2015.
3. Provide schedule updates on the other program progress and status as it pertains to the NEO Project. Approximately monthly.
4. Support test plan development as necessary. 10/31/2015
5. Conceptual development (1A)
6. Optical design(s) and performance assessment with material section (1A) ATP+3months
7. Phase 1A report for approval. Completion of 6. + @ weeks
8. Fabricate light shield wafer and measure transmission (1B)
9. Fabricate full 3D stack components (1B)
10. DBH full proxy detector/light shield/ROIC stack and measure effectiveness (1B)

Subtask 8 (CTI-Pathfinder)

- 1) Provide management and engineering support for the camera development through delivery of the instrument.
- 2) Support the development of a test plan for the instrument. Draft
11/30/2015
Final 6/30/2015
- 3) Support instrument testing and delivery at GSFC as defined in the test plan.

Subtask 9 (Sustainability Activities)

- 1) Support the establishment of a working deliverable schedule that meets funding profile and prioritized list activities. 1/15/2016
- 2) Support the prioritization of sustainability/resiliency activities.
- 3) Weekly meetings with focused team to implement prioritized activities.
- 4) Support deliverables as agreed to in the working deliverable schedule.

IV. Management Approach

a. Staff Allocation, Expertise, and Skill Mix

The contractor shall staff this work item with the appropriate skill mix and staffing level for the work.

b. Configuration Management

Systems and documents will be covered under the Servicing Capabilities Office Configuration Management Plan.

c. Facilities

Appropriate Information Technology devices to support the analyses, specification development, and report development are required. It shall be the contractor's responsibility to provide and set up local workstations and network connections at the contractor's off-site facilities as required, and to install any required tools and utilities on the contractor's equipment.

d. Risk Management and Best Practices

The contractor shall manage schedule, cost, and technical risk through monitoring and reporting of progress and performance metrics, identifying issues well in advance of negative consequences, recommending corrective action [REDACTED], and implementing corrective actions with the compliance [REDACTED].

e. Government Furnished Facilities, Equipment, Software and Other Resources

The Government will provide account and passwords to government-furnished workstations where existing versions of various relevant software packages shall be maintained. It shall be the contractor's responsibility to complete any GSFC required security-related training courses.

V. Travel

Non-local travel is required for this task.

Wallops Flight Facility: [REDACTED]

Mid-West: [REDACTED] trips for technical component discussions and requirements gathering with potential NASA partners [REDACTED]

Vendor on-site: [REDACTED] trips to California vendors [REDACTED]

Miscellaneous travel to vendor: [REDACTED] trip Colorado [REDACTED]

[REDACTED] trip to Oregon [REDACTED]

quarterly visits to vendor Hawaii [REDACTED]

Testing support at vendor [REDACTED]

Kick off Meeting [REDACTED]

Travel from Goleta, CA to GSFC [REDACTED]

Travel from Goleta, CA to Hawaii for TIM [REDACTED]

VI. Work Location

This work shall be performed primarily on-site at the Goddard Space Flight Center, but the contractor may be required to perform some work at the contractor's facility, and at other NASA/non-NASA facilities.

VII. Reporting Requirements

The contractor shall report status in person or via teleconference [REDACTED] [REDACTED] on a weekly basis. Reports shall include informal presentation of interim results, status of development activities, and action item status. The contractor shall provide all reports at least one day in advance of the quarterly meeting via email, and maintain an email distribution list with the concurrence [REDACTED]. The contractor shall also support [REDACTED] in the preparation of status reviews for internal and external funding agencies. The contractor shall comply with any and all additional requests for status meetings and reports. The contractor shall deliver all documents in portable document format (PDF) electronic form [REDACTED].

VIII. Security Requirements

This task shall comply with IT security requirements as documented in the Servicing Study IT security plan for all systems.

This task shall comply with security requirements as spelled out in the security guidance documents as required.

IX. Rights

This SOW shall adhere to the RIGHTS IN DATA – special works (FAR 52.227-17) as modified by NFS 1852.227-17