NASA Procedural Requirements

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COMPLIANCE IS MANDATORY FOR NASA EMPLOYEES

Facility Project Requirements (FPR))

Responsible Office: Office of Strategic Infrastructure

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Preface

P.1 Purpose

This NASA Procedural Requirements (NPR) provides the minimum requirements for planning, approving, and acquiring all NASA Facility Projects with an approved facility project cost estimate (AFPCE) for construction of $100,000 or greater (excluding maintenance work). This document implements the criteria established in the NASA Policy Directive (NPD) 8820.2, Design and CoF, by supplementing the policies and requirements per NPD 7120.4, NASA Engineering and Program/Project Management Policy and per NPR 7120.7, NASA Information Technology (IT) Program and Project Management Requirements, with specific facility planning, design, construction, and commissioning requirements.

P.2 Applicability

a. This NPR applies to NASA Headquarters (HQ) and NASA Centers, including Component Facilities and Technical and Service Support Centers, for all sources of construction funding including CoF funding provided by Programs. In addition, this NPR applies to the Jet Propulsion Laboratory (JPL), a Federally-funded research and development center, and other contractor facilities to the extent specified or referenced in their contracts. For the rest of this document, the term "Centers" refers to NASA Centers, Component Facilities, and JPL. It also applies to non-NASA-owned facilities constructed on NASA real estate unless the NASA HQ Facilities and Real Estate Division (FRED) waives the requirement.

b. In this NPR, all mandatory actions (i.e., requirements) are denoted by statements using the term "shall." The terms: "may" or "can" denote discretionary privilege or permission, "should" denotes a good practice and is recommended but not required, "will" denotes expected outcome, and "are/is" denotes descriptive material.

c. All document citations in this NPR refer to the latest version of the document unless otherwise noted.

d. Documents cited as authority, applicable, or reference documents may be cited as a different categorization, which characterizes its function in relation to the specific context.

P.3 Authority

a. Utility incentive programs, 42 United States Code (U.S.C.) § 8256 (c).

b. Authority to enter into contracts, 42 U.S.C. § 8287.

c. The National Aeronautics and Space Act, as amended, 51 U.S.C. § 20113 et seq.

d. Lease of Non-excess Property, 51 U.S.C. § 20145.

e. National Historic Preservation Act (NHPA), as amended, 54 U.S.C. § 300101 et seq.

f. NPD 8820.2, Design and CoF.

P.4 Applicable Documents and Forms

a. Duties of Executive Agencies, 40 U.S.C. § 524.

b. Architectural Barriers Act (ABA) of 1968, 42 U.S.C. 4151 et seq.

c. Federal Building Energy Efficiency Standards, 42 U.S.C. § 6834.

d. Federal Compliance, 42 U.S.C. § 6835.

e. Clean Air Act (CAA) Amendments of 1990 Title VI (Stratospheric Ozone and Global Climate Protection), 42 U.S.C. § 7401 et seq.

f. McKinney - Vento Homeless Assistance Act as amended, 42 U.S.C. § 11301 et seq.

g. Americans with Disabilities Act (ADA), 42 U.S.C. § 12131.

h. National Historic Preservation Act (NHPA) Section 106 Review, 54 U.S.C. § 306108.

i. The Davis-Bacon Act, as amended, Public Law (Pub. L.) 107-217, 116 Stat. 1062 (2002).

j. Interagency Security Committee, Executive Order (E.O.) 12977, 3 Code of Federal Regulations (CFR) 247 (1995).

k. Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability, E.O. 14057.

l. Energy Efficiency Standards for the Design and Construction of New Federal Commercial and Multi- Family High-Rise Residential Buildings, 10 CFR pt. 433.

m. Energy Efficiency Standards for New Federal Low-Rise Residential Buildings, 10 CFR pt. 435.

n. Federal Energy Management and Planning Programs, Subpart A Methodology and Procedures for Life-Cycle Cost Analyses, 10 CFR 436.

o. Federal Acquisition Regulation (FAR), 48 CFR Chapter 1.

p. NASA FAR Supplement (NFS), 48 CFR pts. 1801-1872, Appendices A, B, and C.

q. Partnering, 48 CFR subpart 1836.70.

r. Office of Management and Budget (OMB) Circular A-11, Preparation, Submission and Execution of the Budget (9/6/21).

s. OMB Circular A-94, Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs.

t. NPD 1000.0, NASA Governance and Strategic Management Handbook.

u. NPD 1000.3, The NASA Organization.

v. NPD 1600.2, NASA Security Policy.

w. NPD 7120.4, NASA Engineering and Program/Project Management Policy.

x. NPD 7330.1, Approval Authorities for Facility Projects.

y. NPD 8810.2, Master Planning for Real Property.

z. NPR 1441.1, NASA Records Management Program Requirements.

aa. NPR 1600.1, NASA Security Program Procedural Requirements.

bb. NPR 1620.2, Facility Security Level Determinations.

cc. NPR 1620.3, Physical Security Requirements for NASA Facilities and Property.

dd. NPR 2810.1, Security of Information Technology.

ee. NPR 7120.5, NASA Space Flight Program and Project Management Requirements.

ff. NPR 7120.7, NASA Information Technology Program and Project Management Requirements.

gg. NPR 7120.8, NASA Research and Technology Program and Project Management Requirements.

hh. NPR 8000.4, Agency Risk Management Procedural Requirements.

ii. NPR 8510.1, NASA Cultural Resources Management.

jj. NPR 8570.1, NASA Energy and Water Management Program.

kk. NPR 8580.1, Implementing the National Environmental Policy Act and E.O. 12114. ll. NPR 8600.1, NASA Capability Portfolio Management Requirements.

mm. NPR 8715.1, NASA Safety and Health Programs.

nn. NPR 8715.3, NASA General Safety Program Requirements. oo. NPR 8800.15, Real Estate Management Program.

pp. NPR 8810.1, Center Master Planning.

qq. NPR 8831.2, Facilities M&O Management.

rr. NPR 9090.1, Partnership Agreements - Financial Requirements and Administration.

ss. NPR 9250.1, Property, Plant, and Equipment and Operating Materials and Supplies.

tt. NPR 9420.1, Budget Formulation.

uu. NASA-STD-10001, NASA Building Information Modeling (BIM) Scope of Services and Requirements for Architects and Engineers.

vv. NASA-STD-10002, NASA Facility Design Standard. ww. NASA-STD-8719.7, Facility System Safety Guidebook.

xx. NASA-STD-8719.11, NASA Safety Standard for Fire Protection.

yy. NASA Business Case Guide for Real Property and Facilities Project Investments.

zz. Construction of Facilities: NASA Partnering Desk Reference.

aaa. American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) Guideline 0, The Commissioning Process, ASHRAE.

bbb. American National Standards Institute (ANSI)/ASHRAE Standard 55-2020, Thermal Environmental Conditions for Human Occupancy.

ccc. ANSI/ASHRAE Standard 62.1-2019, Ventilation for Acceptable Indoor Air Quality.

ddd. ANSI/Sheet Metal and Air Conditioning National Association (SMACNA) 008-2008, Indoor Air Quality (IAQ) Guidelines for Occupied Buildings Under Construction.

eee. Guiding Principles for Sustainable Federal Buildings and Associated Instructions, Council on Environmental Quality.

fff. Montreal Protocol on Substances that Deplete the Ozone Layer, United States (U.S.) Department of State.

P.5 Measurement/Verification

a. FRED verifies compliance with the requirements of this NPR by conducting annual CoF program reviews at Centers. For the CoF reviews, FRED identifies a random selection of CoF projects from the Centers and then reviews project documentation and interviews project managers and project stakeholders for those projects. In addition, Centers document compliance with this NPR by completing a Compliance Matrix (Appendix C) for every facility project and submitting the completed Compliance Matrix to FRED upon request.

b. FRED provides oversight of CoF projects through the designated role of Executive Project Manager (EPM). The EPM provides high-level support and guidance to Center Facility Project Managers (FPMs) for projects that represent a potential of high financial risk to the Agency.

P.6 Cancellation

NPR 8820.2G, Facility Project Requirements (FPR), dated June 05, 2014.

Chapter 1. NASA's Facilities Program

1.1 Facilities Program Overview

1.1.1 General. The annual facilities program is part of the Agency's five-year budget developed in accordance with NPD 1000.0, NASA Governance and Strategic Management Handbook. The five-year budget includes the CoF and the Environmental Compliance and Restoration (EC&R) themes under the Construction, Environmental Compliance, and Restoration (CECR) Account (see Figure 1-1). The CoF theme currently includes programs for Institutional CoF, Exploration CoF, Space Operations CoF, Science CoF, and Aeronautics CoF (but are subject to change). The CECR Account is NASA's only account approved for facilities construction projects with an AFPCE of $1 million and greater. The CECR funding is authorized for procurements only and is not available for civil servant (CS) labor or travel expenses.

a. For definition of which project elements constitute the AFPCE, refer to Appendix D. This yearly account remains available for contract obligations for six years before expiration.

b. Appendix J, NASA's Real Estate History, identifies the Agency's unique privileges for the design and construction of facilities and infrastructure and details the events that led to the inception of NASA's Facilities Program.

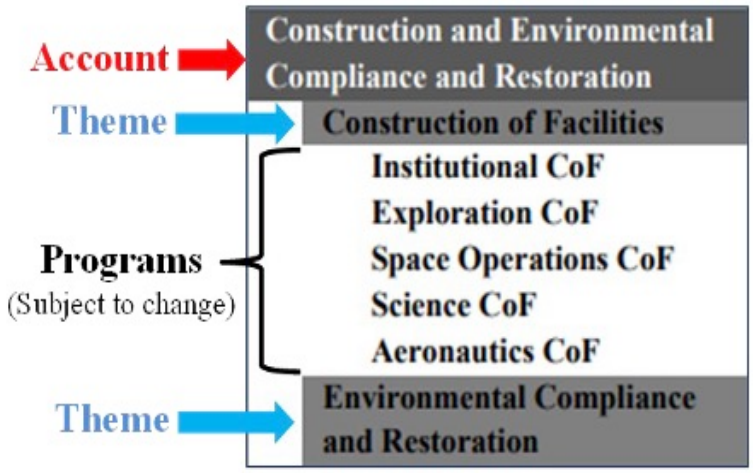


Figure 1-1. Sample, NASA Budget Format: The CECR Account

1.1.2 CoF Project Thresholds. CoF projects are classified by dollar threshold values based upon the AFPCE. NASA's annual appropriation legislation is the only accepted source for adjustments to CoF thresholds.

1.1.2.1 Minor Revitalization and Construction (MRC) Projects. Projects that have an AFPCE of at least $1 million, but less than $10 million. Within the CECR Account, the CoF Theme, each CoF Program contains a single project line item for all MRC CoF projects across the Agency. For example, under the Institutional CoF Program, the total budget for all Institutional MRC CoF projects across the Agency is indicated as a single MRC project line item. Hence, all Institutional CoF MRC projects across the Agency share the same six-digit Work Breakdown Structure (WBS) number in NASA's

financial system. Additional numbering is added after the six-digit WBS number to identify the Center in which the project is to be executed, the specific project, and any project sub-elements (e.g., for phased projects).

1.1.2.2 Discrete CoF Projects. Projects that have an AFPCE of $10 million or more. Within the Construction

of Facilities theme, each CoF Program contains individual line items for any Discrete CoF Projects. Hence, every Discrete CoF Project is identified with a unique six-digit WBS number in NASA's financial system. Additional numbering is added after the six-digit WBS number to identify the Center in which the project is to be executed and to identify the specific project.

1.1.3 CoF Project Types. Under the Construction of Facilities theme, there are two project types: Institutional CoF projects, which reside under the Institutional CoF Program and Program-Direct (or program-funded) CoF projects, which reside under the current CoF Programs for Exploration, Space Operations, Science, and Aeronautics. This could be expanded in the future to include areas such as Space Technology and Space Environments Technology.

1.2 Institutional CoF Projects

1.2.1 The Institutional CoF Program includes Facility Projects involving the construction of new institutional facilities and infrastructure or the major modification, repair, energy/water usage reduction, and demolition/deconstruction of existing institutional facilities and infrastructure. FRED manages this program and issues formal data calls to the ten NASA Centers for submission of candidate Institutional CoF projects. The Institutional CoF Program can consist of both MRC and Discrete CoF projects. Also, the Institutional CoF Program consists of multiple Institutional CoF project categories.

1.2.2 Renewal (also known as Recapitalization) Projects. Projects that reset the clock on existing capital assets. Renewal can occur through major modification of existing assets or through total asset replacement. When completed, Renewal Projects effectively result in a building or structure that is in a like-new condition and meets all current codes. Project advocacy is based on the long-term strategic benefit to the Agency and its missions and will conform to "reduce the footprint" initiatives outlined in NPD 8820.2, Design and Construction of Facilities. In addition, projects need to have an appropriate life-cycle cost analysis (LCCA) per the NASA Business Case Guide for Real Property and Facilities Project Investments. Projects need to be identified in both the Agency and Center Master Plans and are formally approved by FRED.

1.2.3 Repair Projects. Projects that return institutional assets or systems to their originally designed parameters or capacity or extend their service life. This can include the repair of an asset under a single project or the renewal of a horizontal infrastructure system under a combination of phased repair projects (called Renewal by Incremental Repair). Project prioritization is established by FRED following a competitive process that evaluates how candidate projects mitigate risks to NASA missions.

1.2.4 Demolition and Consolidation Projects. Demolition projects are independent, stand-alone projects that eliminate or reduce real property assets or equipment no longer required by NASA. Consolidation projects relocate one or more functions (personnel or equipment) from a building to be demolished into underutilized spaces in another building. Hence, a Consolidation project includes funding for rehabilitation of spaces for the relocated function(s) along with funding for the demolition of the vacated

facility. Demolition and Consolidation Projects are prioritized by FRED following an established data call process. This data call also establishes a five-year Demolition/Consolidation Plan for the Agency.

1.2.5 Energy Projects. Projects that reduce existing real property energy and/or water usage. Projects are approved by FRED following an established prioritization process. In addition, Energy projects need to have an appropriate Business Case that includes a LCCA according to Federal Energy Management and Planning Programs, Subpart A Methodology and Procedures for LCCA, 10 CFR 436.

1.2.6 Facility Planning and Design (FP&D) Projects. Projects to procure professional architectural-engineering (A-E) services for planning and final design of projects within the Institutional CoF Program. This funding can also be used to procure services for historic mitigation and environment assessments associated with the project being designed. FP&D funding for final design services is typically allocated two years in advance of the year of project execution.

1.2.7 Supplemental Projects. Projects appropriated on an as-needed basis to repair facilities and infrastructure damaged by acts of nature (e.g., hurricanes, tornados, earthquakes).

1.3 Program-Direct CoF Projects

1.3.1 General. Mission Directorates that require Facility Projects with an AFPCE of $1 million or greater to support their programs and projects will transfer funds into the CECR Account. These types of funding transfers initiate Program-Direct CoF projects. Program-Direct CoF projects can include the following:

a. The construction of new real property assets that are required specifically for the execution of Mission Directorate programs and/or projects.

b. Major modifications that add additional capacity or capability to existing real property assets required specifically for the execution of Mission Directorate programs and/or projects.

c. Repairs to existing real property assets or replacement of obsolete items (ROI) required specifically for the execution of Mission Directorate programs and/or projects. These repairs are not subject to a prioritization process by FRED. Not all repairs require funds to be transferred into the CECR Account. Refer to Section 1.4.3 for guidance.

1.3.2 Funding Transfers. The transfer of funding into the CECR Account should be identified by the funding organization during NASA's Planning, Programming, Budgeting, and Execution (PPBE) process. As such, Program-Direct CoF projects should be identified in the Congressional Justification (CJ) document one-year prior to the fiscal year (FY) of execution. If a Mission Directorate identifies a facility project after the PPBE cycle, funding transfers will be identified in an Operating Plan Change. Upon approval by Congress, the funding will be identified in the CECR Account in the Initial Operating Plan (IOP) for the FY of execution. Refer to Appendix I, Local and/or Program-Funded Project Flowchart for guidance.

1.3.3 Data Call. FRED issues a yearly Program-Direct CoF Data Call to the Mission Directorates for candidate projects in accordance with the Strategic Programming Guidance (SPG) and the Program Resource Guidance (PRG) budget process. The Exploration CoF, Space Operations CoF, Science CoF and Aeronautics CoF Programs will each have a designated individual to coordinate the CoF Projects for that given Program. The purpose of this data call is to ensure that FRED understands the intent of candidate projects and to ensure compliance with applicable Agency and Federal policies. Candidate projects should be clearly identified and supported by both programmatic and facilities personnel at the Center in which the project is to be executed. In addition, the Center CoF Program Manager shall clearly understand and support the candidate project(s).

1.3.4 Project Requirements. Projects can be either MRC or Discrete. Once established, Program-Direct CoF projects follow all the same procedures as defined within this NPR. New construction will demonstrate integration with the Agency and Center Master Plans.

a. All Discrete Projects require a budget narrative and a business case according to Preparation, Submission and Execution of the Budget, OMB Circular A-11 (08/03/2012) and Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs, OMB Circular A-94. An LCCA per the NASA Business Case Guide for Real Property and Facilities Project Investments is an acceptable business case. The LCCA will include an evaluation of the status quo and of existing facilities and capabilities (e.g., within NASA, within the Federal Government, within U.S. industry, within academia) that could be modified or upgraded to meet the program requirements. New construction of a facility or capability can only be justified after a thorough investigation of these alternatives. The Business Case documentation should be stored as an official record with other project records.

b. In accordance with the Business Services Assessment for Facilities, if a new capability or facility is

funded through Program-Direct CoF, the LCCA will demonstrate the plan and commitment of the Mission Directorate to fund the continued M&O of any new facility or capability while required by the program or project.

c. The LCCA will include the estimate and fund sources for all corollary investments such as outfitting, ground support equipment, special test equipment (STE) and the fund source for their continued maintenance and operations.

d. The relevant demolition offset for additions or new construction projects will be costed within the project and submitted in the budget narrative and be considered in the LCCA calculations.

1.3.5 Applicable Directives and Policies. Since a Program-Direct CoF project is either constructing new facilities and systems, or modifying or repairing existing facilities and systems, the project needs to be managed in accordance with the requirements of this NPR. In accordance with the applicable policy requirement for the sponsoring program (e.g., per NPR 7120.5, NASA Space Flight Program and Project Management Requirements, per NPR 7120.8, NASA Research and Technology Program and Project Management Requirements, or per NPR 8600.1, NASA Capability Portfolio Management Requirements), deliverables from project management key decision points (KDPs) are factored into the facility project planning, design, and construction phases.

1.3.6 Studies and Final Design. Program-Direct Project activities such as studies, PERs and final designs that require professional A-E services are funded with non-CoF resources (e.g., unlike Institutional CoF project PERs and final designs funded with CoF FP&D). Hence, Mission Directorates are not required to transfer funds into the CECR Account for the procurement of these services. However, the Mission Directorate CoF Program Manager, Center CoF Program Manager, or the FPM

should forward the A-E services funding information to the FRED Financial Analyst to record on a NF-1878, Funding Approval Document.

1.3.7 Appropriations Provision. Once the CECR Account budget for a given FY is established in NASA's appropriation, the maximum budget increase for that year is limited to a percentage of the original value. The maximum budget decrease is also limited to a percentage of the original budget value. The values can change and are within the Administrative Provisions of the appropriation. Given these restrictions, mission directorates need to ensure that Program-Direct CoF projects are identified during the PPBE process for inclusion in the President's Budget/CJ. When Operating Plan changes become necessary, the Mission Directorates should alert FRED and the other Mission Directorate point of contacts (POCs) as to the intended change to allow for coordination and, if required, prioritization of competing requirements.

1.3.8 Incrementally Funded Project. In some circumstances, the full scope of a Program-Direct CoF project may be incrementally funded over multiple FYs. Upon completion of each project increment, the product may not meet the "functional" definition; however, the product produced by each increment needs to be usable by the Program. All project increments and AFPCEs will be clearly defined and fully disclosed to FRED using NF-1509, Facility Project Approval & Cost Estimate Document prior to execution of the first project increment. Also, the FPM shall submit a separate NF-1739, Capitalization Determination Form (CDF) for all project increments and an NF-1046 within 30 days of completion of each increment. An incrementally funded project approach is not permitted under the Institutional CoF Program (e.g., each phase of an Institutional CoF Project is to be completely functional and usable).

1.4 Non-CoF Facility Projects

1.4.1 General. Non-CoF Facility Projects, also called "Local Projects" or "Local Authority Projects," are executed with funds managed at the Center level (refer to Appendix I, Local and/or Program-Funded Project Flowchart for guidance). All Facility Projects with an AFPCE equal to or greater than $100,000 require the following:

a. Prior to project execution, Center submission of form NF-1509 via the FRED-approved database. For projects with an AFPCE less than $1 million, the forms are submitted to FRED for information only. For projects with an AFPCE equal to or greater than $1 million (e.g., repair projects conforming to NPR 8831.2, Facilities Maintenance and Operations Management), the forms are submitted to FRED for approval prior to execution. FRED reserves the right to halt the execution of any project for reasons of noncompliance with NASA policy, the appearance of fragmentation, or other related concerns.

b. Prior to project execution, submission of NF-1739 and NF-1509 to the Center's Real Property Accountable Officer (RPAO). Form NF-1509 will be submitted to the Office of the Chief Financial Officer (OCFO) for projects with an AFPCE of $500,000 (lower threshold for capitalization) and greater.

c. Upon completion of execution, submission of NF-1046, Transfer and/or Notification of Acceptance of Accountability of Real Property, to the Center's RPAO. This form should be submitted within 30 days of project completion or at the time of issuance of beneficial occupancy (new construction or major modification).

1.4.2 Non-CoF New Construction and Major Modification Projects. Facility new construction projects result in the installation of new real property assets or systems. Facility major modification projects increase the footprint of existing real property assets or systems or increase an asset's originally designed capacity or capability. Non-CoF construction or major modification projects will conform to the Agency's Reduce the Footprint initiative as defined in NPD 8820.2. New construction or major modification projects implemented with non-CoF funding are required to have an AFPCE below the MRC threshold.

1.4.3 Non-CoF Repair Projects. Facility repair projects return an existing real property asset or system to its originally designed capacity or capability. Repair can include the replacement of existing assets or systems with new materials and equipment of the same design parameters (called "repair by replacement" or "replacement of obsolete items (ROI)"). Non-CoF funding can be used for ROI repair projects without a funding threshold constraint per NPR 8831.2. Following formal approval by FRED, Centers and Mission Directorates can implement ROI repairs with local funding (i.e., funding does not need to be transferred or reprogrammed into the CECR Account).

1.4.4 Power Purchase Agreements. For agreements/procurements to purchase Center-wide utilities from local municipalities and external entities such as treated domestic water, treatment of sanitary sewer flows, natural gas, electricity, etc., refer to NPR 8831.2.

1.4.5 Other types of Non-CoF Facility Projects. The following alternative methods are currently the only methods authorized for Facility Projects (e.g., constructing new or enhancing existing real property) with an AFPCE equal to or greater than $1 million: Energy Savings Performance Contracts (ESPC) as authorized by 42 U.S.C. § 8287 et seq.; Utility Energy Service Contracts (UESC) as authorized by 42 U.S.C. § 8256 (c) et seq.; Enhanced Use Lease (EUL) as authorized by 51 U.S.C. § 20145; and National Historic Preservation Act (NHPA) as authorized by 54 U.S.C. § 306108.

1.4.6 Projects funded by these alternative methods require full disclosure.

1.5 Facility Program Management Responsibilities

1.5.1 Specific individuals are identified to manage the Agency's Facilities Program at both NASA HQ and at each field Center.

1.5.2 Agency CoF Program Management Responsibilities. Individuals within FRED are responsible for Agency management of the Construction of Facilities theme. This requires collaboration with CoF Program counterparts at the field Centers and subsequent coordination with the (OMB) and the applicable Congressional committees.

1.5.2.1 Agency CoF Program Manager. Responsible for managing the PPBE cycle for the Construction of Facilities theme. This includes managing the Institutional CoF Project prioritization processes, the Program-Direct CoF project identification process and funds-transfer process, and all Congressional notification processes that are required up to the point of funds distribution to the Centers.

1.5.2.2 Agency CoF Program Officer(s). These individuals are assigned to act as official CoF Program liaisons for a subset of Centers as assigned by the Director of FRED. Individuals are responsible for approving project documentation and overseeing budgets, schedules, and technical status for their assigned Centers. These duties include oversight of all assigned Center projects included within the

Institutional and Mission Directorate CoF Programs.

1.5.2.3 EPM. Provides FRED oversight, support, and guidance to Center FPMs for selected Facility Projects that present a high financial risk to the Agency. Projects could include Discrete Institutional CoF Projects, highly complex or highly technical projects, or mission critical Program-Direct CoF Projects. An EPM can be assigned to a project by FRED management or requested by Center management. The EPM will represent FRED in construction partnering activities. Representatives that report to the EPM can be assigned to attend weekly construction meetings with the construction contractor. The EPM could also be identified as a member of a Change Control Board for a discrete project (as identified in the Facility Project Management Plan (FPMP)). Additional duties include developing Agency-wide project management standards and practices, developing a policy for management of engineering and construction data (e.g., drawing file management, a lessons-learned database, BIM standards and file management), managing and aligning Agency specifications, and managing CoF project claims.

1.5.2.4 Agency Demolition Program Manager (ADPM). Responsible for managing facility demolition projects funded within the Institutional CoF program or as funded by the Mission Directorate programs. Also acts as the official Demolition Program liaison to counterparts at the Centers.

1.5.2.5 Agency Energy Program Manager for Facility Projects. Responsible for program management of Facility Projects involving energy savings and sustainability improvements funded by any of the following sources: the Institutional CoF Program (see Section 1.2.5); the Agency 35 percent of Enhanced Use Lease (EUL) net revenue; ESPCs; and UESCs. Further duties of this individual are defined per NPR 8570.1, NASA Energy and Water Management Program.

1.5.2.6 Agency Sustainable Facilities Coordinator. Responsible for ensuring that Agency-wide major modification and new construction projects comply with current Federal and Agency Guiding Principles for Federal High-Performance Sustainable Facilities and are certified under a third-party building certification system (See Section 1.10). Also acts as the official liaison for the Sustainability Facilities Coordinator counterparts at the Centers. Additional duties include providing and presenting annual Agency Sustainability Metrics to the OMB), the Council on Environmental Quality (CEQ), the Department of Energy, the General Services Administration (GSA), and within other NASA organizations.

1.5.3 Center CoF Program Management Responsibilities. The individuals at each of the 10 NASA Centers required to manage the CoF theme. They are responsible for managing formal responses to FRED data calls; establishing a Center advocacy process for candidate projects; tracking the CECR, EUL, and NHPA fund releases; and tracking/reporting project financial and technical status to their counterparts in FRED. Center CoF Program Managers also shall assume responsibilities for their component facilities. Centers can identify separate individuals with responsibilities to manage Program- Direct CoF projects included under the CoF theme. These individuals should be regularly involved in the same community of practice activities as their Institutional CoF Program Manager counterparts.

1.5.3.1 Center CoF Program Manager. Individual assigned to act as the Center's official liaison to FRED for all projects proposed and ultimately funded under the CoF theme. This individual's POC is the assigned Agency CoF Program Officer within FRED. Duties include collaborating with Mission Directorate POCs to help advocate for candidate Program-Direct CoF projects for the Exploration,

Space Operations, Science, and Aeronautics Programs. Center Program Managers also shall be involved on a regular basis in their relevant communities of practice supported by FRED.

1.5.3.2 Center Demolition Program Manager (CDPM). Individual assigned to act as the Center's official liaison to FRED for all demolition projects proposed and ultimately funded under the CoF theme. This individual's direct POC is the assigned ADPM within FRED. Duties also include collaborating with Center Mission Directorate POCs to help advocate for candidate Program-Direct Demolition projects for the Exploration, Space Operations, Science, and Aeronautics Programs.

1.5.3.3 Center Energy Manager. Responsible for developing energy/water investment proposals from energy/water audit results and coordinating implementation through available funding. Funding mechanisms include Energy Savings Investments funded within the Institutional CoF Program, energy and sustainability upgrades funded by the Agency 35 percent of EUL net revenue, ESPCs, and UESCs. Further duties of this individual are defined per NPR 8570.1.

1.5.3.4 Center Sustainable Facilities Coordinator. Individual assigned to act as the Center's official liaison to FRED for ensuring that major modification and new construction projects comply with the Guiding Principles for Sustainable Federal Buildings and Associated Instructions and the third-party building certification process. The assigned individual should be a member of the Facility Project Team through all project phases. Additional responsibilities include submitting annual metrics to FRED for inclusion in multiple Agency and Federal Government reports. This individual's direct POC is the assigned Agency Sustainable Facilities Coordinator within FRED.

1.5.3.5 Center Institutional Safety Discipline Leads (ISDL). Individuals assigned to ensure facilities, systems, and activities are safe and conform to Agency, Center, and regulatory policy and requirements. The roles and responsibilities for these individuals, which include the Authority Having Jurisdiction (AHJ), are specified in NPR 8715.1, NASA Safety and Health Program.

1.5.4 Mission Directorate CoF Program Responsibilities. Each Directorate assigns an individual to coordinate the CoF Projects within the Directorate. Individuals are responsible for communicating all Mission Directorate facilities needs to the Agency CoF Program Manager and CoF Program Officers within FRED and with the CoF Program Manager at the Center where the project is to be executed. Additional duties include assisting in the coordination of the funds transfer process from other Mission Directorates to the CECR Account.

1.6 CoF Facility Project Requirements

1.6.1 Requirements. The following are required for all CoF facilities projects AFPCE equal to or greater than $1 million):

1.6.1.1 Full Disclosure. Center CoF Program Managers shall provide full disclosure of the facility project's scope, justification, and overall cost to FRED, who will subsequently inform Congress (as applicable). Full disclosure is accomplished through submission of form NF-1509 via the FRED- approved database. In addition, a Quad Chart that is submitted to FRED aids in the full disclosure of a project.

1.6.1.2 Institutional CoF Project Functionality. Institutional CoF Facility Projects, regardless of type or scope, are required to produce complete and usable assets or systems for their intended use at the time

of construction substantial completion. As such, Institutional Facility Projects will not be dependent on any additional funding to produce a usable asset or system. Where applicable, additional non-CoF project funding can be allocated for outfitting. (See Chapter 5 and Appendix D).

1.6.1.3 Program-Direct CoF Project Functionality. Unless specifically identified within the NF-1509 form, Program-Direct CoF Facility Projects, regardless of type or scope, are required to produce complete and

usable assets or systems for their intended use at the time of construction substantial completion (refer to Section 1.3.7). Where applicable, additional non-CoF funding from the Program can be allocated for special test equipment (STE) or an integrated systems test (IST).

1.6.1.4 OCFO Review. In accordance with NPR 9250.1, Property, Plant and Equipment and Operating Materials and Supplies, all Facility Projects require review by the Center's OCFO prior to project execution. This is accomplished through submission of NF-1739. This review is required to identify if facility investments are to be considered as capital investments or expenditures.

1.6.1.5 RPAO Notification. In accordance with NPR 8800.15, Real Estate Management Program, Chapter 2 Real Property Accountability, FPMs shall notify the Center RPAO of the completion of a facilities project. This is accomplished through submitting NF-1046.

1.6.2 Fragmentation. NASA Centers are prohibited from fragmenting—splitting Facility Projects into parts, each having cost estimates below the MRC threshold, with the intent of circumventing the CoF approval process. In establishing a project scope, a NASA Center will include all necessary elements to ensure functionality within a single project to avoid fragmentation or the appearance of fragmentation.

Note: An Incrementally Funded CoF Project is not considered a fragmented project in that the approach has been approved by Congress and the scope and cost is fully disclosed to FRED during the project formulation phase.

1.6.2.1 CoF project life cycle. As indicated in Section 1.1.1.a, the CECR Account for a given FY remains available for contract obligations for six years before expiration. However, for any given CoF Project, FRED will initiate a review of a project's unobligated budget at the start of the fourth year following the year of appropriated funding. If the Center CoF Program Manager does not have a compelling reason for use of the unobligated budget, the funding will be considered as "residual" and will be sent back to the Agency or Mission Directorate for other high-priority needs.

1.7 CoF Program Formulation

1.7.1 CoF Project Life Cycle. The CoF project life cycle, shown in Figure 1-2, comprises the project formulation phases (including planning and development), final design, implementation (including construction, commissioning, and activation), M&O, decommissioning, and disposal/demolition. The figure shows the full life cycle, and this NPR addresses all phases except Operations, Phase E. NASA Centers and HQ formulate the CoF program through a collaborative process that spans four consecutive phases: concept presentations for out-year projects, prioritization of construction, design funding, and construction funding.

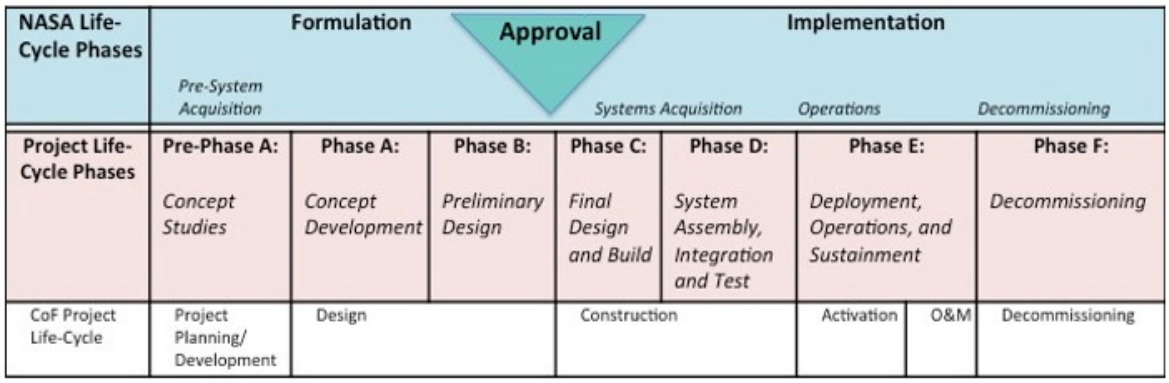


Figure 1-2. CoF Project Life Cycle

1.7.2 Guidance. Each year, NASA's OCFO issues guidance to the Centers for reporting their budget requests. The OCFO coordinates this through the Mission Directorates and Mission Support Offices.

1.7.3 Establishing Project Scope. The scope of a project defines the extent of the proposed work, project goals, and justification. The Center-assigned FPM shall establish the project scope in cooperation with Center management, other project stakeholders, and affected Safety and Mission Assurance Discipline Leads. The scope is formally documented on the NF-1509.

1.7.4 Phased Projects. Phasing involves repairing or replacing a facility in segments. NASA is authorized to accomplish work in phases. A completed phase needs to be fully functional and usable (e.g., a useful segment that stands alone and independent of subsequent phases). The FPM shall include a statement on the NF-1509 that explains the scope of the phase, how many phases are planned, and the associated estimated AFPCE of all phases. Also, the FPM shall submit a separate NF 1739, CDF) for all project phases and an NF-1046 within 30 days of completion of each phase.

1.7.4.1 Budget request (five-year plan). The Agency CoF Program Manager, in accordance with the Control Account Manager (CAM), shall develop and submit a budget request (five-year plan) in accordance with the annual guidance issued through the NASA OCFO (see NPR 9420.1, Budget Formulation). FRED issues data calls (for Institutional CoF and for Program-Direct CoF) to the Centers and Mission Directorates in support of the OCFO budget guidance. Subsequently, FRED and Mission Directorate stakeholders prioritize the CoF Program Agency-wide. Refer to Figure 1-3, Institutional CoF Budget Timeline (Sample) for delineation of three years from prioritization through construction.

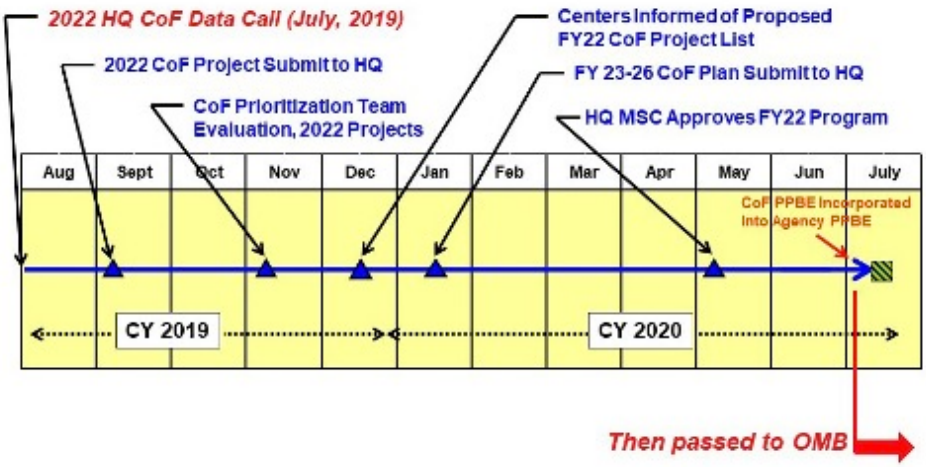


Figure 1-3. Institutional CoF Budget Timeline (Sample)

1.7.5 Documentation. The Center CoF Program Manager, Demolition Program Manager, and Energy Program Manager (as applicable) shall prepare documentation to be uploaded into the FRED-approved database for approval. Refer to Appendix H for the specific data call deliverables for each project type. Typical deliverables are:

a. NASA Form 1509, Facility Project Approval Document (including the Facility Project Cost Estimate section). This document provides full disclosure to FRED regarding project scope, justification, schedule, and all project costs (e.g., study, PER, design, construction, and other burden costs). The form also includes signature blocks for Center, HQ, and Mission Directorate POCs. Refer to Appendix F for instructions on the completion of this form. The FPM shall generate this form at the time of project formulation and update and resubmit this form for all subsequent funding requests (e.g., final design funding, construction funding, and as funding is added to or subtracted from the AFPCE during execution).

b. Project Narrative (also called Project One-Page Narrative). A description of the justification for the

project, the scope of work contents, and the specific impacts to NASA missions (if a project repair will mitigate mission risks). The Narrative should also include all project phases and associated budgets (if applicable). Ideally, this document should be confined to one page (two pages maximum).

c. Quad Chart. Required for all CoF Projects regardless of category. A single chart that provides the following project information: Quadrant 1 – Project title, AFPCE, final design cost estimate, and the Center's core capabilities that are supported by the project; Quadrant 2 – A project graphic that indicates the nature and scope of the work; Quadrant 3 – Details of the project scope; Quadrant 4 – Details of the NASA Mission impact and how the project will mitigate these impacts.

d. Risk Assessment. Required for all Institutional CoF Repair Projects per the data call requirements. NPR 8000.4, Agency Risk Management Procedural Requirements, defines institutional risks assigned to infrastructure that affect capabilities and resources necessary for mission success. The Institutional CoF Repair Program is focused on mitigating institutional risks associated with real property. Risk assessments can be associated with either safety, mission success, schedule, or cost domains. The assessment will define a scenario of credible events that lead to degraded performance and subsequent NASA mission impact. Ultimately, the assessment will justify the likelihood of the scenario occurrence, the consequence of the outcome, and result in a numerical risk score based on a risk matrix issued by FRED. The format and content will comply with the template and instructions provided within the data call. Typically, the FPM, the project stakeholders (including the infrastructure technical experts, facility operators, Health and Safety Plan (HASP) POCs, etc.), M&O personnel, and the Center's Risk Coordinator are involved in developing this assessment.

e. Business Case. All Facility Projects with an AFPCE equal to or greater than $100,000 require the development of a business case conforming with the requirements of OMB Circulars A-11 and A-94. The NASA Business Case Guide for Real Property and Facilities Project Investments also identifies the nature and extent of the document. A LCCA is considered an acceptable alternative to a business case. LCCAs are to conform to the requirements of the NASA Business Case Guide for Real Property and Facilities Project Investments. For projects with an AFPCE equal to or greater than $1 million, Center CoF Program Managers shall upload the LCCA into the FRED-approved database for approval prior to the release of final design funds.

f. Compliance Matrix. For each CoF project, the FPM shall complete a Compliance Matrix (See Appendix C) and upload it into the FRED-approved database. This matrix captures all the "shall" statements in this NPR such that FPMs can use this document as a project management tool. FPMs can indicate if projects are compliant with each statement or if there are areas of intended non-compliance. Intended non-compliances require an explanation and subsequent approval from FRED.

g. Adaptive Re-Use Feasibility Report (ARFR). A concise report that evaluates the property against projected new construction needs of the Center over the next three years. The report compares the square footage, location, and layout of the newly proposed facility to determine if any of the needs can be met through refurbishment and adaption of a historic property. Analysis should include some cost estimates if appropriate (i.e., if a Center is proposing to demolish a historic office building, the ARFR should evaluate any new construction proposed and determine if the existing building could be adapted to meet those needs). An ARFR will be available to FRED upon request.

1.7.6 HQ Review and Prioritization. FRED leads the review and prioritization of Institutional CoF Facility Projects proposed for NASA's five-year plan based on documentation provided by the Centers. This review includes an evaluation of existing capabilities to minimize or eliminate the creation of excess capacity within NASA or the private sector, e.g., construction of a ground-based test facility at a particular Center when there is adequate availability and capability to accomplish the same requirements at a different Center or in the private sector. For Facility Projects funded from other sources (e.g., Program-Direct, or local funds), FRED and the associated Mission Directorate shall coordinate the process.

1.7.7 CoF Program Approvals. The CoF Program is part of the annual appropriation request NASA submits to OMB. Refer to the Annual PPBE Phases and Steps process outlined in NPR 9420.1 Budget Formulation.

1.7.8 At Risk Projects. Projects for which FRED may withdraw or cancel funding as the result of several factors including:

a. For a design-bid-build project, the final design has not started by the end of May preceding the FY in which the project is proposed for Congressional authorization or not completed by February of the FY in which the project was authorized and appropriated.

b. The project scope, as presented to Congress, has significantly changed.

c. The construction award is not scheduled to occur by the end of the FY in which the project was authorized and appropriated.

d. A project for which all construction bids exceed the available construction budget.

1.7.8.1 The Center CoF Program Manager shall identify at risk projects to FRED as early in the FY as possible. This will enable the project funds to be rescinded and used for other Agency needs that can be executed (i.e., obligated) in accordance with the NASA and OMB obligation metrics. For Program- Direct CoF Projects, the sponsoring Mission Directorate will consider the application of at-risk project funds for other needs within their CoF Program.

1.7.9 1.7.9 Financial Resources for Facility Projects. The annual appropriations acts contain the principal funding authorities for projects within the CoF programs. Depending on the type of facilities project (e.g., Institutional CoF, Program-Direct CoF, Non-CoF), various types of funding are to be used for specific project phases. For Facility Projects implemented using either a Design-Bid-Build delivery approach or a Design-Build delivery approach, refer to Figure 1-4 for the funding requirements.

(*AFPCE can exceed the $1M threshold if the work conforms to NPR 8831.2 requirements.)

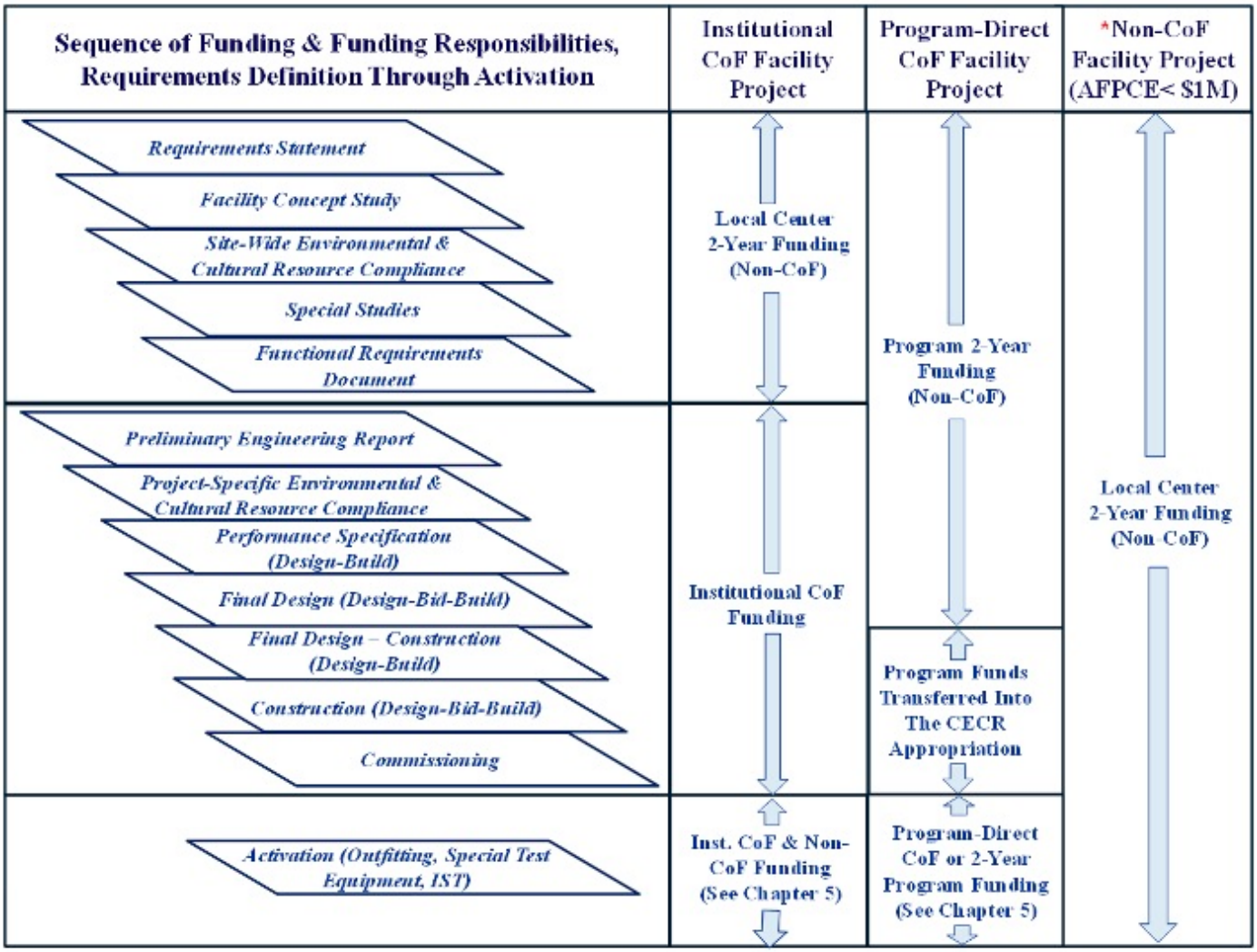


Figure 1-4. Facilities Project Activities and Funding, Design-Bid-Build and Design-Build

In some cases, another Federal Agency, state or local government, or a private party provides funding for facility work at a NASA Center through an Agency agreement. (See Chapter 7 of this document.) Regardless of the source of funds, approval authority will be per NPD 7330.1, Approval Authorities for Facility Projects.

1.8 Facility Project Fiscal Management

1.8.1 Facility Project Approval. The authorities and responsibilities identified per NPD 7330.1 apply to all facilities projects, regardless of fund source. Each Facility Project with an AFPCE of $100,000 or more will be documented on form NF-1509 and uploaded into the FRED-approved database. At a

minimum, the Center POC (CoF Program Manager, FPM. or local authority project manager) shall submit the document and require concurrence and/or approval by the Agency POCs (CoF Program Officer or other) and the Director of FRED. Approval requirements and funding requests vary according to the facility project types and the nature of the funding.

1.8.2 Locally Funded Projects (Center- or Program-Funded). Although Centers and Programs approve and fund these projects, FRED shall review the NF-1509 to ensure compliance with NASA policies and to prevent the appearance of fragmentation. For Locally funded projects with an AFPCE less than $1 million,

the forms are uploaded for FRED awareness.

1.8.2.1 For Locally Funded ROI Projects with an AFPCE equal to or greater than $1 million (i.e., projects that conform to NPR 8831.2 requirements), FRED shall approve the NF-1509 prior to obligation of a construction contract.

1.8.3 Institutional CoF Projects. Funding requests are initiated by the Center CoF Program Manager and coordinated by the Agency CoF Program Officers. Once approved, the Agency's CoF Resource Analyst issues a signed NF-1878 via e-mail, and funding is made available to the Center within NASA's financial management system.

1.8.3.1 Requesting FP&D Funds. Center CoF Program Managers shall request funds for Preliminary Engineering Reports (PERs), final designs, and project-specific environmental and cultural resource assessments by updating and uploading the NF-1509 into the FRED-approved database.

1.8.3.2 Requesting Construction Funds. Center CoF Program Managers shall request construction funds by updating and uploading the NF-1509 and additional documentation (as defined by FRED) into the FRED-approved database.

1.8.4 Program-Direct CoF Projects. The Center CoF Program Manager will coordinate funding for studies, PERs, and final designs with sponsoring Program POCs. Funding utilized for final designs will be reported to FRED and documented on an NF-1870 Funding Approval Document. Program funds required for construction will be transferred into the CECR Account via the PPBE process for inclusion in the President's Budget or, when necessary, via an Operating Plan Change. Once the funds transfer is completed, Center funding requests are identical to those specified for Institutional CoF Projects.

1.8.5 Externally Funded Facilities Projects (including Tenant-funded). Funding approval and authority comes from the party providing the funding; however, NASA facility project approval requirements will be per NPD 7330.1. Centers will request project approval by submitting form NF-1509 to the Director of FRED. Refer to Chapter 7, Facility Investments by Others, for further guidance.

1.8.6 Energy Savings Performance Contract (ESPC) and Utility Energy Services Contract (UESC) Projects. Centers request Facility Project approval prior to contract award by submitting form NF-1509 and proposal documents to FRED via the approved HQ database. For projects with an investment value less than $1 million, the forms are submitted to FRED for information only. The Energy Program Manager for Facility Projects approves projects with an investment value from $1 million up to $10 million, and the Director of FRED approves projects with investment value of $10 million or more.

1.8.7 EUL and NHPA Projects. For EUL and NHPA agreements that include a Facility Project, Centers will follow the same procedures above for Externally Funded Facilities Projects along with the

requirements indicated in NPR 8800.15, Chapter 6. EUL authority is contingent upon legislation and the identified expiration date of the legislation.

1.8.8 EUL and NHPA Net Revenue Projects. FPMs shall request facility project approval by submitting a record via the FRED-approved database. For Facility Projects with an AFPCE of $100,000 or greater the submitted record will be form NF-1509. Agency CoF Program Officers and/or the Agency Energy Program Manager will approve Facility Projects with an AFPCE up to $10 million. The Director of FRED approves projects with an AFPCE of $10 million or more. Upon final approval, the Agency Resource Analyst will document the funding requirements on form NF-1878, and issue funds to the Center via the Agency's enterprise financial system.

1.8.9 Emergency Repair Projects. Emergency repairs are incidents where existing facilities are rendered inoperable because of a major component or system failure, an accident, or other unforeseen circumstance. In these cases, only funding appropriated for Institutional CoF may be used for the repairs. The Director of OSI can determine if the repair is more urgent than repairs, modifications, or construction of other facilities for

which the CoF funds were originally appropriated. The OSI Director will subsequently author and sign a statement of determination to authorize the emergency repair.

1.8.10 Authority for Early Advertisement. FRED grants authority to advertise for design and/or construction contracts upon approval of the NF-1509 in the FRED-approved database and transfer of funding to the Center. However, FRED may grant advanced authority to advertise if necessary and appropriate prior to funding availability. Formal Authority for Early Advertisement will be provided via an e-mail from the Agency CoF Program Officer.

1.8.11 Procurement. When contracted services are required by NASA (e.g., final design services from an Architectural-Engineering firm, construction services from a commercial contractor), the contract acquisition will comply with the requirements per 48 CFR Chapter 1 (the FAR) and the NASA FAR Supplement (NFS) 48 CFR pts. 1800–1872 and Appendices A, B, and C. FPMs will collaborate with warranted Contracting Officers (COs) and designees (i.e., Contract Specialists) to fully comply with the regulations set forth in these documents.

1.8.11.1 HASP Requirements in Procurements. The FPM will work with cognizant safety officials to develop and approve safety requirements and objectives for efforts to be contracted and advise COs and CORs of specific safety concerns or issues related to contract performance.

1.8.11.2 In addition, FPMs will ensure that contracts contain safety, mission success, and risk management requirements for development, design, construction, and the operations of systems, equipment, and facilities.

1.8.12 Project Authority Adjustments. The ability to adjust an approved CoF project authority depends on the CoF Program and the dollar threshold of the project.

1.8.12.1 CoF MRC Projects (AFPCE of at least $1 million and less than $10 million). Funding realignment is the movement of funding within CoF project categories in the same FY. For the Institutional CoF Program, project categories include Renewal, Repair, Demolition, Energy, and FP&D. FRED has delegated limited authority to Center CoF, Demolition and Energy Program Managers to realign MRC project funding within their Center’s respective CoF project categories for a given appropriated year. Funding realignment cannot exceed +/– 25 percent of the originally approved

AFPCE for any given MRC project as defined on the original NF-1509 unless approval to exceed the percentage is received from FRED. As an example, if a Center has four FY 2022 MRC Repair Projects, each with an AFPCE of $5M, the Center CoF Program Manager has the authority to realign the funding between the four projects such that any given MRC Repair Project budget is not increased or decreased by more than $1.25M (and the overall FY 2022 CoF Repair category for the Center remains $20M). Similar authority is granted to the Mission Directorate CoF Program Manager to realign funding with their respective Program-Direct MRC projects in a given FY.

1.8.12.2 CoF Discrete Projects (AFPCE equal to or greater than $10 million). According to NPD 7330.1, there are only two methods to adjust the approved authority for Discrete CoF Projects.

a. Upward Variation. Reprogramming funds within an account (e.g., the CECR Account) is allowed once per FY. Upward Variations enable the authority of a CoF Discrete Project to be increased or decreased by an amount less than $500,000. This funding needs to already reside within the CECR Account for the same FY that the project was authorized or an earlier FY. Upward Variations require approval by the Agency CoF Program Manager and subsequent notifications to the Mission Support Directorate (MSD) Resource & Performance Management Office and the NASA OCFO. Reprogramming of funding can occur between Discrete CoF Projects, from a Discrete CoF Project to an MRC CoF Project, or from an MRC CoF Project to a Discrete CoF Project.

b. Operating Plan Change (OPC). Either a reprogramming of funding within an account or the transfer of funding between accounts in an amount equal to or greater than $500,000. Historically, Operating Plan

Change (OPC) opportunities occur only a few times per FY. OPCs require approval and coordination by the Agency CoF Program Manager, the MSD Resource and Performance Management Office, and the NASA OCFO. Formal approval must be received by Congress prior to funds reprogramming or transfer. Funding for a CoF project authority adjustment has to come from an appropriation within the same year as the project or earlier.

1.8.13 CoF Program Reporting Requirements. Center CoF Program Managers shall maintain records of their Center's ongoing CoF Program in each FY in accordance with NPR 1441.1, NASA Records Management Program Requirements. In addition, formal Quarterly CoF Program Reports will be submitted to the FRED Strategic Planning Branch.

1.9 Independent Safety Review

1.9.1 Throughout the life cycle of a facility project, the FPM will request independent reviews from the Center Institutional Safety Discipline Leads. These reviews will include any proposed facility project configuration changes that have a potential to impact project fire protection, life safety, or health systems and equipment.

1.9.2 The independent reviewer will provide written suggestions, comments, requirements, and requirement sources (e.g., NPRs, Occupational Safety and Health Administration (OSHA) Standards, etc), to the FPM. The FPM will review all input, incorporate items of agreement, and identify any items of disagreement. The FPM will then consult with the Discipline Leads on all items of disagreement.

1.9.3 If disagreement persists, the concerned reviewer can escalate the issue for resolution to both the FPM's and reviewer's management. If the matter relates to Institutional Safety Authority, where

disagreement involves an Institutional Safety Discipline Lead (as defined in NPR 8715.1, Section 2.6), the FPM's supervisor shall document their decision via the request for a relief process as outlined in NPR 8715.1 Section 3.2.

1.10 Facility Program Best Practices Compliance

1.10.1 General. Center FPMs will comply with NASA best practices regardless of the funding source. Required best practices include:

a. Implementing front-end planning developed by the Construction Industry Institute (CII) using comprehensive planning tools such as the Project Definition Rating Index (PDRI), team building, and other techniques (see CII Best Practices).

b. Designing for maintainability to optimize operation and maintenance costs and effort (see CII Best Practices).

c. Installing Condition-Based Monitoring instrumentation on new, related personal property/collateral equipment provided under the implementation phase of Facility Projects when cost effective and as identified by the Center's M&O organization. Guidance is provided in the NASA Reliability Centered Building and Equipment Acceptance Guide.

d. Commissioning installed equipment, systems, building envelope, and other building elements to ensure quality, safety, operability, reliability, and systems integration.

e. Following the Secretary of Interior's Standard for the Treatment of Historic Properties (https://www.nps.gov/tps/standards/treatment-guidelines-2017.pdf) or Center design guidelines for projects within or adjacent to a historic property or district.

f. Maximizing reuse, recycling, and salvage and minimizing disposal when a project includes demolition (see CII Best Practices).

g. Applying constructability concepts and principles during each phase of the facility project to ensure the project execution remains practical (see CII Best Practices).

h. Using partnering tools and techniques to establish and maintain professional working relationships among project stakeholders including, but not limited to, users, contractors, and construction managers. (See Construction of Facilities: NASA Partnering Desk Reference for more specific guidance.)

i. Practicing effective configuration and change order control to minimize project cost and schedule growth.

j. Implementing the safety initiative “Making Zero Incidents a Reality” to encourage proactive safe behavior during the construction phase (see CII Best Practices).

k. Using Design-Build Institute of America’s Design-Build Manual of Practice when a design-build approach is planned.

l. When implementing a CoF Institutional Renewal project that incorporates the footprint reduction requirements specified in NPD 8820.2, Centers should attempt to match the type of space to be demolished with the type of space to be constructed (e.g., lab space for lab space, office space for office space, etc.).

1.10.2 Agency Community of Practice. Many facility project best practices are implemented by the Agency’s Engineering and Construction Innovations Committee (ECIC). The ECIC serves as a conduit for innovations from Government, industry, and academic research, introducing new ideas and new ways of doing business to NASA’s facility engineering and construction organizations. ECIC develops or assesses potential new best practices, and customizes, recommends, and after a decision to implement, champions them for NASA.

1.11 Sustainability Requirements

1.11.1 Guiding Principles. The Federal Government has outlined its intent to advance sustainable building principles and practices throughout its portfolio established through statutory and executive policies. These sustainable principles and practices have been incorporated into six Guiding Principles for Sustainable Federal Buildings (Guiding Principles). The six principles guide agencies in designing, locating, constructing, maintaining, and operating Federal buildings in a sustainable manner that increases efficiency, optimizes performance, eliminates unnecessary use of resources, ensures the health of occupants, protects the environment, generates cost savings, and mitigates risks to assets, consistent with agency missions. In addition, these principles align with the definition of high-performance green buildings as established in Definitions, High Performance Green Buildings, 42 U.S.C. § 17061(13) and serve as guidelines for Federal agencies to assess progress towards the sustainability metrics associated with their real property assets in accordance with the statutory duties of Executive agencies (as required by Duties of Executive Agencies, 40 U.S.C. § 524).

1.11.1.1 Compliance. FPMs shall ensure that all major modification and new construction projects comply with the requirements under the Guiding Principles for Sustainable Federal Buildings, Council on Environmental Quality, as well as Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability, E.O. 14057.

1.11.2 Sustainability Certifications. In addition to the Guiding Principles, FPMs managing Discrete Projects may be required to pursue a third-party sustainability certification.

1.11.2.1 New Construction and Major Modification of Existing Buildings. The FPM, in concert with the Center CoF Program Manager, the Center Sustainable Facilities Coordinator, and the RPAO shall ensure that construction of new buildings or and major modification of existing buildings is certified per the

requirements of one of the following third-party certification systems (at the indicated certification level or higher):

a. Leadership in Energy and Environmental Design (LEED) v4 for Building Design and Construction, U. S. Green Building Council (USGBC) – for new building construction and major modifications of buildings. Projects are to strive to achieve a minimum level of LEED Silver certification. b. Green Globes® for New Construction (NC), Green Building Initiative – for new building construction and major modifications of buildings. Projects are to strive to achieve a minimum level of two Green Globes.

1.11.2.2 New Construction and Major Modification of Infrastructure. The FPM, in concert with the Center CoF Program Manager, the Center Sustainable Facilities Coordinator, and the RPAO, should consider following a third-party sustainability system for the construction of new or major modification of existing horizontal infrastructure. One such system is the Institute for Sustainable Infrastructure's ENVISION: The Blueprint for Sustainable Infrastructure.

1.11.3 Waiver Request. If the FPM does not think compliance with the minimum USGBC LEED and/or Green Building Institute (GBI) Green Globes requirements is reasonable for a particular project, the FPM shall submit a letter to the Director of FRED requesting a waiver that explains why compliance is impractical. This waiver will include a completed initial LEED/Green Globes checklist to the NASA HQ Office of Strategic Infrastructure. Compliance with the Guiding Principles in accordance with the previously referenced E.O. is mandatory.

Chapter 2. Project Development and Planning

2.1 Facility Project Development

2.1.1 The Center CoF Program Manager shall develop a systematic process for developing projects for submission in response to CoF data calls issued by the FRED. At a minimum, this process includes the following:

a. A method for the ongoing collection of institutional technical capabilities and programmatic requirements throughout the year.

b. A method for identifying and collecting M&O information such as excessive trouble calls, unplanned repairs, and adverse condition-based maintenance data for related personal property/collateral equipment, systems, or a facility.

2.2 Facility Project Planning

2.2.1 Acquisition Planning and Execution. The FAR and the NASA FAR Supplement specify the requirements for contract acquisitions that support all phases of Facility Projects. The FPM and the Center's Facility Planning Office shall coordinate all acquisition planning and execution, including the utilization of Regionalized or Centralized facilities contracts, with the Center's Procurement Office to ensure compliance with these regulations.

2.2.2 Agency and Center Master Plan Coordination.

a. Center Master Plans are derived and approved in accordance with the Agency Master Plan (AMP) according to NPD 8810.2, Master Planning for Real Property and per NPR 8810.1, Center Master Planning.

b. The Center will ensure that all proposed CoF projects comply with the requirements of the AMP, the approved Center Master Plan, Mission Directorate programs and projects, and the relevant Agency Capability Portfolios (per NPR 8600.1).

2.2.3 Program-Direct CoF Project Coordination. For Program-Direct CoF projects, the FPM shall coordinate with the sponsoring Mission Directorate to capture the necessary project requirements. The FPM and the sponsoring Mission Directorate personnel should use Appendix I. Local and/or Program- Funded Project Flowchart for guidance in developing Program-Direct CoF projects. For Space Flight Programs, facility infrastructure requirements definition milestones per NPR 7120.5, Appendix I, Table I-4, Product 4.c.i Infrastructure Requirements and Plans.

2.2.4 FPM. Centers assign an FPM for each facility project including Locally Funded, Institutional CoF, and Program-Direct CoF. With support from an assigned project team (see section 2.2.4.4), the FPM shall organize, manage, and direct Facility Projects in accordance with the requirements of this NPR. The FPM's duties typically start at the time of turnover of the Functional Requirements Document from the Center's Facility Planning Office and culminate following the Activation Phase (but could vary by Center). Refer to Figures 1-4 and 1-5.

2.2.4.1 FPM Experience. FPMs should have experience with facility project management

commensurate with the size and complexity of the project to be undertaken. FPMs will complete the Agency's Construction of Facilities Class and pursue completion of any additional NASA-specific Project Management courses available within the Agency. For projects using a design-build delivery approach, specific training in the development of design-build performance specifications and the execution of design-build acquisitions is highly recommended. If alternative forms of project delivery, such as Construction Manager as Constructor (CMc) and Construction Manager at Risk (CMr), are considered, the FPM should complete commensurate training prior to project execution. FPMs should also have experience with using scheduling software and producing Gantt charts, understand the management of Government funding and accounting processes, and understand contract acquisition processes.

2.2.4.2 Senior FPM. Centers can select individuals as Senior FPMs based upon several years of successful FPM performance, demonstration of excellent communications skills, successful management of highly complex project requirements, experience as a construction Contracting Officer Representative (COR), etc. Senior PMs can be considered for managing Facility Projects at other Centers.

2.2.4.3 EPM. See Chapter 1, Section 1.5.2.3 for the description of duties. Centers will assign an FPM for all Facility Projects regardless of whether an EPM is identified for a project.

2.2.5 Facility Project Team. The facility project team includes engineering discipline support and technical leads (e.g., architectural, structural, civil, mechanical, or electrical as required), the construction manager, the COR, the RPAO, the Facility Utilization Officer (FUO), and representatives from stakeholder organizations. Stakeholder representatives can include individuals from the organizations ultimately using the facility and from supporting organizations such as safety, health, fire protection, the AHJ, Center Institutional Safety Discipline Leads, protective services, the Office of the Chief Information Officer (OCIO) for all IT requirements, environmental, cultural resources, acquisition (procurement), M&O (including contractor POCs), and ground test facility technicians. For Program- Direct projects, the Facility Project Team will include a POC from the funding Mission Directorate.

2.2.6 Front End Planning (FEP). The process of gathering and developing sufficient information to define a facility project. The FPM ensures that the Facility Project Team (including stakeholder representatives) are involved in the FEP process. Once the FPM and the Facility Project team have identified the initial project goals and objectives, the FEP process starts and continues through the approval of the final design SOW and the start of final design phase. The FEP phase establishes the project approach, requirements, and concept that provide the basis for project budget and approval.

2.2.6.1 Studies. As shown in Figure 1-4, "special studies" are executed with non-CoF funds. These studies, which evaluate current systems, facilities, and capabilities, and clarify existing field conditions are performed prior to or during project development. The decision to proceed with a CoF project may be the product of this study, but it is not the primary purpose of the study.

2.2.6.2 Project Delivery Method. In cooperation with the CO and the COR, the FPM defines the project delivery method as Design-Bid-Build, Design-Build, or alternative project delivery methods such as CMc or CMr.

a. Design-Bid-Build. In this approach, a design contract is established with a professional (A-E) firm to produce drawings, specifications, and other documents necessary for project execution. The completed final design deliverables are subsequently used to procure a construction contract. Hence, there are two separate contracts required for this delivery approach. Refer to the Design-Build

Institute of America's Design-Build Manual of Practice.

b. Design-Build. In this approach, a single entity — the design-build team — works under a single contract with the Center to provide the design, and then do the construction for the project (see Figure 1- 4). Different elements of the contract may be subcontracted, but there is a single responsible organization. FEP for design-build is not different from design-bid-build.

c. CMc. In this approach, the functions of construction contractor and construction manager are merged and assigned to one entity that may or may not have a Guaranteed Maximum Price (GMP), but which typically assumes control over the construction work by direct contracts with the subcontractors. FEP would involve the Constructor early in the project to provide cost, schedule, and constructability advice to the Owner and Design Team.

d. CMr. This approach entails a commitment by the Construction Manager (CM) to deliver the project within a GMP, which is based on the construction documents and specifications at the time of the GMP plus any reasonably inferred items or tasks. FEP would involve the CM early in the project to provide cost, schedule, and constructability advice to the Owner and Design Team.

2.2.6.3 Project Definition Rating Index (PDRI). The PDRI process, which originated from the CII best practices, is a tool to determine the quality of project requirements and to identify deficiencies that may need further clarification or study. It is recommended that the FPM coordinate the first PDRI activity during the FEP project phase and document the results on the first draft of the NF-1509. A PDRI activity is required at the 30 percent final design milestone.

2.2.6.4 Functional Requirements Document (FRD). The Center Facilities Planning Office shall complete a Functional Requirements Document that contains the comprehensive project requirements obtained from the Facility Project Team and details for all the necessary project disciplines. This document becomes the basis for developing the NF-1509, the Final Design Statement of Work (for a Design-Bid-Build project), or the Performance Specification (for a Design-Build project). If NASA uses the General Services Administration (GSA) services for project design and execution, the P100 Facilities Standards for the Public Building Service (October 2021) will be the basis for the Functional Requirements Document. The Functional Requirements Document includes the following elements:

a. A clear and concise statement of purpose for the project.

b. A comprehensive description of the scope of work for the project, including existing conditions, problems, potential or preliminary solutions, operational need dates, studies, user requests and reports, or M&O data. Supporting documentation can be included as an attachment or appendix.

c. An analysis of existing facilities as an alternative to new construction and a subsequent justification for why no existing facilities can meet the project needs.

d. All environmental, historic property, safety, health, and protective service requirements.

e. Justification for the project.

f. Funding source(s) to be used for all project phases (e.g., studies, PER, final design, construction, outfitting) and the associated POCs for those funds.

g. Signature blocks and dates for all project stakeholders (to indicate concurrence). For Program-Direct CoF Projects, a POC from the Mission Directorate supplying the funding will be included.

2.2.7 FPMP. For Institutional and Program-Direct CoF projects, the FPM shall prepare a FPMP that establishes a schedule for implementing a facility project, assigns roles and responsibilities, and indicates technical and budget decision authorities required to execute the project. The plan provides a detailed outline of the steps in the facility implementation process with well-defined milestones to measure progress.

2.2.7.1 FPMP Elements. The FPM should include the following elements in the FPMP:

a. Identification of the FPM, the Facility Project Team members, and other individuals or organizations responsible for project implementation (including a POC from the Mission Directorate supplying the funding for Program-Direct CoF Projects).

b. A description of the planned work, including scope, location, sustainability elements, special features, and the elements of the AFPCE.

c. An acquisition plan outlining the contract delivery method and schedule that can realistically support the operational need date(s).

d. A project schedule with key milestones for planning, environmental, design, acquisition, construction (including long-lead items such as equipment items that are not typically stocked by suppliers), and activation.

e. Configuration/change control procedures and responsibilities.

f. A description of design review milestones, documentation, fiscal control procedures, and reporting frequency.

g. The Functional Requirements Document (per Section 2.2.6.4) will be included as an attachment to the FPMP.

2.2.7.2 FPMP Approval. Prior to the start of final design work, the FPM shall present the FPMP to the Center official(s) exercising project technical approval authority.

a. Discrete CoF Projects. The FPM shall submit the FPMP to the FRED CoF Program Officer for review and approval. For Discrete CoF Projects, the FRED CoF Program Officer will provide approval of the FPMP prior to the start of the final design phase (for Design-Bid-Build projects) or acceptance of the Performance Specification (for Design-Build projects).

b. MRC CoF Projects. The FPM shall provide the FPMP to the FRED CoF Program Officer upon request.

2.3 Codes, Standards, and General Requirements

2.3.1 General. The FPM will ensure that the planning phase complies with the necessary local, state, and national building codes and standards. If a local jurisdiction has adopted a code that is not nationally recognized, the FPM will ensure the design meets or exceeds the latest version of the International Building Code from the International Code Council. In addition, regardless of locally adopted building codes, the FPM will ensure the design meets or exceeds the latest version of both NASA-STD-8791.11, NASA Safety Standard for Fire Protection and the National Fire Protection Association (NFPA), Requirements for Electrical Systems, Life Safety, and Fire Protection and Suppression. The FPM will ensure that the Center Institutional Safety Discipline Leads are consulted

throughout the planning phase for the applicable codes and standards per 8715.1, Section 2.6.3. All NASA facilities will also be designed for accessibility for all personnel according to the requirements of the Architectural Barriers Act (ABA) of 1968, 42 U.S.C. 4151 et seq. and the Americans with Disabilities Act (ADA), 42 U.S.C. § 12131.

2.3.2 Drawing Standards. The FPM will ensure that all facility project design drawings comply with the United States National CAD Standard (NCS), National Institute of Building Sciences.

2.3.3 Specification Standards. For all facility project specifications, designers can use SpecsIntact (i.e., the Unified Facilities Guide Specifications—UFGS—found in the Whole Building Design Guide). For equipment or systems not adequately specified by using the UFGS, the designer may use professional judgment to ensure that a specification is suitable for open and competitive procurement. Regardless of the product that is used, the specifications need to allow construction contractors to submit products with equal salient features for consideration by the NASA Facility Project Team in accordance with FAR and NASA FAR requirements.

2.3.4 BIM Standards. For Facility Projects where BIM is to be used, the FPM shall reference NASA- STD-10001, NASA BIM Scope of Services and Requirements for Architects and Engineers. This document incorporates the requirements from the National BIM Standard, National Institute of Building Science.

2.3.5 Risk Management Requirements. If applicable to any portion of a facilities project, the FPM will ensure compliance with the risk management process per NPR 8000.4. In addition, the leading indicators established in the Center's Monthly CoF Project Report to FRED also can be used as a risk management tool.

2.3.6 Environmental Compliance and Cultural Resource Requirements. NASA needs to comply with numerous Federal, state, and local environmental and cultural resource laws and regulations for all Facility Projects, including Institutional and Program-Direct CoF new construction, major modification, repair, and demolition. These include, but are not limited to, the National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 et seq.; NHPA, 54 U.S.C. § 306108; Endangered Species—the Endangered Species Act (ESA), 16 U.S.C. Chapter 35; the Archaeological Resources Protection Act of 1979 (ARPA) as amended, 16 U.S.C. §§ 470aa–470mm; and the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. § 3001 et seq. The FPM is responsible for the following:

a. Coordination. Coordinate facility project planning activities with the Center NEPA Manager (CNM) and Center Cultural Resources Manager (CRM) to determine the appropriate level of review, agency consultations, permits, and documentation required for environmental compliance (per NPR 8510.1, NASA Cultural Resources Management and per NPR 8580.1, Implementing the National Environmental Policy Act and Executive Order 12114.

b. Environmental and Cultural Resources Checklist. Submit an environmental checklist to the CNM and the CRM early in the planning stage of the project (but no later than 30 percent design). The checklist will be used by the CNM and the CRM to:

(1) Identify environmental requirements, issues, mitigation measures, impacts, and required permits.

(2) Determine the appropriate level of NEPA documentation (i.e., Categorical Exclusion (CatEx) Environmental Assessment (EA) or the Environmental Impact Statement (EIS)).

(3) Complete the NHPA Section 106 process.

2.3.6.1 Environmental and Cultural Resource Compliance, Budget, and Schedule. Coordinating and developing the project budget and schedule to account for any required Agency consultations (e.g., State Cultural Resources Officer, U. S. Fish and Wildlife Service), surveys (Cultural Resources Survey, Biological Resources Survey), environmental permitting (e.g., wetlands, air permit modifications), documentation (e.g., Record of Environmental Consideration, Environmental Assessment, Environmental Impact Statement), and mitigation.

2.3.6.2 Other FPM Environmental and Cultural Resource Compliance Requirements. Other requirements include:

a. Ensuring any resulting environmental requirements are included in the contract scope of work to implement the project, including any mitigation or design requirements for compliance with Protection of Historic Properties, 36 CFR pt. 800 and NEPA.

b. Ensuring all permits are obtained and mitigation measures are implemented as appropriate.

c. Including the CNM and CRM as stakeholders on the Facilities Project Team. As such, they are involved in all final design reviews.

d. Providing the CNM and CRM with sufficient project description information to complete the NEPA environmental review and Section 106 consultation.

e. Ensuring that facility project construction or demolition does not start until confirmation is received from the CNM and CRM that the NEPA environmental review and Section 106 consultation processes are complete.

2.3.6.3 Completed Section 106 consultation means the Center has received a letter of concurrence from the State Historic Preservation Officer (SHPO) or has executed a Memorandum of Agreement (MOA). If the action is covered under a Programmatic Agreement (PA), Section 106 compliance is completed once any consultation stipulations within the PA have been met.

2.3.6.4 Completed NEPA environmental review means the appropriate NEPA documentation has been completed (i.e., CatEx, EA or EIS) and, if applicable, the Finding of No Significant Impact or Record of Decision have been signed.

2.3.7 Energy and Water Requirements. During the facility project planning phase, FPMs will ensure that the requirements for reducing energy and water, as required by the following documents, are incorporated as applicable:

a. Energy Efficiency Standards for the Design and Construction of New Federal Commercial and Multi- Family High-Rise Residential Buildings, 10 CFR pt. 433, establishes performance standards for energy conservation that are mandatory for the design of Federal buildings. This Federal standard incorporates by reference ASHRAE 90.1 and specifies a particular edition based on the facility project design start date.

b. Energy Efficiency Standards for the Design and Construction of New Federal Low-Rise Residential Buildings, 10 CFR pt. 435, establishes mandatory energy efficiency standards for the design of Federal buildings. This Federal standard incorporates by reference the International Code Council International Energy Conservation Code and specifies a particular edition based on the facility project design start date.

c. Federal Building Energy Efficiency Standards, 42 U.S.C. § 6834, establishes energy efficiency

performance standards for Federal buildings. This includes 42 U.S.C. § 6834(a)(3)(A)(ii) and 42 U.S.C. § 6834(a)(3)(D)(vii) for water conservation technologies.

d. Federal Compliance, 42 U.S.C. § 6835, limits the expenditure of Federal construction funds to Federal buildings that meet or exceed the energy standards of 42 U.S.C. § 6834.

e. “Large capital energy investments,” 42 U.S.C. § 8253 (g) establishes requirements for the life-cycle cost effectiveness of large capital energy investments in existing buildings.

f. NPR 8570.1.

2.3.8 Occupational Safety and Health Requirements.

2.3.8.1 General. Including safety from the start of the project, whether it’s a new building construction, major modification of an existing building, a system repair, or building demolition, enables determination of applicable consensus codes and standards and NASA requirements to minimize the risk that safety and health requirements are not incorporated from the start of the project. The FPM and the Center Institutional Safety Discipline Leads shall identify safety and occupational health requirements as required by NPR 8715.1 and NPR 8715.3, NASA General Safety Program Requirements. The FPM will then prepare a Preliminary Hazards Analysis and a Preliminary Hazards List.

2.3.8.2 Facility Safety Management Plan (FSMP). The FPM, in collaboration with the Center Institutional Safety Discipline Leads, shall initiate the preparation of the FSMP to ensure that facility safety requirements are addressed throughout the entire life cycle of the facility project. The FSMP should identify facility project safety requirements for the formulation, planning, design, construction, activation, operation, and disposal phases with a goal of managing the risks for each phase. Facility safety is to be integrated with functional project objectives to ensure that appropriate resources are

allocated for safe facility management over the project life cycle. NASA-STD 8715.1, Chapter14 establishes requirements for the safety and mission success of NASA facilities throughout their life cycle. Safety tasks (e.g., hazards analysis, pre-operations/construction safety meetings, safety surveillance) during each phase need to be appropriate for the size and complexity of the project, the nature of operations active in the facility, and the associated risks.

2.3.8.3 Safety and Health Representatives. The Facility Project Team will include safety and health representatives that will be included in all reviews and site inspections throughout the facility project life cycle.

2.3.9 Physical Security Requirements. NASA is required by Interagency Security Committee, E.O. 12977, to comply with the Interagency Security Council (ISC) Design Criteria for planning and designing new construction and major modification Facility Projects.

2.3.9.1 Design-Basis Threat. The Design-Basis Threat (DBT) establishes the characteristics of the threat environment to be used in conjunction with ISC physical security standards.

2.3.9.2 Facility Security Level. The application of the Physical Security Criteria for Federal Facilities is predicated on a Facility Security Level per NPR 1620.2 Facility Security Assessments.

2.3.9.3 Codes and Standards. In addition to the ISC Design Criteria and according to NPD 1600.2, NASA Security Policy, FPMs, with cooperation from the Center’s Office of Protective Systems officer assigned to the project, will ensure NASA Facility Projects comply with the requirements of

NPR 1600.1, NASA Security Program Procedural Requirements (Section 7.7); NPR 1620.2; and NPR 1620.3, Physical Security Requirements for NASA Facilities and Property.

2.3.10 IT Requirements. Facility Projects often require construction/installation of new IT infrastructure or the repair/replacement of existing antiquated IT infrastructure. In these cases, the FPM shall coordinate these project requirements with the Center's OCIO to ensure that the IT infrastructure meets current NASA standards, integrates with existing NASA systems includes establishing and implementing appropriate IT system security plans security plans.

2.3.10.1 Data Centers. Although generally classified as Center institutional infrastructure, data center requirements are as technically complex as research ground test facilities. Such facilities often require vibration isolation of structural foundations, high quality electrical power supply systems and backup systems, specialized heating, ventilation, and air-conditioning (HVAC) systems with humidification controls, and extensive physical security systems. In addition to addressing these concerns, the FPM will ensure that all sustainability practices (see Section 2.3.11) are coordinated with the OCIO to ensure that required IT operations are maintained.

2.3.10.2 Data Center Approval. In general, Facility Projects may not budget funding or resources towards the construction of a new data center or the major modification (or expansion) of an existing data center without approval from the Office of Management and Budget's (OMB's) OCIO. To request such approval, the Agency's OCIO will submit a written justification that includes an analysis of alternatives (including opportunities for cloud services, inter-agency shared services, and third-party co- location) and an explanation of the net reduction in the agency's data center inventory that will be facilitated by the new or expanded data center (such as through consolidation of multiple existing data centers into a single new data center).

2.3.10.3 Building IT Distribution System Installations. Most new building construction and existing building major modification projects require the installation of an interior communications cable distribution network that extends to every office, laboratory, and conference room throughout the building. Typical IT distribution systems involve an interface system where external communications systems enter the building, a series of cables routed in above-ceiling cable trays and conduits, and cable termination boxes within each room. Often, facility project construction contractors will install the cable tray and conduit systems, while the cabling and termination devices will be installed by a separate contractor managed by Center or Agency OCIO.

2.3.10.4 Building Conference (or Collaboration) Rooms. New building construction and existing building major modification projects may include requirements for conference rooms with virtual conferencing or collaborative engineering requirements. These projects could involve specialized cabling, power and communications pedestals, cable routing trays or conduits installed during the pouring of concrete floors, etc.

2.3.10.5 Center-wide Communications Distribution Infrastructure. Many Centers are faced with replacing many antiquated copper wire and coaxial cable communications systems with modern fiber- optic cable systems. These systems, which often loop around the campus and extend to all buildings and other structures, can be installed in either underground manhole/duct bank/tunnel systems or on above- ground pole systems. Due to the high transmission capacity of modern fiber-optic cable, multiple legacy communications systems (e.g., telephone, EMCS, life-safety signals, security signals, research data collection, etc.) can be consolidated into a single communications distribution system. These systems should be designed to consider redundancy (in the event of cable breaks), expandability, and ease of maintenance.

2.3.10.6 M&O Requirements. The FPM will coordinate with the Center's M&O organization during the facility project planning phase. M&O POCswill recommend the appropriate provisions of NPR 8831.2 to be implemented in the project. Facility Projects will consider maintainability requirements for all planned equipment and systems. In addition, critical equipment installed under the scope of a facility project will include condition-based monitoring systems and predictive testing and inspection (PT&I) provisions in accordance with the NASA Reliability-Centered Building and Equipment Acceptance Guide. Additionally, for projects employing BIM processes, FPMs may consider a Product Attributes approach in Construction-Operations Building Information Exchange (COBie) format for capturing installed asset information that will eventually be stored in the Center's Computerized Maintenance Management System (CMMS). Refer to NPR 8831.2 for further information.

2.3.11 Sustainability Requirements. Refer to Section 1.11 for applicable standards. In addition, the following sustainability practices should be considered by the FPM for Facility Projects involving new construction or major modification:

2.3.11.1 Indoor Air Quality (IAQ) during construction and testing. Follow the requirements per ANSI/SMACNA 008-2008, Indoor Air Quality (IAQ) Guidelines for Occupied Buildings Under Construction. Following construction and prior to occupancy, the project specifications should require that installed ductwork systems be flushed with outdoor air for a minimum of 72 hours (consistent with achieving a relative humidity no greater than 60 percent). After occupancy, the project specifications should require ductwork to be flushed with outdoor air as necessary to minimize exposure to contaminants from new building materials.

2.3.11.2 Ventilation and Thermal Comfort. Follow the requirements per ANSI/ASHRAE Standard 55- 2020, Thermal Environmental Conditions for Human Occupancy, including continuous humidity control within established ranges per climate zone and per ANSI/ASHRAE Standard 62.1-2019, Ventilation for Acceptable Indoor Air Quality.

2.3.11.3 Moisture Control. Implement a moisture control strategy for minimizing condensation and preventing building damage due to mold contamination.

2.3.11.4 Daylighting. Maintain a minimum daylight factor of two percent (excluding all direct sunlight penetration) in 75 percent of all spaces occupied for critical visual tasks. Provide automatic dimming controls or accessible manual lighting controls and appropriate glare control.

2.3.11.5 Low-Emitting Materials. Specify materials and products with low pollutant emissions (e.g., minimally or not volatile organic compounds). This requirement includes adhesives, sealants, paints, carpet systems, and furnishings.

2.3.11.6 Biobased Content. Specify products meeting or exceeding the United States Department of Agriculture's biobased content recommendations indicated in the BioPreferred® Program, U. S. Department of Agriculture (USDA). For other products, use biobased products made from rapidly renewable resources and certified sustainable wood products.

2.3.11.7 Ozone-Depleting Compounds. Specify the elimination of ozone-depleting compounds during and after construction where alternative environmentally preferable products are available. This is required by both the Montreal Protocol on Substances that Deplete the Ozone Layer, U. S. Department of State and the Clean Air Act Amendment of 1990: Title VI (Stratospheric Ozone and Global Climate Protection), 42 U.S.C. § 7401, or equivalent overall air quality benefits that consider life-cycle impacts.

2.3.11.8 Recycled Content. Specify products meeting or exceeding the Environmental Protection Agency's (EPA's) recycled content recommendations. For other products, use materials with recycled content such that the sum of postconsumer recycled content plus one-half of the pre-consumer content constitutes at least 10 percent (based on cost) of the total value of the materials in the project.

2.3.11.9 Installation of Laboratory Space. For Facility Projects involving new construction or major modification of laboratory space, reference and follow the recommendations of the EPA's Labs21 Program, including the Labs 21 Environmental Performance Criteria 3.0, U.S. EPA.

2.3.12 Commissioning Requirements. Refer to Chapter 5 for the applicable practices and standards.

2.4 Cost Estimating

2.4.1 Cost Estimate Development Requirements. During the planning phase, the FPM, in conjunction with the Facility Project Team, will develop the first draft of the project's Engineering Estimate (EE) and the AFPCE for construction (refer to Appendix D). These estimates should include all the applicable elements described in the project Functional Requirements Document with enough accuracy to have a reasonable expectation of project success. In addition, the FPM will capture other project costs that are outside the scope of the AFPCE (e.g., costs for studies, PERs, final designs, outfitting items in accordance with Appendix E, special test equipment, integrated systems tests, and other activation requirements).

2.4.2 LCCA Requirements. All CoF projects (both MRC and Discrete) require an LCCA in compliance with OMB Circulars A-11 and A-94. For new construction and major modification projects, the Center Master Planner shall coordinate the development of the LCCA during the planning phase in accordance with the NASA Business Case Guide for Real Property and Facilities Project Investments. For all other facility project types, the FPM needs to coordinate and develop the LCCA.

Chapter 3. Design

3.1 Design Coordination

3.1.1 General. Guidance for final designs can be found in NASA-STD-10002, NASA Facility Design Standard.

3.1.2 FPM Responsibilities. The FPM shall keep the Facility Project Team, the FRED EPM (if applicable), the FRED CoF Program Officer, the CNM, and the Center CRM, apprised of all changes or proposed changes in project requirements.

3.1.3 Program-Direct CoF Projects. For Program-Direct CoF Space Flight and/or R&D projects, the FPM shall coordinate the final design effort with the sponsoring Mission Directorate POCs.

3.2 Procurement of Architectural-Engineering (A-E) Services

3.2.1 General. Whenever commercial A-E services are required, the FPM and the Center Procurement Office's assigned CO shall acquire those services in accordance with the FAR Part 36 and NFS.

3.2.2 A-E Contractor Selection Criteria. A-E contractor selection is subject to the criteria under Selection of Architects and Engineers, 40 U.S.C § 11 (Brooks Act).

3.2.3 Regional A-E Contracts. In lieu of procuring A-E services, FPMs will use NASA's regionally established A-E Contracts as much as possible for providing the required facility project services in accordance with Architect-Engineering Services Not Associated with Environmental Remediation, NFS A-102.14. If it is necessary to deviate from NFS A-102.14, the FPM will work with the Center CO to submit a request for permission for such a deviation. If granted, the request for deviation would ultimately be approved by the NASA Associate Administrator for Procurement. Only after the deviation has been approved can quotes, bids, or proposals be requested from potential contractors.

3.3 Public Release

3.3.1 The FPM and Facility Project Team members will ensure that public disclosure of CoF project information (including subprojects and/or work packages) occur only after release by the appropriate committees of Congress. Facility project design documents prior to their planned construction FY of execution are sensitive, and the FPM ensures that all parties connected with project development are aware of this sensitivity. Design packages used for acquisition do not include any information classified as "for official use only," secret, or top secret.

3.3.2 Any information deemed Controlled Unclassified Information (CUI) will be handled by the FPM and Facility Project Team members per NPR 2810.1, Security of IT.

3.4 Management of Preliminary Engineering Report (PER)

3.4.1 PER Purpose. If special studies are not sufficient to identify the necessary content for a Facilities Requirements Document (FRD), the FPM should advocate for the development of a PER. This is especially applicable for projects of complex technical content, implementation, schedule, or geographic constraints. The goal of a PER is to study options, identify the optimal project approach, clarify design

requirements, clarify operational requirements, identify environmental issues, and establish a high-level cost estimate for the project design, implementation, and activation phases. If the project may cause adverse effects to cultural resources, the PER should include an analysis of alternatives considered to avoid these effects. Other deliverables from a PER can include the following:

a. Documentation and analysis of field visits required to verify existing conditions (e.g., review of existing record drawings, photographs).

b. Market research of potential vendors to ascertain capabilities necessary to meet project objectives.

c. A 15 percent conceptual design including the development of basic site/floor plans, piping & instrumentation diagrams (P&IDs), general equipment layouts and existing facility/utility modifications. This could include a preliminary specification table of contents.

d. Functional Requirements Document or a Performance Specification for a design-build project per Section 2.2.5.4.

e. Preliminary business case, per the NASA Business Case Guide for Real Property and Facilities Project Investments, including a review of the status quo (including current maintenance and repair costs) and the associated costs based on the required modifications and a study of alternatives.

f. Preliminary project risk assessment including studies of the reuse of existing assets, impacts of unplanned outages, etc.

g. A preliminary FPMP per Section 2.2.7.

h. Site analysis, including soil borings to determine geotechnical characteristics and/or identification of hazardous soils.

i. A preliminary construction schedule identifying major milestones.

3.4.2 PER Funding. Funding for a PER is determined by the facility project type.

3.4.2.1 Institutional CoF Project. If a PER is required for an Institutional CoF Project, the FPM should advocate to the FRED for FP&D funding in advance of the request for Final Design funding.

3.4.2.2 Program-Direct CoF Project. If a PER is required for a Program-Direct CoF Project, the FPM should advocate for funding from the sponsoring Mission Directorate in advance of the request for Final Design funding.

3.4.3 Cost for a PER. Typically, the cost of a PER should not exceed two percent of the initially assumed project AFPCE.

3.4.4 PER Format. The FPM will ensure that the SOW for a PER includes provisions for developing project requirements, scope of work, justification, alternatives considered, method for selecting proposed option, final design estimate for the proposed option, engineering budget for construction of the proposed option, and appendices to include sketches (e.g., floor plan, elevations, piping &

instrumentation diagrams, one-line electrical diagrams) engineering analyses, catalog cuts, or other descriptive materials.

3.4.5 PDRI Requirements. The FPM and the Facilities Project Team shall perform a PDRI exercise immediately upon the completion of the PER (refer to Chapter 2, Section 2.2.6.3, Project Definition Rating Index – PDRI). This does not eliminate the need for the required PDRI at the 30 percent final design milestone. All stakeholders including facility occupants and users, POCs for facility systems, facility/building managers, and Center Institutional Safety Discipline Leads should participate in the PDRI exercise.

3.5 Management of Final Design Phase

3.5.1 Final Design Funding. Funding for a final design (including project-specific environmental and cultural resource compliance) is determined by the facility project type.

3.5.1.1 Institutional CoF Project. If a final design is required for an Institutional CoF Project, the FPM should advocate to the FRED for FP&D funding no later than two years prior to the year of execution.

3.5.1.2 Program-Direct CoF Project. If a final design is required for a Program-Direct CoF Project, the FPM should advocate for funding from the sponsoring Mission Directorate no later than two years prior to the year of execution. This funding should be recorded on a NF-1878 issued by the FRED Resource Analyst.

3.5.2 Final Design Funding Obligation. NASA's policy is to award final design contracts for Facility Projects early in the FY for which the design funding is appropriated. The FPM shall plan and manage the procurement of final design services to achieve the goal of obligating 85 percent of all approved design funding by the end of the FY (assuming that the remaining 15 percent of unobligated funding is required for Contingency and Other Burden Costs). Contract obligation planning will include time for the preparation, submission, and approval of the NF-1739, which establishes the proper accounting treatment of the design funding. Completing the NF-1739 process and establishing the proper accounting treatment by the OCFO needs to occur prior to procuring the final design services.

3.5.3 Designing in Accordance with Project Budget. For all Facility Projects, the FPM shall include a statement in the A-E SOW indicating that the design entity is responsible for designing the project in accordance with the estimated cost of construction provided by the Government. For all CoF projects, the SOW should specify that at the 60 percent design completion milestone, the A-E design entity will notify the FPM, the CO, and the FRED EPM (if applicable) in writing if the estimated cost of construction is not adequate to cover the requirements included in the SOW. Refer to Section 3.6.1.3 for alternatives.

3.5.4 Final Design Cost Limitation. Final design cost proposals received from an A-E firm are subject to 48 CFR § 836.606-71 – Application of six percent Architect-Engineer Fee Limitation. Additional funding beyond the six percent limitation is typically required for A-E contract personnel field investigation and record drawing review, cost estimating, special analyses, construction implementation plans, and other services not addressed in the CFR.

3.5.5 Final Design Guidance. The FPM is encouraged to use NASA STD-10002, NASA Facility Design Standard as a reference during the facility project final design phase.

3.5.6 BIM Requirement. BIM is required for all Discrete level new construction and major modification projects. Depending on the project delivery approach (Design-Bid-Build or Design-Build), the FPM should incorporate applicable information from NASA-STD-10001 into the final design statement of work.

a. The FPM should clearly identify the scope of BIM requirements within the Final Design SOW.

b. For design-bid-build delivery, refer to the guideline documents NASA BIM Scope of Service and Requirements for Architects and Engineers and NASA BIM Scope of Services and Requirements for Construction Contractor in a Design-Bid-Build Process.

3.5.7 Final Design SOW, Design-Bid-Build Project. The FPM shall develop an SOW such that the A-E contractor can provide a firm fixed-price cost to provide the design required services. A typical format for a final design SOW is as follows:

3.5.7.1 Part 1 General. This section should provide a high-level overview of the project and some basic A-E requirements.

a. Description. Provide an overview of the project location, scope, purpose, the Government's budget, a statement regarding the need to design in accordance with the defined budget (see Section 3.5.4), and a schedule for delivery of the final design services.

b. General Requirements. Provide a comprehensive description of the A-E services required including field visits and verification of existing conditions, the use of BIM, required calculations and analyses (refer to NASA-STD-8719.11), Federal-State-Local code requirements, drawing and specification development, cost estimating services, construction scheduling services, development of a construction implementation, and other specialized services as required. This section should include a description of what existing record drawings, services, or equipment will be furnished by the Government for A-E contractor use. Lastly, this section should include a short statement of any services that are not required under this SOW.

3.5.7.2 Part 2 Projects. This section should clearly define all deliverables required from the A-E firm.

a. Final Design Cost Proposal. Provide details regarding hourly rates and total hours per engineering discipline and proposed subcontractors. This section should also require the A-E contractor to acknowledge the furnished requirements, budget, and schedule for completing the task.

b. Final Design Drawings. Provide details of the drawing units, sizes, formats, standards, and software requirements (including BIM requirements). Details should also be provided regarding the specific discipline drawings required, the organization of the drawing package, and any signature or professional stamp requirements.

c. Construction Specifications. Indicate the requirements for specifications to conform to Part 10 of the FAR (e.g., the need to describe equipment salient features to enable equal products) and to be prepared in accordance with the Construction Specifications Institute (CSI) 50 Division three-part 2004 format. Typically, this section offers the A-E firm to use SpecsIntact (i.e., the Unified Facilities Guide Specifications—UFGS—found in the Whole Building Design Guide) or to propose an alternate method

for approval by the NASA Facility Project Team.

d. Final Design Schedule. Provide requirements for a Gantt chart that includes site visits, progress

level submissions, design reviews and other important milestones.

e. Construction Schedule. Provide requirements for a conceptual construction schedule in Gantt chart format that includes mobilization, demolition (if required), site preparation, procurement of long-lead items, typical construction activities, commissioning, and activation. This construction schedule also should account for any facility operations and specific Center restrictions that might affect the Performance Period of Construction).

f. Construction Cost Estimate. Provide instructions for the engineering estimate to include all construction discipline labor, materials, supervision, overhead and profit and insurance (bid bond) markups. Subsequently, the A-E should develop the AFPCE by including escalation to the mid-point of construction and specified markups for Supervision, Inspection, and Engineering Services (SIES), construction contingency and other costs. The A-E should also be instructed to develop a base bid work scope and contract options for bid protection purposes.

g. Construction Implementation Plan. Provide requirements for the A-E firm to provide a plan considering all unique site impacts, personnel impacts, construction lay-down area requirements, NASA research ground testing impacts, utility impacts (including tie-in procedures), special permits and forms, confined space concerns and all off-hour work requirements.

h. Final Design Report. Provide instructions on the format requirements for the report including specific sections for technical discipline information and calculations, materials assessment reports, hazardous materials abatement requirements, a list of long-lead materials and equipment and appendices for special studies, back-up data, catalog cut sheets, etc.

3.5.7.3 Part 3 Execution. This section should clearly define major events occurring during the final design process and what is required for those events.

a. Conferences and Meetings. Require the A-E firm to identify all formal meetings including a final design kick-off meeting, fact-finding meetings, milestone review meetings (per Section 3.6 below) and any other specialized meetings. The meeting locations should be specified, and the A-E firm should be responsible for logging meeting minutes and action items.

b. Health and Safety Plan. As applicable, the A-E should submit a site-specific HASP for all employees accessing the site.

c. Design Submittal Requirements & Project Deliverables. See Section 3.6 below.

d. Project Requirements. Attach the Functional Requirements Document (FRD) identified in Section 2.2.6.4.

3.5.8 SOW, Design-Build Projects or Projects with other Delivery Approaches. The primary document used during the acquisition of a design-build contractor is the Performance Specification. In contrast to the functional requirements document that is developed for a design-bid-build project, the functional

requirements document for a design-build acquisition should have baseline (minimum) project success requirements and performance goals that may be evaluated during the acquisition phase and during contract performance. At the conclusion of the design-build contract, the FPM shall ensure that a complete set of as-built drawings and/or a BIM is provided by the A-E contractor.

3.6 Final Design Milestones

3.6.1 Design-Bid-Build Projects. The FPM shall ensure that the design-bid-build final design SOW specifies formal submissions from the A-E firm (and subsequent NASA reviews) at the 30 percent, 60 percent, and 90 percent level of final design completion. For highly technical and/or complicated projects, interim milestones can also be identified in final design SOW as required. These final design stages should include the following minimum elements:

3.6.1.1 30-Percent Final Design Submission. The 30-percent design submission is a critical design milestone for which the project requirements are validated. The SOW should instruct the A-E firm to include the following documents for this submission:

a. For new construction or major modification Facility Projects, civil site plans will be provided including existing utility locations, grading, pavements, and landscape features. The submission should also include basic architectural floor plans and elevations, preliminary structural system drawings, drawings identifying mechanical equipment locations and basic piping and ductwork runs, preliminary piping and instrumentation drawings (P&IDs), electrical equipment locations, one-line diagrams, a preliminary building code summary, and preliminary fire protection, suppression, and protective system drawings.

b. For repair projects, the location and scope of the work will be clearly identified from the existing conditions on site plans, architectural floor plans, and elevations, P&IDs, and electrical one-line drawings (as applicable).

c. A draft construction phasing plan and a preliminary commissioning plan (see http://www.wbdg.org/project/buildingcomm.php).

d. Design analyses and supporting engineering calculations. The analyses should support important assumptions and demonstrate conformance to required codes and standards.

e. An outline of the required construction specifications including section numbers and titles.

f. A preliminary order-of-magnitude engineering cost estimate and AFPCE, in accordance with Section 3.5.7.2.f above.

3.6.1.2 30-Percent PDRI Requirement. The FPM shall engage an independent entity (e.g., third-party Center individual, Agency PDRI team, etc.) to score the project using the PDRI process within two- weeks after receipt of the 30-percent design documents.

a. If the 30-percent final design PDRI score is over 200 out of a possible 1,000 points, the FPM shall immediately notify the assigned FRED CoF Program Officer and the EPM (if applicable). Depending on the magnitude of the score, the FRED may require the Facility CoF Program Manager and the FPM to either specify a higher construction contingency in the AFPCE calculation or recommend a delay in

proceeding with the remainder of the final design. If the recommendation is to delay the final design, the Facility Project Team and all stakeholders will meet to refine the requirements and re-run the PDRI exercise until an acceptable score is achieved. The design will then be allowed to proceed.

b. If the PDRI score is 200 or below, the FPM shall provide the score to the assigned FRED CoF Program Officer and the EPM (if applicable) for information only and proceed with the remainder of the final design activities.

c. The FPM shall record the 30-percent PDRI score on the NF-1509 when requesting construction

funding.

3.6.1.3 60-Percent Final Design Submission. This submission will validate that the construction of the facility project is achievable within the NASA-specified budget. If the 60-percent estimate provided by the A-E firm is close to or exceeds the specified budget, the Facility Project Team and the A-E firm should develop a project structure that identifies a base bid work scope that is below the budget and bid option packages that contain work scope items of lesser importance. The base bid work scope needs to result in a project that is functional upon completion (see Chapter 1, Section 1.6.1.2). The A-E firm shall furnish the following deliverables for this submission:

a. A drawing package with a cover sheet including a drawing index, initial versions of drawings and equipment schedules for all required disciplines. Although the drawings will be in varying states of maturity, the set should be complete enough to validate the construction cost estimate. The drawings should reflect adequate M&O clearances around all equipment and systems.

b. First draft of construction specifications including all required sections for each discipline that are edited to reflect the project requirements.

c. Completed design analyses and supporting engineering calculations.

d. A second draft of the construction phasing plan and the commissioning plan.

e. First draft of the construction schedule identifying key milestones and utility tie-in requirements.

f. Identification of any constructability issues.

g. A comprehensive construction engineering estimate and AFPCE in accordance with Section 3.5.7.2.f above.

3.6.1.4 90-Percent Final Design Submission. This submission should be an essentially complete final design package of drawings, specifications, calculations and analysis, schedules, and commissioning plans. The period between 90-percent and 100-percent should be for the A-E firm to address minor spelling corrections, small adjustments to drawings and specifications and for final coordination activities. The A-E firm shall address all of NASA’s 90-percent comments prior to receipt of final payment.

3.6.2 Design-Build Projects or Projects with other delivery approaches. The only formal design milestone is at 30-percent. The submission requirements should be comparable to Section 3.6.1.1

above. A PDRI process should be completed upon completion of the Performance Specification and also is required at the time of 30-percent submission.

3.7 Final Design Reviews by NASA

3.7.1 For each of the submission milestones indicated in Section 3.6 above, the FPM shall immediately distribute all materials received from the A-E firm to the Facility Project Team and any other project stakeholders including the FRED CoF Program Officer and the EPM (if applicable), and the Center Institutional Safety Discipline Leads. Depending on the size of the project, NASA will typically have between two and four weeks to review each package and return comments prior to the established submission review meeting. The primary purpose of these reviews for Design-Bid-Build and Design- Build projects is as follows:

a. Ensure A-E conformance to the Final Design SOW.

b. Ensure drawing and specification coordination between engineering disciplines and address any constructability issues.

c. Confirm that environmental and cultural resource issues are addressed according to referenced codes and standards.

d. Review and address project constructability and maintainability issues.

e. Ensure construction safety and health code compliance.

f. Ensure compliance with applicable national consensus building and fire codes, NASA-STD-8719.11, and all other applicable standards through a plan review in accordance with NPR 8715.1, Section 14.4.6.

g. Validate the correction of all nonconformances identified during the plan review in accordance with NPR 8715.1, Section 14.4.6.

h. Ensure that security, IT and other stakeholder requirements are addressed.

3.8 Mission-Critical Technical Facilities

3.8.1 NASA's Mission-Critical Technical Facilities are defined according to NPR 7120.5. These facilities are constructed or significantly modified for ground testing or deployment of space flight hardware and systems. The FPM (per NPR 7120.7 and NPR 7120.8) shall comply with the requirements per NPR 7120.5 and this document. Where compliance to both documents' requirements would duplicate an effort (e.g., a project management plan), only one effort incorporating all required elements from both policies is necessary.

3.8.2 For complex or mission-critical systems, the FPM will ensure that a Failure Mode and Effects Analysis (FMEA) is accomplished in accordance with the NASA-STD-8719.7, Facility System Safety Guidebook.

3.9 Activation Budget

3.9.1 General. The activation budget includes estimated costs associated with all tasks necessary to verify that the facility equipment and systems meet the project requirements, the equipment and systems operate within the design parameters, and the M&O and operating organizations are ready to use and maintain the facility. Facility project activation requirements are identified in Chapter 5 of this document and in Appendix E. As indicated in these references, activation activities can require a combination of CoF project funds, Mission Directorate funds and/or local Center funds. During the Final Design phase, the FPM shall complete the estimate of the activation budget started during the planning process. Upon completion, this plan requires coordination with FRED, the supporting Mission Directorate, and the Center's OCFO.

3.9.2 Outfitting. This budget includes all costs necessary to outfit the facility for personnel move-in and its intended operation. New construction and major modification projects are to include an amount for these items as indicated in Appendix E.

3.9.3 Special Test Equipment. This budget includes all costs for equipment that interface with a

ground test facility and the equipment and systems to be tested (usually associated with a Program-Direct CoF Project). These funds are not included in the CoF project budget and are furnished by the supporting Mission Directorate.

3.9.4 Integrated Systems Test (IST). This budget includes all costs for testing the construction of a new or major modification of an existing technical facility (e.g., ground test facility, data center). An IST usually involves installation of a test article or simulated load and subsequent testing of all installed or modified facility systems for the fully integrated operations specified in the design. These funds are not included in the CoF project budget and are furnished by the supporting Mission Directorate.

3.9.5 Full Disclosure of Activation Budget. The FPM shall identify the full activation cost requirements on NF 1509. Activation costs covered under the scope of a CoF project will be included within the engineering budget on the Facility Project Cost Estimate section of the NF 1509 and subsequently be captured in the project AFPCE. All activation costs not covered under a CoF project budget are to be identified in the “Other Related Costs” sections of these documents.

Chapter 4. Construction

4.1 Facility Project Construction General Requirements

4.1.1 General. The construction of Facility Projects referenced in this chapter will meet any of the following requirements:

a. Construction of new real property or the major modification or repair of existing NASA real property (excluding maintenance work) with an AFPCE equal to or greater than $100,000.

b. Construction contract documents designed by professional architects and engineers.

c. Implementing labor force payment in accordance with Pub. L. 107–217, the Davis-Bacon Act.

d. Requires construction expertise including but not limited to excavation; advanced rigging or the use of cranes and lifting devices; steel erection; concrete placement and finishing; carpentry; pipefitting; plumbing systems installation; HVAC systems installation; electrical power and lighting installation; and life safety and security systems installation.

4.1.2 Maintenance Projects. Maintenance projects are defined in NPR 8831.2. Maintenance projects are excluded from this NPR.

4.1.3 OCFO and RPAO Requirements.

a. OCFO requirements. For Facility Projects with an AFPCE of $500,000 or greater, the FPM shall complete form NF-1739 prior to generating any project purchase requests (e.g., contracted A/E services for a PER of Final Design) and submit the completed form to the Center OCFO’s property accountants and the RPAO. Refer to Section 1.6.1.4.

b. RPAO requirements.

(1) For Facility Projects with an AFPCE of $100,000 or greater, the FPM shall complete form NF-1046 upon completion of the construction activity per the requirements in NPR 8800.15.

(2) For new construction and major modification (including Institutional CoF Renewal), the FPM shall submit a completed NF-1046 to the RPAO at the time of issuance of Beneficial Occupancy and an updated form at the time of project financial completion.

(3) For Repair and Energy Projects, the FPM shall submit a completed NF-1046 to the RPAO at the time of project financial completion.

(4) In all cases, the NF-1046 should include the cost for PERs, final design, and all construction activities related to the project. In addition, the FPM will need to provide the project work breakdown structure (WBS) numbers for the project PER, final design, and construction phases and the total funding obligations for each of these phases. Refer to Section 1.6.1.5.

4.1.4 Required Construction Contractor Staff. As a minimum, a facility project construction contract will require a full-time, onsite project manager/superintendent and a full-time, onsite health and safety manager dedicated to the project.

4.1.5 Earned Value Management (EVM). EVM is a tool that offers the potential for early visibility

into the likelihood of cost/schedule problems. The Center CoF Program Manager and the FRED EPM (if applicable) will evaluate the candidate project and determine if EVM is to be utilized for any project with an AFPCE of $20 million or more or where there is significant development or technical risk as determined by FRED. Information on EVM can be found in Section 7.11 of NASA SP-2010-3403, NASA Schedule Management Handbook.

a. Resource-Loaded Schedule. A schedule that includes the estimated percentage of the total cost and time to complete each element of the construction contract. Typically, a construction contractor submits this schedule to the NASA CO for approval prior to starting the work. A resource-loaded schedule is an acceptable alternative to EVM when a construction contract is structured as firm-fixed-price procurement. If this option is selected, the construction contractor is required to submit a resource- loaded schedule for review and approval by the NASA CO prior to beginning work.

b. Integrated Baseline Review (IBR). Establishing an Integrated Baseline Review (IBR) is recommended in which the contractor and NASA's Facility Project Team meet for a detailed review of the EVM system that will be used to report on the project's progress, status, and cost.

4.2 Acquisition of Construction Contracts

4.2.1 Request for Construction Funding (the CECR, EUL, and/or NHPA). The Center CoF Program Manager shall submit documents for FRED review and approval via the FRED-approved database. Refer to Section 1.8.3.2. Upon approval of the documentation, a FRED Resource Analyst will issue funding to the Center in accordance with Section 1.8.3. For EUL and NHPA funding, refer to Section 1.8.8. Upon receipt of construction funds, Centers are authorized to advertise for contracted construction services.

4.2.2 Authority for Early Advertisement. For Institutional and Program-Direct CoF projects, Centers can request authority for early advertisement of construction contracts to meet aggressive schedule requirements, account for long-lead delivery items, or meet Agency funding obligation metrics. Refer to Section 1.8.10 for guidance.

4.2.3 Construction Contract Procurement Options. Centers will use the Agency's centralized or regionalized construction contracts to the largest extent possible. All such procurements need to be fully in accordance with NASA FAR Supplement (NFS) A-102.13 (Construction), and/or NFS A-102.14 (Architect-Engineering Services Not Associated with Environmental Remediation). Any procurement not fully in accordance with NFS A-102.13 and/or NFS A-102.14 need to include a deviation from the NFS approved in accordance with FAR 1.4 (Deviations from the FAR) and NFS 1801.4 (same subject). The deviation is required to be fully approved before the procurement can be advertised outside of NASA. In addition, FRED may require Centers to utilize external construction entities such as the General Services Administration (GSA) or the U. S. Army Corps of Engineers (USACE). The Center CoF Program Manager shall ultimately obtain approval from the assigned Agency CoF Program Officer on the method of construction.

4.2.3.1 Centralized or Regionalized Multiple Award Construction Contract (MACC). A MACC is a type of Indefinite-delivery Indefinite-quantity (IDIQ) contract, per the FAR, subpt.16.504, Indefinite- quantity contracts. MACC contracts are used to pre-qualify a group of contractors so that faster procurement timelines for individual construction contracts can be obtained. In accordance with FAR 19.502-4, Partial set-asides of multiple award contracts, MACC contracts typically require that a mix of large, small, and disadvantaged businesses be pre-qualified if determined

capable of performing the work. This includes 8(a) participants, HUBZone small business concerns, service-disabled veteran- owned small business concerns, economically disadvantaged women-owned small business concerns, and women-owned small business concerns.

4.2.3.2 Full and Open Competition. Full and open competition for Government contracts is a competitive process in which all responsible sources are permitted to compete, as outlined in FAR Subpart 6.1 – Full and Open Competition. Methods of full and open competition are described in FAR Subpart 6.102, and include sealed bids, competitive proposals, combination of competitive procedures (i.e., two-step sealed bidding), and other competitive procedures. Typically, a minimum of three bids is desired, and the contract is awarded to the lowest qualified bidder. The COR can use the Contractor Performance Assessment Reporting System (CPARS) to research qualified bidders.

4.2.3.3 Other Than Full and Open Competition. Contracting without providing for full and open competition is outlined in FAR Subpart 6.3 – Other Than Full and Open Competition. Other Than Full and Open Competition is used in rare cases when there may be only one contractor who can perform a task (i.e., specialized construction work that only one company can perform). The COR will assist the CO in preparing a Justification for Other than Full and Open Competition (JOFOC). Justification will be approved in accordance with FAR Section 6.304 Approval of the Justification (depending on the dollar value, it is not always by the Center's Chief Procurement Officer).

4.2.3.4 Center Service Contracts. If a Center service contract (e.g., Maintenance and Operations (M&O) contract, engineering service contract) is being considered for construction execution, the FPM shall consult with the Center CoF Program Manager and the CO/COR assigned to the contract during the final design phase. It is likely that these contracts do not contain the appropriate construction labor (per the Davis Bacon requirements) or have provisions within their contract to provide the necessary construction services, nor have the appropriate construction contract clauses for such details as schedules of values or invoice breakout.

4.2.4 CO. The CO is responsible for awarding all contracts and subsequent modifications, in addition to contract administration of those awards. The CO is ultimately responsible for ensuring compliance with the FAR, NFS, Agency-specific clauses, and all applicable terms and conditions of the contract.

a. The CO is the only person with authority to obligate the Federal Government in acquiring and executing contracts.

b. The CO shall provide direction for the required content of the acquisition package; however, at a minimum for design-bid-build contracts, the package includes a Government cost estimate, the design documents, and either funds or a planning purchase request with the funds source identified.

c. For design-build procurements, the minimum acquisition package includes a Government Cost Estimate, a requirements document, and a contractor selection and evaluation plan.

d. The CO shall issue Notice to Proceed (NTP) to the Contractor after the contract is awarded. In some cases, two NTPs can be issued: one to initiate contractor-provided submittals (e.g., site-specific health and safety plans, construction schedules, schedules of values) and one to initiate work in the field.

4.2.5 COR. The COR has delegated authority from the CO and serves as the technical advisor to the CO and the Contractor (but does not have contractual authority). Frequently, the FPM may be designated as the COR with a Delegation of Authority Letter (NF1634) executed by the CO. During contract acquisition, the COR responsibilities include:

a. Ensuring that all contract acquisition activities conform with the Project Management Plan.

b. Reviewing technical aspects of proposals and helping establish the relevance of contractor past performance to the requirements of the contract.

c. Assisting the CO in the review of cost proposals.

4.2.6 NASA Form 1579, Flash Bid Report requirement. The FPM, in conjunction with the Center CoF Program Manager, shall prepare and submit an NF 1579 to the assigned Agency CoF Program Officer for all Institutional and Program-Direct CoF Projects (MCR and Discrete). This submission occurs immediately following the construction bid evaluation process and the CO's acceptance of the bids as responsive.

4.3 Construction Implementation and Administration

4.3.1 Preconstruction Meeting (post award). A preconstruction meeting is required for all NASA construction projects. All construction projects require a thorough understanding of processes and procedures and the roles and responsibilities of key project individuals. General items of discussion should include the following:

a. Introductions of key individuals (NASA and Contractor) and their roles during the construction project.

b. General overview of the project.

c. Details on how the contract will be administered. In some cases, contract administration services can be purchased from the A-E firm that performed the final design. If this is the case, the project AFPCE will include the budget for these services.

d. Overview of the site plan including identification of contractor trailer locations, material and equipment lay-down area, and provisions for temporary power.

e. Construction site access requirements and contractor security badging.

f. Code compliance and construction inspection procedures and guidelines.

g. Third-Party quality assurance inspection procedures and guidelines.

h. Environmental requirements and coordination.

i. Site-specific safety requirements and coordination.

j. Management of submittals and Requests for Information (RFIs).

4.3.2 Partnering. During the administration of the construction contract, the COR shall establish a formal Partnering program for all facilities projects with an AFPCE of $20 million and greater, as required by Partnering, NFS subpt.1836.70; 48 CFR Chapter 18; and Construction of Facilities: NASA Partnering Desk Reference. Partnering is a formal management process in which all parties involved in a construction project voluntarily agree at the outset to adopt a cooperative, team-based approach to project development and problem resolution to reduce or eliminate conflicts, litigation, and claims. The FRED EPM (if applicable) or other FRED representative will participate in the partnering process. In addition, a representative from the A-E firm that performed the final design

should be involved in the partnering session.

4.3.3 Safety and Compliance. Construction work will be subject to inspection by Center-designated personnel, Center Institutional Safety Discipline Leads, and designated third-party agencies. Construction work will be subject to inspection by Center designated personnel, Institutional Safety Institutional Safety Discipline Leads, or designated third party agencies. Construction inspections should validate the implementation of design and compliance with applicable codes and standards identified in the Building Code Summary in accordance with NPR 8715.1. Nonconformances identified during these inspections will be identified to the COR and CO to implement corrections.

4.3.4 Construction Safety Roles and Responsibilities. The contractor's onsite supervisor and the contractor's onsite health and safety manager are responsible for construction site safety. The contractor's employees are responsible to plan and perform their work activities in a way that creates a safe and healthy work environment. The contractor will submit a site-specific HASP that includes an accident prevention plan (Accident Prevention, FAR § 52.236-13). The CO and COR have overall contractual authority on all safety matters. The COR has the authority to review and approve/disapprove the contractor's accident prevention plan, hazard analyses, lift plans, dig permits, and other construction documentation. The function of the Center's Institutional Safety Discipline Leads is to provide independent review of the implementation of contract health and safety requirements. These Discipline Leads communicate their observations of concern to the COR. The COR will evaluate the concern and coordinate with the contractor's onsite supervisor, as necessary. This section outlines approaches to contractual communication with the performing contractor, but in no way limits the authority of the Center's Health and Safety Office in executing Institutional Safety Authority. Matters relating to the contractor's impact to the onsite civil servants and NASA contractors as part of a multi-employer worksite are still managed under Institutional Safety Discipline Leads. In addition, the Center Health and Safety Office, along with any NASA employee (contractor or civil servant), maintains stop work authority when an observed construction activity creates an apparent threat to personnel, equipment, or property.

4.3.4.1 Site-Specific HASP. The Contractor will submit the site-specific HASP shortly after contract award. This plan will be formally approved by the CO prior to starting any onsite activities. Refer to Accident Prevention, FAR § 52.236-13, NPR 8715.1, and NPR 8715.3.

4.3.4.2 Fire and Life Safety Systems. All fire and life safety systems will be tested at the completion of installation and subject to witnessing and acceptance by the AHJ.

4.3.5 Sustainability. In accordance with Section 1.11, NASA's construction contract documents will specify the sustainability requirements for a project including conformance to the Guiding Principles and a third-party certification requirement.

4.3.5.1 NASA Responsibilities. Typically, NASA provides third-party commissioning oversight services under a separate contract. The cost for these services needs to be included under the project AFPCE. (See Appendix D.)

4.3.5.2 Contractor Responsibilities. The contractor is responsible for implementing sustainability requirements and the associated documentation required for the applicable third-party certification system to meet certification requirements for all sustainable building credits as identified in the Design Checklist for this project.

a. The Contractor will submit documentation for approval for all sustainable building credits.

b. The Contractor will submit all backup documentation required to meet credit requirements of

each sustainability credit, so the Owner's certification application is approved.

4.3.6 Construction Administration Services. Professional services are required to process the large amount of information submitted by the prime construction contractor to the Government. This includes material and equipment submittals that require review in accordance with the requirements of the contract drawings and specifications and subsequent approval. In addition, formal RFIs are submitted by the contractor to the Government throughout the construction period that require review and written guidance. For large projects, NASA will often establish a separate contract for these professional administrative services with the A-E firm that performed the final design services. The cost for these services should be accounted for in project AFPCE.

4.3.7 BIM. Refer to sections 2.2.19.3 and 3.5.6. For projects that include a BIM model as part of the final design deliverables, the FPM shall include requirements within the construction contract for the contractor to maintain the BIM model throughout the construction process. The construction contractor should be directed to incorporate any field changes or adjustments made during the construction phase and return the model to the Government at the end of the contract such that it reflects as-built conditions.

4.4 Construction Contract Oversight

4.4.1 General. During the execution of the construction contract, NASA provides oversight of the construction contractor to ensure conformance with the terms, conditions, and requirements of the contract including drawings and specifications, compliance with the schedule, implementation plan, etc. This includes managing costs for unforeseen field conditions, design errors and omissions, and minor scope changes within the available contingency. These oversight services are provided collaboratively by the CO, the COR, and contracted individuals funded with the project's allocation for SIES. The funding allocation for SIES is included in the AFPCE for the project. (Refer to Appendix D.)

4.4.2 Role of the COR in construction oversight. The COR will act as the formal liaison between NASA (Facility Project Team, customers, and other stakeholders) and the construction contractor.

However, only the CO has authority to direct the construction contractor or make decisions that could obligate the Government. Typical COR construction oversight duties include, but are not limited to:

a. Managing the A-E construction administrative services contract and ensuring the timely delivery of approval submittals and answers to RFIs to the construction contractor.

b. Ensuring that all required permits are received prior to starting work and signed off upon completion.

c. Collaborating with the contracted construction management services (funded under SIES) daily and reviewing status reports and inspections logs.

d. Overseeing construction progress including comparing the progress of the work in the field with the contractor's schedule of values. If EVM is implemented, the COR oversees this process and coordinates with the contractor's EVM specialist.

e. Processing contractor requests for payment (in concert with the CO).

f. Managing the technical review of contractor change requests and assisting in the development of the associated Government Cost estimates. Assisting the CO in executing relevant changes in official contract modifications.

g. Ensuring that contractor-led safety briefings (i.e., “toolbox meetings”) occur in accordance with the contractual requirements.

h. Attending weekly construction status meetings and ensuring that the contractor is capturing all field changes by redlining the construction drawings.

i. Collaborating with the third-party sustainability contractor and monitoring the required checklists.

j. Upon construction completion, ensuring that all sustainability check-sheets and other required information is submitted to the third-party entity (LEED, Green Globes) to obtain formal certification.

k. Aiding in the establishment of a formal punch-list and ensuring that all items are addressed by the construction contractor.

l. Collaborating with the Center’s AHJ to obtain occupancy certification (and establish Beneficial Occupancy).

m. Ensuring that the construction contractor is maintaining equipment that has been installed under the construction project, yet not officially turned over to the Government, to ensure that the expected manufacturers’ recommendations are followed to avoid warranty issues.

4.4.3 Role of contracted construction management services (funded by SIES). Depending on the size of the project, construction management services can range from a team of individuals (construction engineers, managers, schedulers, quality assurance personnel) to a few quality assurance inspectors. Hence, the scope of required services varies in accordance with the size of the project. Typical construction management duties include:

a. Providing oversight of construction contract performance in the field to ensure compliance with the drawings and specifications.

b. Serving as a Subject Matter Expert (SME) to the COR.

c. Preparing daily status reports and inspection logs.

d. Collaborating with the construction personnel on any unforeseen field conditions and/or design errors or omissions and communicating these issues to the COR.

e. Providing oversight on any design changes resulting from Government responses to RFIs to ensure that they are being executed accordingly in the field.

4.5 Construction Closeout

4.5.1 General. For construction commissioning requirements, outfitting, punch list activities, and requirements for project turnover to the Center’s M&O function, refer to Chapter 5, Activation.

4.5.2 Certificate of Occupancy (or Beneficial Occupancy). For the construction of new buildings or the major modification of existing buildings, a Certificate of Occupancy, issued by the AHJ, is required prior to building occupancy in accordance with NASA-STD-8719.11, Section 6.6. This

certificate will be issued upon completion of all inspections (resulting in no violations of the applicable codes) and after all fire and life safety systems have been tested and accepted.

4.5.3 Construction Contract Records Retention. The FPM and the CO will ensure that all records associated with the construction contract are retained in accordance with NPR 1441.1.

Chapter 5. Activation

5.1 Activation Definition

5.1.1 Activation is the portion of the facility project execution process that follows substantial completion of construction and precedes project turnover to the Center's M&O organization. Activation includes activities funded under the CoF project AFPCE Appendix E, M&O turnover requirements and activities funded by sources other than CoF (installation of non-CoF outfitting items, personnel moves, STE purchase and installation, and subsequent ISTs if required for technical facilities). Activation costs, regardless of fund source, will be identified on form NF-1509. The completion of the activation phase should demonstrate that the project has produced assets that are functional and operable.

5.1.2 Stakeholders. The Facility Project Team and all other stakeholders that were involved during the planning, design, and construction phases should be involved during the activation phase.

5.1.3 Activation budget. The activation budget should be as originally identified in the Function Requirements Document.

5.1.4 Activation Plan. The FPM should develop an activation plan for all Facility Projects. The following are typical components of an activation plan:

a. Installation of non-collateral and ground support equipment (both CoF funded and non-CoF funded). This includes furniture design, purchase, and installation (conventional, modular, and systems as applicable).

b. Subsystem testing (list each subsystem, include test limits and the PT&I technology to be used by the Center's M&O personnel following acceptance.

c. STE acquisition and installation plan (for projects involving technical facilities).

d. IST plan (for projects involving technical facilities) and safety/health plan review.

e. Operational readiness review (for projects involving technical facilities).

f. M&O services startup plan and anticipated M&O contract changes required for maintaining newly installed systems following Beneficial Occupancy (See Sect 5.5).

g. Final facilities construction contract closeout including punch list completion and the submission of construction contractor red-line drawings (or updated, as-built BIM model). In addition, plans for generating formal as-built drawings from the contractor-furnished red-line drawings.

h. Training plan for all newly installed related personal property/collateral equipment and systems (provided to the onsite M&O contractor by the construction contractor).

i. Testing and verification of newly installed systems, including communications systems, equipment control systems, HVAC, lighting, life safety systems, automated external defibrillators (AEDs), and physical security systems.

j. Personnel move-in plan and schedule.

k. Post-occupancy activities including, but not limited to, verification of the energy model (if applicable), energy efficiency verification vs. estimated, building health monitoring, and effectiveness of white-noise systems.

5.2 Commissioning

5.2.1 General. Commissioning is a quality process emphasizing procedures to ensure that systems are designed, installed, functionally tested, and capable of being operated and maintained to perform in conformity with the owner's project requirements. As required by ASHRAE Guideline 0, The Commissioning Process, ASHRAE, commissioning is required on all new construction and major modification projects and also on the installed items and associated systems of all other Facility Projects. Commissioning should occur prior to issuing Beneficial Occupancy.

5.2.2 Third-party building enhanced commissioning. In accordance with Section 1.11.2, Sustainability Certifications, enhanced commissioning is to be accomplished in accordance with the requirements of either LEED v4 for Building Design and Construction - current version, U. S. Green Building Council (USGBC) or Green Globes® for New Construction (NC), Green Building Initiative.

5.2.3 Commissioning Agent. A third-party commissioning agent is required to monitor the construction activities to ensure compliance for a minimum USGBC LEED Silver or a GBI Green Globes – two Green Globes certification. This agent is to be a third party employed by NASA and not an agent of the construction contractor.

5.2.3.1 Funding for the Commissioning Agent should be budgeted and be part of the AFPCE for construction.

5.2.3.2 Accreditation. The Commissioning Agent is required to have an industry accreditation (e.g., Building Commissioning Association, American Air Balance Council Commissioning Group) and be certified for either USGBC LEED Green Building Design and Construction or GBI Green Building Initiative.

5.2.4 Seasonal Testing. Commissioning should include seasonal testing requirements for conditions that may not be present at the actual time the commissioning is conducted.

5.3 M&O Turnover Requirements

5.3.1 During the activation phase, the FPM and COR will ensure that the construction contractor furnishes the Center's M&O organization with the proper information to take ownership of all installed equipment and systems. This information should be in an electronic format to enable ease of uploading into the Center's CMMS. Construction contractor M&O turnover requirements should include, but are not limited to, the following:

5.3.1.1 Red-lined construction documents. Red-line drawings (hard copies or in electronic format) that reflect any field changes made during the construction phase should be submitted to the COR. NASA will then issue the red-lined drawings to another contracted drafting entity to create as-built record drawings. If a BIM model was furnished by NASA at the start of construction, the contractor will modify the model to reflect any field changes and submit the as-built BIM model in an electronic format to the COR.

5.3.1.2 Tagging of installed equipment. All installed assets should be tagged with asset numbers as instructed in the contract documents. Asset tag numbers and asset information furnished by the construction contractor will be loaded by NASA (or by the onsite M&O contractor) into the Center's CMMS.

5.3.1.3 Asset Preventative Maintenance Instructions. Preventative Maintenance instructions for installed/tagged assets and associated vendor catalog information should be turned over to NASA in an electronic format to enable uploading into the Center's CMMS (by NASA or the onsite M&O contractor).

5.3.1.4 M&O Training. Training to onsite M&O personnel on all newly installed facility systems, related personal property/collateral and non-collateral equipment. Training should include live, onsite formal training that includes the distribution of written and/or electronic document files. Sessions should be videotaped for future training of M&O personnel not available during the live training opportunities.

5.3.1.5 Warranties. Any equipment or system (including roofs) warranties will be transferred to the COR. The COR will then be responsible for transferring warranty information to the on-site M&O contractor and for uploading into the Center's CMMS.

5.4 Completion and Acceptance of Installed Systems

5.4.1 The COR will ensure that all inspections and tests are performed for equipment and installed systems to validate compliance with M&O requirements identified in the FPMP (see Section 2.2.7) and the NASA Reliability Centered Building and Equipment Acceptance Guide.

5.5 Beneficial Occupancy

5.5.1 For new building construction or major modification of existing buildings, formal issuance of beneficial occupancy is required. With the approval of the CO, the Center's AHJ will visit the site and verify if all installed life safety and security systems comply with required codes and that there are no safety hazards to personnel. Once the evaluations are completed, the AHJ should issue a formal document of beneficial occupancy or certificate of occupancy. Beneficial occupancy could be approved for full personnel occupancy or for "partial" occupancy of the site. Taking beneficial occupancy does not absolve the construction contractor from completing all contractual agreements. For these types of projects, the FPM should submit the NF-1046 to the RPAO at the time beneficial occupancy is approved.

5.6 Facility Outfitting

5.6.1 General. Outfitting is the process of equipping a facility for its intended purpose during activation and is typically required for personnel occupancy. Refer to Appendix E for guidance on outfitting that is covered under the project AFPCE and outfitting that is furnished with other funding. The FPM should coordinate all outfitting activities with the Center's FUO.

5.6.2 Outfitting includes, but is not limited to, the following:

a. Non-collateral equipment purchases and installation including conventional, modular, and/or

systems furniture purchase and installation.

b. Communications and data systems purchase and installation.

c. Audio-visual systems purchase and installation.

d. Electronic security systems purchase and installation.

e. Personnel moves.

5.7 Post-Occupancy Evaluation

5.7.1 Following, a period of occupancy of a new facility (usually one calendar year), a post-occupancy evaluation should be conducted by an independent entity. Subject to availability of funds, FP&D or I&TC funding for this review will be provided by FRED. This evaluation should include:

a. Surveys of all occupants.

b. Functional performance reviews of the building and support systems.

c. Evaluation of Facility Project Team experiences in gaining sustainability certification (LEED or Green Globes, as applicable).

d. Sustainability lessons learned.

e. Annual potable water usage vs. predicted.

f. Annual energy usage vs. that predicted from the final design energy model. This should include evaluation of all utilities such as electricity, natural gas, steam (if provided from an external centralized source) and chilled water (if provided from an external centralized source).

g. Comparison of the building and support system performance to industry averages (utility usage, survey results).

Chapter 6. Demolition/Deconstruction

6.1 NASA Demolition Program Objectives

6.1.1 Demolition Program. The following are the Agency's Demolition Program objectives:

a. Eliminate underutilized and obsolete facilities that are no longer required for NASA's missions.

b. Eliminate inactive facilities identified as "abandoned" in NASA's Real Property Management System (RPMS) that pose a safety and/or environmental liability to onsite personnel and neighboring entities.

c. Ensure that NASA's field Centers comply with Federal mandates and NPD 8820.2 requirements to reduce total square footage and total Current Replacement Value (CRV).

d. Reduce the cost of ownership of NASA facilities by eliminating nonproductive operating and maintenance expenses.

6.1.2 Consolidation Program. This is a program consisting of projects that relocate one or more functions (e.g., personnel, equipment, storage spaces, laboratories) from NASA-owned buildings that will be demolished to underutilized spaces in another NASA-owned buildings that are planned to remain active. The Consolidation Program scope includes the demolition of the vacated building(s) and the modifications (improvements, rehabilitation, reconfiguration) of the receiving building(s). The Consolidation Program is a subset of the Agency's Demolition Program.

6.2 Key Personnel

6.2.1 ADPM. The ADPM resides within FRED and has duties as defined in Section 1.5.2.4.

6.2.2 CDPM. Each of the 10 Centers will have a designated CDPM with duties as defined in Section 1.5.3.2. The CDPM also will be responsible for managing the Demolition Program for any of the Center's component facilities.

6.2.3 Others. Execution of the Demolition Program requires close coordination with other key individuals including the Center Cultural Resource Manager (CRM), the CNM, the FUO, the RPAO, the Center Property Disposal Manager (for tagged equipment), the Center Master Planner, the Center AHJ, and the Center Institutional Safety Discipline Leads.

6.3 Agency Disposal List

6.3.1 Candidate properties for future disposal are initially compiled at the Center level by CDPMs, RPAOs, FUOs, and Master Planners. In addition, Agency Portfolio Managers should be consulted regarding candidate facilities and equipment to be considered for disposal, per NPR 8600.1. The Center's Facility Utilization Review Board (FURB), as defined in NPR 8800.15, then will review the initial list and approve which properties are to be submitted to FRED. An Agency governance council (per NPD 1000.3, The NASA Organization) will then review and approve the candidate properties for inclusion in the Agency Disposal List. RPAOs will identify these properties in the

RPMS by entering an anticipated disposal date.

6.3.2 Candidate properties. Properties on the Agency Disposal List may include the following:

a. Disposals mandated by an Agency governance council.

b. Offsets to new acquisitions.

c. Abandoned facilities as defined in the RPMS.

d. Disposals identified in the AMP and the approved Center Master Plan.

e. Facilities irreparably damaged in natural disasters.

f. Other planned disposal actions (e.g., termination of leases, transfers, sale).

6.3.3 Centers may request the removal of facilities from the Agency Disposal List by submitting a letter, signed by the Center Director, to the Director of FRED. The letter needs to include compelling reasons that show such disposal would adversely affect the Agency's mission. Conditions for approving properties for removal from the list include:

a. Properties mandated by the Agency governance council. Centers will seek approval for removal of the property from the Disposal List by the same Agency governance council that originally mandated the disposal.

b. Properties identified in the approved Center Master Plan. The Center Master Plan will be updated and reviewed/approved by the Agency governance council according to a cycle defined in NPR 8810.1.

c. Property disposal offsets for new acquisitions. The Center Director will identify other disposal offsets of equivalent or greater footprint than the originally proposed disposal property or of a CRV equal to or greater than the originally proposed disposal property.

d. Properties identified as "abandoned" in the RPMS. The Center Director will identify an alternate facility sustainment method (e.g., funding for M&O and repairs for the anticipated life of the facility and

for the ultimate facility demolition provided by organizations other than NASA's Office of Strategic Infrastructure).

e. Properties irreparably damaged in natural disasters. These properties cannot be removed from the Agency Disposal List.

6.4 Sustainment of Abandoned Facilities

6.4.1 Once facilities are identified as "abandoned" in the RPMS, they will be physically secured in accordance with the criteria specified in NPR 8800.15 until demolition. The Center AHJ will determine the level of maintenance required for abandoned facilities (e.g., preventative maintenance of life safety systems, fire suppression systems, security systems) to minimize risks to personnel and surrounding facilities. Execution of the physical security measures are usually performed by the Center's Maintenance and Operations organization.

6.5 Approval of Facility Demolition

6.5.1 The CDPM will begin preparing for demolition by ensuring that alternatives to demolition are properly explored and that the required Center approvals are obtained.

6.5.1.1 Candidate properties for demolition need to be evaluated for alternative use in accordance with the McKinney-Vento Homeless Assistance Act, 42 U.S.C. § 11301 et seq. The CDPM and the RPAO shall submit a draft of the Title V – Property Survey, Federal Property Information Checklist to FRED via the FRED-approved database. FRED will then submit the document to U.S. Department of Housing and Urban Development (HUD) for review/approval. HUD will inform FRED if the property is to be considered for alternate use or if property disposal can commence. For more information, see NPR 8800.15.

6.5.1.2 Candidate properties for demolition are to be evaluated for historic eligibility according to NHPA, 54 USC § 300101 and per NPR 8510.1. If deemed historic, the CDPM will conduct an analysis to evaluate alternatives to demolition, including adaptive reuse of the property, and submit the analysis to the Center CRM to include in consultation materials. Demolition may not begin until the Center CRM has confirmed completion of the NHPA, Section 106 review process (see Section 2.2.7).

6.5.1.3 Upon completion of the evaluation of demolition alternatives, the CDPM and the RPAO shall submit a formal Authority to Dispose/Demolish letter to the Center Director for signature. This signed letter will then be issued to the Director of FRED in accordance with the requirements outlined in NPR 8800.15, Disposition of Real Property.

6.5.1.4 Existing facility demolition projects required to offset the amount of new building footprint constructed from an Institutional CoF Renewal project or a Program-Direct CoF project will be at least 25 percent greater than the area in square feet of the new facility (per NPD 8820.2 requirements). Demolition offsets should be clearly identified in the Center Master Plan.

a. The cost of demolition of these offset facilities will be included in the Renewal (or Program-Direct) project’s AFPCE and identified in the Renewal (or Program-Direct) project’s business case.

b. The approval and documentation requirements for these demolition offsets are the same as any demolition project (refer to Section 6.5.1).

c. On a case-by-case basis, the use of Institutional CoF Demolition Program funds may be allowed to demolish these offsets upon approval of the Director of FRED via the formal submission of a waiver document.

6.6 Demolition and Consolidation Project Data Call

6.6.1 In accordance with the NASA PPBE cycle, the ADPM will issue a formal call to the Centers each year for candidate demolition and consolidation projects and for the development of an Agency five- year Demolition Plan. Mission Directorate POCs and Agency Portfolio Managers also will be copied on this data call. The CDPM will respond to the data call by uploading the required data in the FRED- approved database. (See Appendix H for required data call deliverables).

6.6.1.1 The annual data call includes a Demolition Prioritization Procedure Document, which

provides a process for how Centers will submit candidate demolition projects and the criteria used by the FRED to prioritize the submitted projects to maximize the use of limited resources.

6.6.2 The five-year Demolition Plan, a subset of the Agency Disposal List (see Section 6.3), is the near- term disposal strategy for the Agency's Demolition Program. This plan, which is updated annually, identifies all facilities that can be demolished within a specified five-year window regardless of demolition funding source. The CDPM shall identify the earliest demolition date for candidate projects within the five-year period and identify any schedule constraints. In addition, the following information should be included for each candidate facility:

a. Measured gross area (square feet).

b. CRV.

c. M&O cost.

d. Earliest demolition year.

e. Demolition/Disposal Cost.

f. Demolition project score (according to the criteria issued in the Demolition Prioritization Procedure Document).

6.6.3 Other Required Documents. For projects to be executed in the first year of the five-year Demolition Plan, the CDPM shall submit a project narrative, form NF-1509, the Approved Authority to Dispose/Demolish Letter, and the HUD Screening Documentation via the FRED-approved database. For projects demolishing properties with a CRV greater than $20 million, additional documentation may be requested by the ADPM. Consolidation projects require the completion of a worksheet that includes quantitative and qualitative measures for project advocacy.

6.7 Demolition Execution

6.7.1 FPMs for Demolition projects will use NASA's centrally established U.S. Army Corps of Engineers (USACE) demolition services or regional multiple award construction contracts (MACCs) to the largest extent possible in lieu of procuring individual contracts.

6.7.2 The CPDM shall utilize the Demolition Planning Checklist (see Appendix G) to create a Demolition Project Management Plan.

6.7.3 Demolition funding requests.

6.7.3.1 Design Funding. One to two years in advance of the year of execution, the CDPM may request Demolition Program funding for the design of demolition projects. This is accomplished by submitting form NF-1509 in the FRED-approved database.

6.7.3.2 Demolition Funding. The CDPM shall request funding for the demolition of facilities by submitting updated form NF-1509 in the FRED-approved database and other documentation as identified by the ADPM.

6.7.4 Environmental and Cultural Resource Planning and Compliance. Demolition projects will comply with the same requirements as other Institutional CoF projects. Refer to Section 2.2.8, Environmental Compliance and Cultural Resource Requirements.

6.7.4.1 All disposals/demolition require the FPM to coordinate with the CNM and the CRM as early as possible in formulation to ensure that all environmental requirements are met.

6.7.4.2 The FPM shall complete an Environmental Checklist, as detailed in Chapter 2, to ensure compliance to NEPA, NHPA, and other environmental compliance requirements.

6.7.5 Prior to implementation, the FPM will ensure an evaluation is conducted to review the operational history of the real property to identify potential environmental issues and risks, including identification of hazardous substances (e.g., asbestos, lead, mercury) for removal as part of the disposal process.

6.7.6 Salvage Material Inventory/Diversion Plan. The FPM will ensure that the demolition contract documents clearly identify all potential salvage materials (e.g., materials such as steel or copper that can be sold) associated with the project. The Government cost estimate should include the salvage values of these materials and account for how this will offset the total cost of demolition. The demolition contract documents should also ensure that any all-other recyclable materials are identified (e.g., those materials that are not of salvage value). One of the primary goals of the Government is to minimize the amount of material going to a landfill.

6.7.7 Pollution Prevention and Hazardous Material Abatement Plan. The FPM will ensure that pollution prevention and hazardous material abatement/remediation issues are addressed as part of decommissioning. Potential environmental risks associated with the work could include, but are not limited to, the following:

a. Hazardous waste disposal.

b. Run off/erosion.

c. Underground storage tank systems.

d. Damage to wetlands.

e. Modification of floodplains.

6.7.8 Twelve to twenty-four months before the start of demolition execution, the CDPM or FPM will develop a Personal Property Reuse Plan that ensures all tagged equipment, personal property, and other artifacts within the facility to be reused, excessed, and/or demolished are clearly identified and cataloged. This activity requires coordination with the CRM, the Center Property Disposal Officer(s), and Mission Directorate POCs to whom the personal property is assigned. Disposal of this property needs to conform to NPR 4300.1, NASA Personal Property Disposal Procedural Requirements.

6.7.9 The CDPM or FPM will ensure that demolition impacts to utilities, roads, other facilities, and security are investigated and evaluated a minimum of 24 months prior to the start of execution. Demolition of a facility may remove either the supply of or the demand for essential services (e.g., domestic water, natural gas, roads, parking lots), requiring modifications to associated systems. Fire and Safety Systems decommissioning need to be coordinated and approved by the AHJ.

6.7.10 The CDPM or the FPM shall ensure that a Safety Baseline Survey that conforms with NPR 8800.15, Chapter 7 is performed as part of the decommissioning process.

6.7.11 Twelve months prior to the start of demolition, the CDPM or the FPM shall communicate information about the proposed demolition and the associated impacts to Center stakeholders.

6.7.12 The CDPM, in consultation with the ADPM, will consider using the Agency's centralized contract services for the execution of demolition. If this is not a cost-effective option, alternative contract services can be obtained as defined in Section 4.2.

6.7.13 Upon completion of a demolition project, the FPM shall submit form NF-1046 to the RPAO. For partial demolition projects, the FPM will need to include the details of the portion of the property that was demolished and the cost for the demolition. The FPM will consult with RPAO on when to consider issuing the NF-1046 based on the disposition and percent completion of the property.

6.8 Disposal Incentives

6.8.1 The Director of FRED can incentivize disposals by rewarding Centers with demonstrated success, progress, and commitment to their planned disposals. Incentives may include the following:

a. Allocation of additional CoF funds to be applied toward approved local authority projects.

b. Allocation of additional demolition funds to be used toward other approved demolition projects.

c. Use of Institutional Demolition funds for the following costs:

(1) Demolition of offsets for new acquisitions.

(2) Modification of existing spaces to accommodate displaced functions (personnel, equipment, storage, laboratories, or other). This is addressed via Consolidation Projects.

(3) Relocation and reactivation of utilities and related personal property/collateral equipment.

(4) Adaptive Reuse studies. Adaptive Reuse is defined as the "process of repurposing existing buildings for uses other than those they were built or designed for while retaining their historic features".

6.8.2 Centers demonstrate their demolition success, progress, and commitment by the following:

a. Conformance to the master planning Affordability policy.

b. Compliance with the most current AMP footprint reduction plans.

c. Completion of a "dispositioning review" within the last five years with the results of that review incorporated into the Agency Disposal List.

d. Achieving 95 percent or greater demolition program obligation for the FY prior to the FY under consideration. Using the Agency Disposal List as the basis, achieving either/or:

(1) 95 percent or greater achievement of planned square footage disposal for facilities measured in square feet.

(2) 95 percent or greater achievement of planned CRV reduction for facilities not measured in square feet.

Chapter 7. Facilities Investments by Others

7.1 Purpose and NASA Goals

7.1.1 Non-NASA Funded Construction. NASA has traditionally allowed other Federal Government agencies and commercial entities to operate in or on NASA facilities under formal real estate agreements. When Federal and commercial entities desire to fund either modifications to existing NASA property or construction of new buildings and facilities on NASA-owned property, these actions need to be documented within the real estate agreement and approved by FRED. This chapter provides references to the appropriate property accounting and real property policies and provides guidance regarding modifications or new construction desired by non-NASA entities. Mission Directorate POCs, Agency Portfolio Managers, Center CoF Program Managers, FPMs, RPAOs , COs, and Real Estate Contracting Officers (RECOs) shall ensure that the requirements of this chapter are included in real estate agreements that include construction activities. In this chapter, the term “others” includes Federal or commercial entities that have established a real estate agreement (e.g., lease, enhanced use lease, license, or permit) to access, use, or alter NASA-owned property.

7.1.2 Compliance to NASA policy. All facilities constructed on NASA-owned or -managed property need to comply with requirements of this NPR regardless of the funding source used for construction.

7.1.3 New facilities constructed by others. The NASA personnel involved in developing real estate agreements shall stipulate that new facilities constructed by tenants on NASA-owned property will be demolished upon expiration of the agreement. In this case, compliance with this NPR ensures that constructed entities will be deconstructed or demolished in a manner that maximizes material recycling and equipment reclaim/reuse to minimize wastes deposited to landfills. However, there are instances where NASA will assume ownership of the new facility upon completion of the interests and term of agreement. Compliance with this NPR ensures that NASA receives property that is energy efficient and sustainable according to current codes and industry standards, environmentally responsible, accessible to all, maintainable, and provides a healthy and safe working environment.

7.1.4 Major modification of existing NASA-owned facilities by others. Real estate agreements typically stipulate that NASA-owned properties that have been modified by the tenant be returned to their original condition upon expiration of the agreement. However, there are instances where the modifications are of benefit to NASA’s missions. Compliance with this NPR ensures that modifications are energy efficient and sustainable, environmentally responsible, accessible to all, maintainable, and provide a healthy and safe work environment.

7.2 Real Estate Agreements Involving Construction

7.2.1 Federal Partners/Tenants. Real estate agreements will conform with the requirements of NPR 9090.1, Partnership Agreements – Financial Requirements and Administration. Partners/tenants will establish a reimbursable cost model as required by the Economy Act and use the Estimated Price Report (EPR) to identify facility investments to be executed by any funds source. All modifications and new construction to be capitalized require the submission of form NF-1509 to FRED by the Center’s CoF Program Manager.

7.2.2 Non-Federal Partners/Tenants. Real estate agreements will conform to the requirements of NPR 9090.1. Partners/tenants will establish a reimbursable cost model per the Space Act, identifying facility investments to be executed as specified within the Estimated Price Report (EPR) and other accounting and financing methods for all construction executed regardless of funding source. All modifications and new construction to be capitalized require the submission of form NF-1509 to FRED by the Center's CoF Program Manager.

7.2.2.1 Real estate agreements with non-Federal partners/tenants will require acknowledgment that the property, including major modification of existing facilities and the construction of new facilities, is subject to, without limitation, state and Federal laws and regulations and NASA-specific policy directives.

7.2.2.2 Real estate agreements with non-Federal partners/tenants require acknowledgment that said laws, regulations, and policy directives regulate and police, without limitation, physical and cyber security, preservation of designated historical sites, environmental concerns, Federal Aviation Administration compliance, and FEMA compliance. As such, non-Federal partners/tenants exercise of Real Estate Uses and Agreements may sometimes be delayed, limited, modified, or denied due to overriding legal, regulatory, or policy concerns.

7.3 Major Modifications and New Construction by Partners/Tenants

7.3.1 General. Major modifications of existing NASA-owned property and the construction of new facilities on NASA-owned land executed by a partner/tenant will be considered a lease-hold improvement. These activities, as clearly defined in the real estate agreement, will comply with Federal, state, and local environmental and cultural resource preservation laws and regulations, as well as NASA environmental and cultural resource preservation policies identified in this NPR. Agreements will include language identifying the roles and responsibilities for NEPA, NHPA (if applicable), and Environmental Due Diligence (EDD) compliance. New construction or major modifications to any NASA-owned real property, with an AFPCE more than the MRC CoF threshold will not be undertaken without prior approval of the Director of FRED or their designee.

7.3.2 Federal Tenant/Partner Funding for Infrastructure. Federal partner/tenant that desire to fund infrastructure projects on NASA-owned property will ensure that Congress has provided appropriations for this purpose and that the Federal partner/tenant has authority to execute the project. Therefore, the FPM or the Center CoF Program Manager should request this information from the Federal partner/tenant and the real estate agreement should include language that clearly identifies the responsibility of the funding agency as related to these appropriations.

7.3.3 Emissions. Real estate agreements will clearly indicate that the partner/tenant may not execute any construction activities that will create, change, or increase any emission of wastewater, air emissions, hazardous wastes, or other uniquely regulated waste streams without the prior written approval of the Center's Environmental Organization.

7.3.4 Property retained by NASA. NASA out-grants may authorize the partner/tenant to make capital modifications to NASA-owned real property assets or construct new assets on NASA-owned property. In these cases, the out-grant should require the partner/tenant to record all costs associated with the modification or new construction. The FPM or the Center CoF Program Manager will then use this information to submit form NF-1509 to FRED and the RPAO. If NASA wishes to retain the

modified or newly constructed asset upon expiration of the out-grant, NASA will have to reimburse the partner/tenant for the value of the improvements or, if offered by the partner/tenant as a gift, accept the improvements in accordance with the National Aeronautics and Space Act, 51 U.S.C. 20113 (d). The Center CoF Program Manager should work with the Center's Office of the General Counsel to select the appropriate path. The RPAO will then record the costs in the RPMS as an addition to the net value of a modified existing asset or the value of a newly constructed asset. These costs will then be capitalized in accordance with NPR 9250.1 and require the submission of an NF-1739 for OCFO review.

7.3.4.1 The request for transfer of the modified asset to NASA is to be submitted not less than one year before the end of the out-grant or agreement term and includes an explanation of the benefit of such acceptance in accordance with the acquisition policy described in this and other NASA NPR documents.

7.3.4.2 In most cases, the out-grant will specify that modifications to an existing asset or a newly constructed asset be removed by the tenant, at the tenant's cost, at the end of the lease, out-grant, or other agreement term.

7.4 Waiver Process

7.4.1 The NASA-designated FPM representing a Federal or commercial entity shall submit a waiver request and a supporting business case when the planned project seeks relief from the design and

construction requirements specified in this NPR. This includes, but is not limited to, a request to waive compliance with the Guiding Principles and/or third-party building sustainable certifications.

7.4.2 The submitted waiver will follow the guidelines of NPR 1400.1, NASA Directives and Charters Procedural Requirements, Chapter 5, describing Requesting Waivers from Requirements in NASA Directives. This guidance does not allow for a waiver due to additions to cost or schedule, relief from safety regulations (including consensus building and fire codes), or elimination of the requirement. Along with the justification for a waiver, the requestor shall include the alternative solution proposed to compensate for the relief requested. No construction-related activity can begin during the waiver submittal review nor until a NASA decision has been made and received by the requester in writing.

7.4.3 This waiver process is different than the process of requesting a deviation from the FAR or the NASA FAR Supplement. Those processes are described in FAR 1.4 (Deviations from the FAR) as well as NFS 1.4 (same title).

Appendix A. Definitions

Acquisition. The acquiring by contract with appropriated funds of supplies or services (including construction) by and for the use of the Federal Government through purchase or lease, whether the supplies or services are already in existence or must be created, developed, demonstrated, or evaluated. Acquisition begins at the point when Agency needs are established and includes the description of requirements to satisfy agency needs, solicitation and selection of sources, award of contracts, contract financing, contract performance, contract administration, and those technical and management functions directly related to the process of fulfilling agency needs by contract. Acquisitions can include multiple procurements (see the definition of Procurement below).

Adaptive Reuse. The process of repurposing existing buildings for work other than that they were built or designed for while retaining their historic features.

Agency Master Plan (AMP). A comprehensive strategic real property plan integrating long-term asset investment strategies to address overall Agency priorities in alignment with the most current NASA Strategic Plan. This is prepared at the HQ level through a partnership with Mission Directorates, Technical Capability Leaders, and Centers.

Alternative Future Use (AFU). An asset is considered to have an alternative future use if there is a reasonable expectation (i.e., slightly greater than a 50 percent likelihood) that the item will be used on another project (or projects) that has not yet commenced. Alternative Future Use is defined by the Center's Property Accountants upon review of NF-1739 that is submitted by the FPM. AFU is only a requirement if the asset is being acquired for a research and development project and is typically associated with personal property (not Real Property). Refer to NPR 9250.1.

Approved Facility Project Cost Estimate (AFPCE). The most current and accurate professional cost estimate for a facility project at any given time during the planning, design, or construction phases. The AFPCE incorporates the Engineering Estimate (EE) and accounts for escalation, construction contingency, SIES, and other burden costs. The value of the AFPCE is used to determine the classification of a project in accordance with the Agency CoF threshold values (i.e., determines if a facility activity is a Local Project, an MRC CoF Project, or a Discrete CoF Project).

Asset. Any item of economic value owned by NASA. The item may be physical (tangible) or a right to ownership (intangible) that is expressed in terms of a cost or some other value. An asset can be real property or personal property.

Authority for Early Advertisement. The authority received from FRED to move forward with a design or construction procurement prior to the receipt of funding at the Center.

AHJ. The person at a NASA Center to whom the Center Director has delegated the authority to ensure compliance with NASA-STD-8719.11 and to approve the Certificate of Occupancy (both Temporary and Permanent) for a new or modified building.

Beneficial Occupancy. Full or limited acceptance and approval by the Center's AHJ for occupancy prior to a facility's construction completion and acceptance. Formal disclosure of Beneficial Occupancy needs to be issued by the CO to the contractor. Refer to NASA-STD-8719.11. The issuance of

Beneficial Occupancy is also the point at which form NF-1046 should be issued to the RPAO such

that the new property or existing property modifications can be entered into the Agency's Real RPMS.

Budget. A financial plan providing a formal estimate of future revenues and obligations for a definite period for approved programs, projects, and activities.

Budget Cycle. The period that elapses from the initiation of the budget process to the completion of the budget process for a particular FY.

Budget Estimate. A fund requirement for any element included in a budget. Collectively, all estimated fund requirements for a particular operating agency or component or consolidation thereof.

Budget Year. The approaching FY (see "Fiscal Year") or typically the year for which a budget is being formulated.

Building and Equipment Acceptance. A phase during which quality control staff start up and check out equipment in a new construction, repair, or rehabilitation project in accordance with a set of criteria that quality assurance personnel have established. See NASA Reliability Centered Building and Equipment Acceptance Guide for acceptance criteria.

BIM. A process supported by various tools and technologies involving the generation and management of digital representations of physical and functional characteristics of buildings and other structures. BIM models are computer files that, as a minimum, consist of three-dimensional drawings and a database of asset information that can be extracted, exchanged, or networked to support decision-making regarding a constructed asset. NASA's BIM strategy spans the conceptual study, final design, estimating, detailing, fabrication, construction, and operations and maintenance of real property. Refer to NASA-STD-10001.

Buildings. Constructed assets, each with a minimum of four walls and a roof, typically used for office space for personnel, laboratory space, shop space or for material storage. "Buildings" are one of the two main classifications of real property at NASA (the other being "Other Structures"). See NPR 8800.15, Real Estate Management Program.

Capital Asset (Property Accounting terminology). An asset that has future economic benefit and whose cost is spread over the useful life of the asset as depreciation or amortization expenses. Costs associated with projects determined to be a capital improvement are recognized in an asset account for recognition as an expense of subsequent periods. The criteria for determining which assets will be capitalized is stated in NPR 9250.1. In addition, the useful life of assets is identified in NPR 9250.1 under "Recovery Period for Real Property Assets."

Capitalized Events (Real Property terminology). Also called "Recordable Events." Assets with a unit acquisition cost that meets or exceeds the threshold set forth in NPR 9250.1, have an estimated useful life of two years or more, are not intended for sale in the ordinary cost of operations, have been acquired or constructed with the intention of being used or being available for use by NASA, and have an alternative future use. See NPR 8800.15. Only the Property Accountants will consider a subset of Recordable Events as "Capital Assets."

Capital Improvement. An individual improvement or modification to an existing Property, Plant, and Equipment (PP&E) item that adds to its future economic benefit and whose cost is spread over the remaining useful life of the PP&E item being improved or modified. The criteria for determining which modifications or improvements should be capitalized as capital improvements is stated in

NPR 9250.1. The PM will issue a form NF-1739, CDF to the Center's Property Accountants to determine if a facility project will be considered a capital improvement.

Category C. Used for projects requesting funds that had not been part of the President's Budget (e.g., emergency repairs).

Centers. Ten primary NASA field installations, each led by a Center Director. The following are Centers:

a. Ames Research Center (ARC).

b. Armstrong Flight Research Center (AFRC).

b. Glenn Research Center (GRC) at Lewis Field.

c. Goddard Space Flight Center (GSFC).

d. NASA Office of JPL Management and Oversight (NOJMO).

e. Jet Propulsion Laboratory (JPL), a Federally Funded Research and Development Center.

f. Johnson Space Center (JSC).

g. Kennedy Space Center (KSC).

h. Langley Research Center (LaRC).

i. Marshall Space Flight Center (MSFC).

j. Stennis Space Center (SSC).

Center Cultural Resource Manager (CRM) (previously called the Historic Preservation Officer). A NASA employee who is designated by the Center Director and given the responsibility of managing cultural resources at the Center or Component Facility pursuant to NHPA, Archeological Resource Protection Act (ARPA), Native American Graves Protection & Repatriation Act (NAGPRA), and other legal authorities, per NPR 8510.1.

Center Master Plan. A Center's statement of its concept for the orderly management and future development of the Center's real property assets, including land, buildings, physical resources, and infrastructure. The plan provides a narrative, statistical, and graphic record of current capabilities and conditions (natural features, buildings, structures, utilities, transportation systems, and other improvements), as well as necessary changes to support NASA Missions. Center Master Plans need to comply with the AMP.

Centralized Functions. Those functions managed either by NASA HQ or by an identified Center and delivered to all Centers accordingly.

Certificate of Occupancy. A certificate issued after construction completion by the Center's AHJ to certify that the facility is ready for occupancy. This often leads to Beneficial Occupancy of the facility.

Change in Scope. A change in work elements that are defined on form NF-1509 and in the project's Functional Requirements Document. These changes result in a deliverable differing from a prior approval by the next higher authority (e.g., local supervisor, FRED). Also see 'Descope. '

Change Order. A written direction from the CO to the contractor modifying the contract as originally awarded.

Chief Financial Officer. The official in charge of all fiscal and financial plans and operations.

Commissioning. A quality process that focuses on verifying and documenting that all facility systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the owner's project requirements. Commissioning can be associated with a single system or expanded to include all systems within the facility (i.e., Total Building Commissioning).

Commitment. When funds are set aside for a particular purpose but not yet obligated. Issuing a purchase request (PR) is an example of a commitment.

Component Facilities. NASA installations geographically separated from the NASA Centers to which they are assigned (see "Centers"). The Component Facilities annotated with their assigned NASA Centers are as follows:

a. Deep Space Network (DSN), Goldstone, CA; Canberra, Australia; Madrid, Spain (NOJMO/JPL).

b. Ground Network at KSC (GSFC).

c. Katherine Johnson Independent Verification and Validation Facility (IV&V), Fairmont, WV (GSFC).

d. Michoud Assembly Facility (MAF) (MSFC).

e. Jet Propulsion Laboratory (JPL), NASA Office of JPL Management and Oversight (NOJMO).

g. Armstrong Test Facility (ATF), Sandusky, OH (GRC).

i. Space Network (White Sands, NM) (GSFC).

j. Wallops Flight Facility (WFF), Wallops Island, VA (GSFC).

k. White Sands Test Facility (WSTF), White Sands, NM (JSC).

l. Columbia Scientific Balloon Facility (CSBF), Palestine, TX (GSFC).

m. Goddard Institute for Space Studies (GISS), Columbia University, NYC (GSFC).

Computerized Maintenance Management System (CMMS). Computer software that is used to monitor, plan, and schedule facility and equipment maintenance functions. The software provides historical data, report writing capabilities, job analysis, and more. The data in the system describe equipment, parts, jobs, crafts, costs, step-by-step instructions, and other information involved in the maintenance effort. Refer to NPR 8831.2.

Condition-Based Maintenance (CBM). Facility and equipment maintenance scheduled only when the condition of the facility or equipment requires it. CBM replaces maintenance scheduled at arbitrary time or usage intervals. It usually involves the application of advanced technology to detect and assess the actual condition. See NPR 8831.2.

Condition-Based Monitoring. Also known as Predictive Maintenance. The continuous or periodic monitoring and diagnosis of systems and equipment to forecast failure. See NPR 8831.2.

Constructability. The optimal use of construction knowledge and experience during the planning,

design, procurement, and field execution phases of a facility project to achieve overall project objectives (definition consistent with the Construction Industry Institute – CII).

Construction. The construction of new or major modification of existing buildings and/or other structures including support systems (e.g., utilities, sidewalks, parking lots, driveways). The CECR, EUL and NHPA accounts are the only accounts at NASA appropriated for Construction with an AFPCE equal to or greater than $1 million. The procurement definition of construction is found in FAR 2.101.

Construction Completion. The point when final inspections have been completed and the facility is accepted in the following manner:

a. Construction has been completed in accordance with the plans and specifications.

b. All project commissioning activities have been completed.

c. All construction deficiencies noted on the “punch list” are corrected.

d. The contractor or construction agency acknowledges the listed deficiencies and ensures corrective action within the contract.

Construction Contractor. A business entity (i.e., person, corporation, partnership, or joint venture) that has satisfied the CO that they are qualified to perform the work as described in the construction contract documents.

Construction of Facilities (CoF). A centralized Agency program that funds planning for future facility needs, design of facilities projects, new construction projects, major modification of existing Facility Projects, repair of existing Facility Projects, consolidation and demolition projects and energy and water reduction projects. CoF projects include the acquisition/installation of related personal property/collateral equipment, the acquisition/installation of allowable outfitting items as defined in Appendices D and E, and project commissioning. CoF Program funding is included in the CECR Account. The CECR, EUL, and NHPA accounts are the only NASA accounts appropriated for Construction activities with an AFPCE greater than $1 million.

Construction-Operations Building Information Exchange (COBie). A U.S.-originated specification relating to managed asset information including space and equipment. It is closely associated with BIM approaches to design, construction, and management of built assets.

Contingency (Construction). An allowance included in the AFPCE for unanticipated construction cost increases. Examples include unanticipated construction costs incurred due to final design errors and omissions, field conditions not identified within the contract documents, and incomplete or changing user requirements.

Contract. Either an agreement or an order for the acquisition of supplies or services signed by a CO. The award of a new contract and/or an amendment to an existing contract is considered a funding obligation.

Contract Award Date. The date on which the CO and a representative from the construction contractor signs the contract.

Contracting Officer (CO). Any person who can bind the Federal Government to a contract. The CO holds an official warrant that allows them to negotiate on behalf of the U. S. Government. A CO has the authority to enter into, administer, or terminate contracts and make related determinations and

findings such as changes to contract cost, schedule, and scope.

Contracting Officer's Representative (COR). An authorized representative of the Federal Government with an understanding of the technical aspects of a contracted project. The COR acts according to the authority delegated to them by the CO.

Conventional Furniture (or Case-Good Furniture System). Metal/wood office furniture components such as a desk, computer table, credenza, and hutch unit that do not interlock or connect and have no power or communications distribution through the units. Conventional furniture is typically used in single and shared-occupant offices.

Current Year. The present FY (October 1 through September 30).

Data Call. A request to the field Centers from FRED to identify institutional CoF project requirements as part of the Construction of Facilities Program.

Decommissioning. The formal process for changing the status of a real property asset from “active” to “inactive.” Assets are decommissioned when they are not currently needed to support a NASA mission or function but have a planned need in the future.

Deconstruction. The disassembly of a facility by the careful salvaging of reusable or recyclable elements. This method is preferable to Demolition, because it diverts salvageable equipment and materials for reuse instead of disposal into landfills. When procuring deconstruction services, it should be noted that “disassembly” falls under “dismantling,” which is included in the definition of “dismantling, demolition, or removal of improvements.” “Dismantling, demolition, or removal of improvements” is defined in FAR 37.300 (Scope of subpart) as, “dismantling or demolition of buildings, ground improvements and other real property structures and for the removal of such structures or portions of them.”

Demolition. The act of tearing down of real property to clear an existing site which results in the elimination of the property from the Agency’s inventory. Partial demolition involves the tearing down or removal of portions of real property but does not result in the total elimination of the real property from the Agency’s inventory. Demolition projects are focused on reducing the Agency’s real property footprint and/or CRV.

Demountable Panels. Specialty (non-office) items sold by many furniture manufacturers. They are also called moveable wall panels, modular office privacy walls, office space dividers, and architectural walls.

Descope. The process of removing work items from a design statement of work or a construction package that results in cost or budget reductions. Projects that are descoped need to meet the definition of “functional” upon construction completion.

Design. The process of developing, planning, and communicating project requirements into workable drawings and specifications to accomplish the project within the established scope, objectives, and budget. This encompasses both the preliminary design and final design for Facility Projects. It also includes providing cost estimates, design analysis, and construction schedule for the planned project at each design review stage.

Design Review. A collaborative effort during which users and technical experts verify that the design adequately addresses the project scope, objectives, and technical requirements.

Direct Costs. A price that can be completely attributed to the production of specific goods or

services. Direct costs refer to materials, labor, and expenses directly related to the accomplishment of a contract.

Discrete Facility Project. A CoF project with an AFPCE of $10 million or more. Discrete Facility Projects have a unique Work Breakdown Structure (WBS) number in NASA's financial system (SAP).

Drawings. Graphic representations on either electronic media or paper that convey the intent of the project requirements.

Earned Value Management (EVM). A tool for measuring and assessing project performance through the integration of technical scope with schedule and cost objectives during the execution of the project. EVM provides quantification of technical progress, enabling management to gain insight to project status and project completion costs and schedules. Two essential characteristics of successful EVM are EVM system data integrity and carefully targeted monthly EVM data analyses.

Electronic Security Systems. That part of facility physical security concerned with safeguarding personnel and property by use of electronic systems. These systems include, but are not limited to, intrusion detection systems (IDS), enterprise physical access control systems (EPACS), and closed-circuit television systems (CCTV).

Emergency Repair. Repair of an existing facility or component(s) after a major breakdown or accident, as authorized by the National Aeronautics and Space Act of 1958, as amended. FRED defines "emergency" as so urgent that it cannot wait to go through the normal PPBE cycle. For all emergency repairs, the replacement of components or materials will be of the size or characteristics originally designed or currently required to meet demands or needs. Also see "Category C."

Energy Savings Performance Contract (ESPC). A partnership between a Federal agency and an energy service company (ESCO). The ESCO conducts a comprehensive energy audit for the Federal facility and identifies improvements to save energy and water. In consultation with the Federal agency, the ESCO designs and constructs a project that meets the Agency's needs and arranges the necessary funding. The ESCO guarantees that the improvements will generate energy and water cost savings sufficient to pay for the project over the term of the contract. After the contract ends, all additional cost savings accrue to the Agency.

Engineering Estimate (EE). The total facility project cost estimate which includes the cost for materials, labor, real estate actions, services for project-specific environmental and historical compliance, and project commissioning requirements. The EE includes contractor supervision, overhead, and profit for both the prime contract contractor and any subcontractors. Also, the EE includes all labor and material costs for related personal property/collateral equipment and allowable installed non-collateral equipment. The EE does not include escalation, construction contingencies, or SIES. The EE value is identified on the NF-1509.

Enhanced Commissioning. A set of best practices that go beyond fundamental commissioning to ensure that building systems perform as intended by the owner. These practices include designating a commissioning authority prior to the construction documents phase, conducting commissioning design reviews, reviewing contractor submittals, developing a system manual, verifying operator training, and performing a post-occupancy operations review.

Enhanced Use Lease (EUL). An out-grant lease executed under Lease of non-excess property (Enhanced Use Lease – EUL,) 51 U.S.C. § 20145 for underutilized NASA-owned real property that allows the Agency to retain and use the lease proceeds. For more information, see NPR 8800.15,

Real Estate Management Program, and NM 8800.82, NASA Desk Guide for Enhanced Use Leasing of Real Property.

Enterprise Function. Functions that are delivered to all Centers regardless of where they are managed. An example could include a single download of a software package that is managed at one location and utilized by all Centers (e.g., IBM TRIRGA is the FRED-Approved Database).

Environmental Analysis. The process of making the initial evaluation of the environmental considerations of a proposed action including alternative proposals.

Environmental Assessment (EA). One of three possible documents required for compliance with the 42 U.S.C. § 4321 et seq. process. The three documents in order of increasing effort and cost are a Categorical Exclusion (CATEX), an EA, and an Environmental Impact Statement (EIS). The EA is the correct path when the environmental impact is low but does not qualify as a CATEX. For details, contact the Center Environmental Management Office.

Environmental Impact Statement (EIS). A document developed through the NEPA process when the impact to the environment is significant, e.g., a change in mission to a Center or the Agency with significant environmental ramifications—air/water quality, noise, soil contamination, or an increased risk (perceived or real) to the public. For details, contact the Center Environmental Management Office.

EUL Net Revenue. The amounts of cash consideration received for an EUL more than the full costs to NASA in connection with the lease.

Expense. Costs associated with projects determined to be non-capital are expensed and charged to operations in the accounting period in which the costs were incurred. As an example, a maintenance activity or a repair to an asset may be considered an expense unless it extends the useful life of the asset by two years or more (and therefore may be considered a capital improvement). See NPR 9250.1.

Facilities Maintenance. The recurring day-to-day work required to preserve facilities (buildings, structures, grounds, utility systems, and related personal property/collateral equipment) in such condition that they may be used for their designated purpose over an intended service life. It includes the cost of labor, materials, and parts. Maintenance minimizes or corrects wear and tear and, thereby, forestalls major repairs. Facilities maintenance includes PM, PT&I, grounds care, PGM, repair, TCs, ROI, and SRs (not a maintenance item but work performed by maintenance organizations). Facilities maintenance does not include new work, work on non-collateral equipment, or maintenance performed in the Central Plant by plant operations personnel. For additional information, refer to NPR 8831.2.

Facility. Land, buildings, structures, and other real property improvements including utility systems and related personal property/collateral equipment. The term does not include operating materials, supplies, special tooling, special test equipment, or noncapitalized equipment.

Facility Acquisitions. The acquisition of an interest in land, buildings, other structures and facilities, or leasehold improvements. The normal facility acquisition methods include purchase, transfer, lease, easement, use permits, and rights of way.

Facility Closure Plan. Before the RPAO modifies the status of an active facility to “Inactive,” an assigned individual will prepare a Facility Closure Plan (FCP) that includes a baseline survey of the condition of the facility’s building systems derived from the most recent Deferred Maintenance

Assessment (DMA). In addition, this plan includes a list of specific tasks to prevent the facility from becoming a safety risk and a list of all building facility systems that will remain active to comply with safety and security requirements for the duration of the closure.

Facility Project. Work related to the construction of a new facility or the major modification or energy/water usage improvements of an existing facility, or the demolition of an existing facility with an AFPCE greater than or equal to $100,000 (excluding preventative maintenance work). A Facility Project may be funded with local Center funds or funded under the CECR CoF Programs per the requirements of this document. A facility project needs to be functional upon completion and not dependent on additional funding to be complete and usable.

FPM. The individual responsible for organizing, managing, and directing the phases of a facility project to accomplish work within schedule and cost. For local Facility Projects, some Centers define a Local Authority Project Manager (LAPM) who has identical duties.

Failure Modes and Effects Analysis (FMEA). A process used to determine which parts fail, why they usually fail, and what effect their failure has on the total system. This is an element within Reliability Centered Maintenance (RCM) (see Reliability Centered Maintenance Guide for Facilities and Collateral Equipment).

Filing Systems. Products not integral to a furniture system (systems or modular) required to store work- related items within or adjacent to individual work areas. This can include bookcases, file cabinets (vertical and lateral), storage cabinets, and movable pedestal units. These products may or may not be included under a facility project AFPCE.

Fiscal Year (FY). The Federal Government's accounting period that begins on October 1 of the calendar year and ends on September 30 of the following calendar year. FY is designated by the calendar year in which it ends.

Flash Bid Report (NASA Form 1579). A form that summarizes the results of a project bidding process and identifies if funding residuals exist.

Fragmentation. The planning, development, or execution of a project by splitting the scope into two or more interdependent projects to circumvent the appropriate budget approval process. Centers and programs are prohibited from fragmenting projects.

Full Disclosure. The act of providing full scope, justification, cost, and schedule transparency of a facility project from a Center to FRED and from FRED to Congress (as applicable). Full disclosure is also required to prevent the appearance of project fragmentation. This concept outlines all reasonably identifiable elements of cost necessary to achieve a fully function and operable facility for all stages of planning, approval, and management of a facility project. The estimated cost of the facility project needs to include every associated element of real property including non-collateral equipment. It needs to also identify all other equipment required to the extent practicable. Project full disclosure is documented on form NF-1509.

Full Funding. The provision of funds to cover all project costs including the design, construction, and activation phases and all activities necessary to support those phases.

Functional Project. A project that, upon completion of the construction and commissioning phases, is fully operable and usable for its intended purpose. Functional projects do not require additional future funding to become totally operable and usable.

Funds Reprogramming. The moving of funds between line items of a given account within a given FY. For a Discrete CoF Project line item, reprogramming of funding less than $500,000 can be accomplished by NASA HQ with notification to Congress (see Upward Variation). For a Discrete CoF Project line item, reprogramming of funds of an amount equal to or greater than $500,000 requires Congressional approval (see Operating Plan Change).

Funds Transfer. The moving of funds from one account to another. This is the process that a given Program initiates to transfer funding from their account to the CECR Account for construction projects that have a CCE of $1 million and greater (e.g., creation of a Program-Direct CoF project). Funds transfers require Congressional approval either through the standard budget process (project identification in a CJ for an IOP or through an in-year budget change process (project identification in an Operating Plan Change). Refer to the Administrative Provisions in the FY Appropriations language.

Government-Furnished Property. Property owned by the Government and provided to a contractor for use in the performance of a contract. The Government could also install Government-furnished property.

Ground Support Equipment. Equipment, implements, and devices required for handling, servicing, inspecting, testing, maintaining, aligning, adjusting, checking, repairing, and overhauling an operational end item or a subsystem or component thereof.

Health and Safety Plan (HASP). A comprehensive written document developed by a construction contractor that is specific to the contract scope of work and applicable to all subcontractors. A HASP explains how the construction contractor affirmatively and proactively assesses work for hazards, complies with applicable Federal, state, local, and NASA health and safety requirements, and provides controls for the specific hazards identified. This document is submitted by the contractor to the CO for review and approval prior to commencing any field activities.

Improvements. An addition to land, buildings, other structures, and attachments or annexations to land that is intended to remain so attached or annexed, such as sidewalks, drives, tunnels, utilities, and installed related personal property/collateral equipment.

Incrementally Funded Project. A project that is approved by Congress to be incrementally funded over multiple program years. All increments of the project need to be clearly defined and disclosed to FRED by completing an NF-1509 form prior to execution. The products produced by each project increment need to be usable but may not be considered as fully “functional.”

Indirect Cost. Labor and material costs that are not related to specific projects.

Initial Operating Plan (IOP). A yearly internal plan which sets forth the specifics on how NASA intends to apply Agency financial resources during the FY to fulfill its mission. It includes all programs and projects and requires Congressional approval.

Institutional Facilities. A classification of assets that support all Center personnel. This includes buildings for the general morale and welfare of the Center population and for supporting all programs and tenants (including general office buildings, housing for human resources, legal, security or other administrative functions, cafeterias, and child-care facilities) or other structures such as roads, bridges, parking lots, general transportation systems, perimeter fences, and utility generation/distribution systems.

Institutional Project.

A project involving the new construction, upgrade, or repair of institutional facilities. Institutional projects with an AFPCE below $1M are typically funded with local Center funding. Institutional projects with an AFPCE of $1M or above are funded under the CECR Account. All Institutional Projects greater than $100,000 require full disclosure on form NF-1509.

Integrated Systems Test (IST). A series of acceptance tests to a new or modified testing facility that incorporates a test article to check out all the operational systems and confirm design requirements. Costs for IST activities are not included within the AFPCE for a CoF project.

Invitation for Bids. The solicitation documents used to acquire a project requirement under sealed bidding rules in the FAR and NASA FAR Supplement.

Land Acquisition. An acquisition of title to land including any interest in the land such as mineral and water rights, easements, rights of way, or interagency permits whether obtained by purchase or other means.

Lease. A written document by which the owner transfers the rights of use and occupancy of land and/or structures to another person or entity for a specified period in return for a specific consideration, usually monetary.

Life-Cycle Cost. An estimate of the economic impact over a selected design life of a project or project alternative. This estimate includes first cost, energy consumption, periodic replacement of equipment or materials, operations, maintenance, and residual value.

Life-Cycle Cost Analysis (LCCA). A method for assessing the total cost of facility ownership. An LCCA considers all costs of acquiring, owning, and disposing of a building or building system. This analysis is especially useful when project alternatives that fulfill the same performance requirements, but differ with respect to initial costs and operating costs need to be compared to select the one that maximizes net savings. Refer to NASA Business Case Guide for Real Property and Facilities Project Investments.

Limitation. A statutory or administratively imposed restriction within an appropriation or other authorization act that establishes the maximum threshold for a specific purpose.

Localized Functions. Functions that are managed and executed within the confines of a Center.

Local Funding. Funding that is managed at a Center level that will be obligated within two years of the year of appropriation.

Long-Lead Items. Items that, because of their complexity of design, complicated manufacturing processes, or limited production, require an extraordinary length of time for delivery.

Major Modification. A project involving work on an existing facility with an AFPCE that exceeds 50 percent of the CRV for the space or system in question. In many cases, a major modification will require that a facility's systems be updated to comply with current industry codes and standards (e.g., as identified in the International Existing Building Code - IEBC). A major modification can "reset the clock" on a facility.

Maintainability. The design, installation, and operational characteristics of an item used for ease of keeping it operational, e.g., designed access to a chiller's coils for easy cleaning.

Maintenance and Operations (M&O) Manuals. Organized procedural information specifying

methods of operating and maintaining building systems, related personal property/collateral equipment, and support equipment. M&O personnel use the manuals in the performance of day-to-day maintenance and repair tasks. Preferably, the manuals are in an electronic format such that they can be stored within a CMMS.

Minor Construction and Revitalization (MCR) Project (also called a Minor CoF Project). A CoF project with an AFPCE of at least $1 million and less than $10 million. Institutional CoF MCR projects are identified in the CECR Account under the Institutional CoF line item and Program-Direct CoF MRC projects are identified under each of the Mission Directorate line items.

Modular Furniture (or Non-Panel Based Systems). Freestanding furniture modules/components such as a desk, bridge, computer table, hutch, and pedestal that connect to form a workstation.

New Capability. A facility project that supports new programmatic or institutional requirements. This includes projects for major modification of existing facilities when the facility supports new programmatic or institutional requirements.

New Construction. A facility project where new real property is built. (See “Construction.”)

Non-Collateral Equipment. Equipment other than related personal property/collateral equipment that, when acquired and used in a facility or test apparatus, can be severed, and removed after erection or installation without substantial loss of value or damage to the premises where installed. Non-collateral equipment is often classified as Personal Property and capitalized based on the criteria outlined in NPR 9250.1.

Notice to Proceed (NTP). The date a CO directs a contractor to start work. In some construction contracts, there may be two NTPs: one to begin the flow of project submittals including the site-specific safety and health plan and one to begin field work.

Obligation. The award of a contract or purchase order by a CO to satisfy a contractual agreement. See also Commitment. After funds are committed on a purchase request, the CO acquires a contract with a construction contractor. Obligation occurs at the time the contract is signed.

Operational Readiness Review. The final NASA review of a facility immediately prior to placement into its intended operation.

Operating Plan Change. A change to the annual internal plan that sets forth the specifics on how NASA intends to apply Agency financial resources during the FY to fill its mission. It includes all changes to the IOP and previous Operating Plan Changes (if any) and requires Congressional approval.

Other Burden Costs. A CoF funding allowance used for items not addressed under SIES. Activities could include, but are not limited to, funding for other onsite contractor services, drafting services to produce as-built drawings from construction contractor furnished red-lines, Government-furnished property (GFP) refurbishment, support during utility outages, or transportation of special equipment that might need to be included in the project.

Other Structures. Improvements to land, other than buildings, such as airfield pavements, harbor and port facilities, utility distribution systems, antennas, cooling towers, and roads and bridges. This classification also includes structures that are not completely enclosed, like electrical substations, picnic shelters, pavilions, and covered storage areas. See NPR 8800.15, Real Estate Management Program.

Option. A unilateral right in a contract by which, for a specified time, the Government may elect to purchase additional supplies or services called for by the contract or may elect to extend the term of the contract. Options do not need to be awarded at the same time as the contract base bid work. FRED encourages Centers to structure bid packages with options to ensure that at least the base bid work can be awarded within the AFPCE. Options can also include contract deductions.

Partnering. A Government-contractor relationship to foster the achievement of mutually beneficial goals (see NFS, 48 C. F. R., Chapter 18). Per the Whole Building Design Guide, partnering is a formal program used by the Project Delivery Team to improve communications to avoid disputes and work towards mutually beneficial goals. Partnering creates opportunities for more efficient resolution of issues through higher levels of trust, personal satisfaction, and increased collaboration.

Partnership Agreement Maker (PAM). A Web-based software product that allows for a systematic routing of documents within NASA. It records the electronic approval and related stipulations of required reviewers or their identified alternatives.

Past-Year. The FY immediately prior to the current FY.

Payback. The amortization period defined in years calculated by dividing the total budget estimate by the total expected discounted annual savings.

Personal Property. Property that is tagged, monitored, and excessed by NASA's Logistics function. See the definition of "Non-Collateral Equipment."

Phased Project. A strategy which structures projects over multiple program years to renew or repair a building or other structure. The building or other structure needs to be independent and functional upon the completion of any given phase (e.g., a phase cannot be dependent on future funding to be functional). Phased projects need to be fully disclosed to FRED.

Power Purchase Agreement. A partnership authorized or allowed by some States, between a Federal agency and a renewable energy developer. The developer installs a renewable energy system on Federal land or facilities. In exchange, the Federal agency agrees to purchase the power generated by the system throughout a contract term per a contract rate. These power purchase payments repay the developer over the contract term. The developer owns, operates, and maintains the system for the life of the contract.

Predictive Testing and Inspection (PT&I). The use of advanced technology to assess the condition of equipment, utilities, and systems. When using RCM, the PT&I data obtained allow for planning and scheduling preventive maintenance or repairs prior to failure. Refer to NPR 8831.2.

Procurement. Acquisition by contractual instrument (contracts, orders, or calls/orders against Basic Purchase Agreements – BPAs) with appropriated funds of supplies or services (including construction) by and for the use of the Federal Government through purchase or lease, whether the supplies or services are already in existence or must be created, developed, demonstrated, and evaluated. Acquisition begins at the point when agency needs are established and includes the description of requirements to satisfy agency needs. Acquisitions may sometimes be split into more than one solicitation for many possible reasons. For example, depending on what is being acquired, different sets of contractors may only be able to perform different parts of government requirements. These different parts would likely be separated into separate solicitations. Each solicitation would be a separate procurement, though all such procurements would still be part of the same acquisition. Whether an acquisition is done through one procurement or more than one procurement, the procurement would also include selection of sources, award of contracts (or orders or BPA calls),

contract financing, contract performance, contract administration, and those technical and management functions directly related to the process of fulfilling agency needs by separate contract.

Program. A strategic investment by a Mission Directorate or Mission Support Office that has a defined architecture and/or technical approach, requirements, funding level, and a management structure that initiates and directs one or more projects. See NASA Space Flight Program and Project Management Handbook.

Program-Direct CoF Project (or Program-Funded CoF). A facility project for which the AFPCE equals or exceeds $1 million in AFPCE for which a NASA Mission Directorate transfers funding into the CECR Account.

Progress Payment. A partial expenditure of funds made to a contractor as work progresses. Usually this is in accordance with a schedule of values submitted by the contractor at the time of notice to proceed.

Project. New facility construction, existing facility work (repair, major modification, energy and water reduction), and facility demolition on NASA real property with an estimated cost greater than or equal to $100,000 (excluding preventative maintenance work).

Project Definition Rating Index (PDRI). A Construction Industry Institute best practice tool used in front-end planning to determine how well a project is defined. This tool is used throughout project development but is scored at the 30-percent design stage. The scoring system is based upon a 1000-point scale, and a low score (i.e., 200 or less) reflects a well-defined project.

Project Scope. The description of a facility project limits, objectives, and planned result. The scope of a facility project typically includes a description of its location, purpose, capabilities, capacity, physical dimensions, configuration, and utilities affected.

Purchase Request (PR). A document or electronic file used to convey funds to the CO. It also describes the supplies or services required and includes a Government cost estimate for those supplies or services. The issuance of a purchase request or purchase order constitutes a funds commitment.

Real Property. Property that is attached directly to land or land itself. This includes land, buildings, structures, air space, utility systems, improvements, and appurtenances permanently annexed to land referred to as assets. The term real property also includes related personal property also known as collateral equipment. It is property that is owned, leased, occupied, and/or controlled by NASA, and includes Government Owned, Contractor Held (GOCO) real property. Trailers and Quonset huts permanently affixed to land will be recorded in RPMS until they are detached and transferred to personal property.

RPAO. An individual assigned to FRED that is responsible for regional management and accountability of a defined subset of Centers' real property assets. Refer to NPR 8800.15.

Real Property Management System (RPMS). NASA's enterprise database for recording, maintaining, and reporting real property data. Information concerning every real property asset under NASA's management by the RPAO community is stored in the RPMS. Refer to NPR 8800.15.

Recapitalization. The process by which NASA renews its real property assets over the entire service life of its facility inventory to maintain operational capability. Implementation can occur

through restoration and modernization of existing structures or through total replacement. The process may include phased replacement of entire systems or subsystems over long periods or a single replacement project.

Recordable Event. See “Capitalized Event.”

Reduce the Footprint. A facilities philosophy to ensure that the Agency purchases, constructs and/or operates new property only when existing capabilities (including those owned by NASA and other external entities) cannot be used or modified cost-effectively. In addition, this philosophy ensures that NASA real property inventory is right sized in accordance with projected future operations and maintenance budgets. Reduce the Footprint initiatives defined in NPD 8820.2 mandate that facilities disposal will be at least 125 percent of the new/additional construction of facilities.

Regionalized Functions. Functions that are managed by NASA HQ or a defined Center and delivered to a subset of Centers (typically within a geographical region such as Eastern, Southern, etc.).

Related Costs. Estimated cost elements of project work that are not included in the AFPCE. Related costs will be identified on form NF-1509.

Related Personal Property/Collateral Equipment. Encompasses building-type equipment, built-in equipment, and large, substantially affixed equipment/property and is normally acquired and installed as part of a facility project as described below (also see Non-collateral Equipment):

a. Building-Type Equipment. A term used in connection with Facility Projects to connote the equipment normally required to make a facility useful and operable. It is built in or affixed to the facility in such a manner that removal would impair the usefulness, safety, or environment of the facility. Such equipment includes elevators, heating, ventilating, and air-conditioning systems, transformers, compressors, and other like items generally accepted as being an inherent part of a building or structure and essential to its utility. It also includes general building systems and subsystems, such as electrical, plumbing, pneumatic, fire protection, and control and monitoring systems.

b. Built-in or Large, Substantially Affixed Equipment. A term used in connection with Facility Projects of any type other than building-type equipment that is to be built in, affixed to, or installed in real property in such a manner that the installation cost, including special foundations or unique utilities service, or the facility restoration work required after its removal is substantial.

Reliability-Centered Maintenance (RCM). A process used to determine the most effective approach to maintenance. It involves identifying actions that, when taken, will reduce the probability of failure and are the most cost effective. It seeks the optimal mix of Condition-Based Actions, other Time- or Cycle-Based actions, and a Run-to-Failure approach. (See NASA Reliability Centered Maintenance Guide.)

Renewal by Incremental Repair (R by IR). Renewal of horizontal infrastructure (e.g., institutional utilities distribution) or systems by repair by wholesale replacement accomplished in project phases. Each phase needs to be functional and usable upon completion. R by IR is considered a subset of Institutional CoF “Repair.”

Repair. Facility work required to restore a facility or component, including related personal property/collateral equipment, to a condition substantially equivalent to its originally intended and

designed capacity, efficiency, or capability or extend its service life. It includes the substantially equivalent replacements of utility systems and related personal property/collateral equipment necessitated by incipient or actual breakdown. It includes restoration of function, usually after failure.

Resources Authority Warrant. A document granting authority to initiate, commit, obligate, and outlay funds for approved projects and activities. A CO will have a resources authority warrant.

Spare Parts. Items particular to a system or end item held in reserve or for backup. Spare parts typically should not be part of a facility project AFPCE.

Special Test Equipment (STE). Single or multipurpose integrated equipment engineered, designed, fabricated, or modified to accomplish special purpose testing. This includes items or assemblies of equipment including foundations and similar improvements necessary for installing special test equipment, and standard or general-purpose items or components that are interconnected and interdependent to become a new functional entity for special testing purposes. STE is assembled and subsequently removed from a facility within a defined timeframe that is significantly less than the life of the building or structure. STE is not required to make a building or structure functional and is therefore not included in the AFPCE (typically funded independently by programs or customers).

Substantial Completion. The status of a facility project that has completed all required inspections and any discrepancies recorded on a "punch list" (any discrepancies recorded on the punch list that do not require further reinspection).

SIES. A CoF funding allowance used to provide services including, but not limited to, the necessary controls to ensure contractor conformance to Government-furnished drawings and specifications. In addition, SIES can fund services to isolate exiting utilities, the review of equipment submittals and shop drawings, and surveying services.

Sustainability. Sustainability involves the design and management of built structures, whether at the scale of buildings, infrastructure, or urban environments; the performance of materials throughout their whole use cycles; and the use of renewable energy resources in building operation and maintenance to reduce global greenhouse gas emissions.

Systems Furniture (or Panel-Based System). Furniture whose foundational panels or frames can support surfaces and other components and can be configured to form workstations and delineate space. Typically, the units are designed to distribute 120 V power and communications cabling through the panels to the workstation.

Upward Variation. Changes to a Discrete Project budget (less than $500,000) that require notification (but not approval) by Congress. This action reprograms funding from Minor CoF MRC elements (Renewal, Repair, Demolition, Energy, or FP&D) to a Discrete Project. Upward Variation requests need to be approved and coordinated with the FRED Program Manager and the MSD Resource and Performance Management Office as soon as the need for a change is identified. An Upward Variation to a Discrete Project can occur a maximum of once per FY. Funds provided under an Upward Variation are to come from the same FY as the Discrete Project in need.

Usable. The product of a facility project that can be used for either it’s originally intended purpose or for some future need. As an example, a project intended to produce a large antenna could have work scope elements that include the installation of a foundation and a structural pedestal. If the full project scope is completed including the installation of the antenna, the project would be considered fully “functional.” However, if the project scope is reduced and only the foundation and pedestal are

completed, the structure could be considered as “usable” for either the installation of a future antenna or as a structural element for some other future need.

Utility Energy Services Contract (UESC). A partnership between a Federal agency and a serving utility company. Typically, the utility company arranges funding to cover the capital costs of a project, which are repaid over the contract term from cost savings generated by the energy efficiency measures. UESCs also can be partially or entirely direct-funded up front from agency funds.

Value Engineering. The systematic engineering process to determine the lowest practical overall cost of a facility consistent with the requirements of performance, reliability, and maintainability.

Work Breakdown Structure (WBS). A product-oriented hierarchical division of the hardware, software, services, and data required to produce the program/project end product(s) structured according to the way the work will be performed, reflecting the way in which program/project costs, schedule, technical, and risk data are to be accumulated, summarized, and reported. In the context of this document, the WBS is used when incorporating EVM.

Work Breakdown Structure (WBS) Number. A numbering system used in NASA’s financial system to identify how projects are structured under a program.

Workspace Accessories. Assorted equipment items that may be required by building personnel to perform their daily duties and are not to be included within a facility project AFPCE. This includes, but is not limited to, the following:

a. Boards and Easels: Includes whiteboards, dry-erase boards, tack boards, cork boards, display easels, table-top easels, and flip-chart holders.

b. Computer Accessories: Includes elevated computer stands, screen filters, keyboard trays, mouse pads, docking stations, monitor stands, and other accessories that support computer use.

c. Power and Data Accessories: Includes voice/data outlets, electrical distributors, and cable management products.

d. Task Lighting: Free-standing lighting fixtures to illuminate work surfaces.

e. Privacy/Boundary Screens: Free-standing, movable screens that define space and provide visual and/or acoustic privacy (not part of systems or modular furniture products).

Appendix B. Acronyms

A/E or A-E	Architect-Engineer
AA	Associate Administrator
ABA	Architectural Barriers Act
ADA	Americans with Disabilities Act
ADPM	Agency Demolition Program Manager
AED	Automated External Defibrillators
AFPCE	Approved Facility Project Cost Estimate
AHJ	Authority Having Jurisdiction
AMP	Agency Master Plan
ANSI	American National Standards Institute
ARC	Ames Research Center
ARPA	Archeological Resources Protection Act
ARRA	American Reinvestment and Recovery Act (2009)
ASBCA	Armed Services Board of Contract Appeals
ASHRAE	American Society of Heating, Refrigeration, and Air-Conditioning Engineers
ASTM	American Society for Testing Materials
ATF	Armstrong Test Facility (Component Facility, Glenn Research Center)
BCA	Building Commissioning Association
BIM	Building Information Model or Modelling
BIPV	Building-Integrated Photovoltaics
BMP	Best Management Practices
BTU	British Thermal Units
BY	Budget Year
CA	Commissioning Authority
CAD	Computer-Aided Design
CAM	Control Account Manager
CAS	Cross Agency Support (fund/budget term)
CatEx	Categorical Exclusion
Cat C	Category C Project
CBM	Condition-Based Maintenance (or Continuous-Based Monitoring)

CCB	Change Control Board
CCE	Current Cost Estimate
CCI	Consolidated Contract Initiative
CCTV	Closed Circuit Television Systems
CDF	Capitalization Determination Form
CDPM	Center Demolition Program Manager
CECR	Construction, Environmental Compliance and Restoration (Fund that includes Institutional and Programmatic CoF; and Environmental)
CEQ	Council on Environmental Quality
CFIP	Capitol Facilities Investment Program
CFO	Chief Financial Officer
CFR	Code of Federal Regulations
CII	Construction Industry Institute
CIPP	Capital Improvement Program Plan
CJ	Congressional Justification
CMc	Construction Manager as Constructor
CM&O	Center Management and Operations
CMMS	Computerized Maintenance Management System
CMr	Construction Manager At Risk
CNM	Center NEPA Manager
CO	Change Order or Contracting Officer
COBie	Construction-Operations Building Information Exchange
CoF	Construction of Facilities
COR	Contracting Officer's Representative
COSS	Center Operations Support Services
CPARS	Contractor Performance Assessment Reporting System
COTR	Contracting Officer Technical Representative
CPG	Comprehensive Procurement Guidelines
CPM	Critical Path Method
CR	Continuing Resolution
CRM	Cultural Resource Manager (previously Historic Preservation Officer)
CRV	Current Replacement Value

CSI	Construction Specification Institute
CUI	Controlled Unclassified Information
Cx	Commissioning
CY	Calendar Year
DB	Design-Build (contract)
DBT	Design-Basis Threat
DFRC	Dryden Flight Research Center
DHS	Department of Homeland Security
DMA	Deferred Maintenance Assessment
DoD	Department of Defense
DOE	Department of Energy
DSN	Deep Space Network (Component Facility, JPL)
EA	Environmental Assessment
ECIC	Engineering and Construction Innovation Committee
EC&R	Environmental Compliance and Restoration
EDD	Environmental Due Diligence
EE	Engineering Estimate
EEO	Equal Employment Opportunity
EIS	Environmental Impact Statement
EISA	Energy Independence and Security Act
EMCS	Energy Management Control Systems
E.O.	Executive Order
EPA	Environmental Protection Agency
EPACS	Enterprise Physical Access Control Systems
EPM	Executive Project Manager
EPR	Estimated Price Report
ESA	Exploration, Science and Aeronautics or Endangered Species Act
ESCO	Energy Service Company
ESPC	Energy Savings Performance Contract
EUL	Enhanced Use Lease (or Leasing)
EVM	Earned Value Management
EXC	Exploration Capability

FAD	Funding Approval Document
FAI	Federal Acquisition Institute
FAR	Federal Acquisition Regulation
FASAB	Federal Accounting Standards Advisory Board
FCP	Facility Closure Plan
FEMP	Federal Energy Management Program
FEP	Front-End Planning
FERP	Facilities Engineering and Real Property Division
FF&E	Fixtures, Finishes and Equipment
FMEA	Failure Modes and Effects Analysis
FMM	Financial Management Manual
FMP	Facilities Master Plan
FMS	Facilities Management System
FONSI	Finding of No Significant Impact
FP&D	Facility Planning and Design
FPB	Facilities Program Board (now defunct)
FPM	Facility Project Manager
FPMP	Facility Project Management Plan
FPN	Facility Project Number
FPR	Facility Project Requirements or Facility Project Review
FPT	Functional Performance Tests
FRB	Facilities Review Board (now defunct)
FRD	Facility Requirements Document
FRED	Facilities and Real Property Division (NASA Headquarters)
FSC	Federal Supply Catalog
FS&GS	Flight System and Ground Support
FSMP	Facility Safety Management Plan
FUO	Facility Utilization Officer
FURB	Facility Utilization Review Board
FY	Fiscal Year
G&A	General and Administrative
GBA	Green Building Advisor

GBI	Green Building Institute (for Green Globes)
GFE	Government-Furnished Equipment
GFP	Government-Furnished Property
GIS	Geospatial Information System
GMP	Guaranteed Maximum Price
GRC	Glenn Research Center
GSA	General Services Administration
GSE	Ground Support Equipment
GSFC	Goddard Space Flight Center
HASP	Health and Safety Plan
HABS	Historic American Buildings Survey
HAER	Historic American Engineering Record
HSF	Human Space Flight
HQ	Headquarters (NASA)
HUD	U. S. Department of Housing and Urban Development
HVAC	Heating, Ventilation, and Air-Conditioning
IAQ	Indoor Air Quality
IBC	International Building Code
ICC	International Code Council
IDIQ	Indefinite Delivery, Indefinite Quantity
IDS	Intrusion Detection System
IEQ	Indoor Environmental Quality
IESNA	Illuminating Engineering Society of North America
IFB	Invitation for Bid
IOP	Integrated Operations Plan or Initial Operating Plan
ISC	Interagency Security Committee
ISDL	Institutional Safety Discipline Leads
IST	Integrated Systems Test
IT	Information Technology
IV&V	Independent Verification and Validation Facility (Component Facility, GSFC)
JOFOC	Justification for Other than Full and Open Competition
JPL	Jet Propulsion Laboratory

JSC	Johnson Space Center
KDP	Key Decision Points
KIC	Knowledge Information Center
KSC	Kennedy Space Center
LAPM	Local Authority Project Manager (unique to KSC)
LaRC	Langley Research Center
LCCA	Life-Cycle Cost Analysis
LEED	Leadership in Energy and Environmental Design
LLIS	Lessons Learned Information System
LS	Lump Sum
M&O	Maintenance and Operations
MACC	Multiple Award Construction Contract
MAF	Michoud Assembly Facility (Component Facility, MSFC)
MRC	Minor Revitalization and Construction
MRI	Mission Relevancy Index (Replaces Mission Dependency Index - MDI)
MdM	Meta-data Management
MS	Mission Support
MSC	Mission Support Council
MSD	Mission Support Directorate
MSFC	Marshall Space Flight Center
N/A	Not Applicable
NAGPRA	Native American Graves Protection and Repatriation Act
NAIS	NASA Acquisition Internet Service
NASA	National Aeronautics and Space Administration
NAVFAC	Naval Facilities
NC	New Construction
NCS	National CAD Standard
NEHRP	National Earthquake Hazard Reduction Program
NEPA	National Environmental Policy Act
NF	NASA Form
NFPA	National Fire Protection Association
NFS	NASA FAR Supplement

NHPA	National Historic Preservation Act
NIBS	National Institute of Building Services
NID	NASA Interim Directive
NIPR	NASA-Interagency Purchase Request
NIST	National Institute of Standards and Technology
NODIS	NASA Online Directives Information System
NOJMO	NASA Office of JPL Management and Oversight
NPD	NASA Policy Directive
NPG	NASA Procedures and Guidelines
NPR	NASA Procedural Requirement
NRC	National Research Council
NSBF	National Scientific Balloon Facility
NSPE	National Society of Professional Engineers
NSS	NASA Safety Standard
NTP	Notice to Proceed
OA	Office of the Administrator
OCFO	Office of the Chief Financial Officer
OMB	Office of Management and Budget
OMC	Operations Management Council (being replaced with the MSC)
OMFIT	Operations and Maintenance Facilities Innovations Committee
OP	Operating Plan
OPC	Operating Plan Change
OSHA	Occupational Safety and Health Administration
OSI	Office of Strategic Infrastructure
P&ID	Piping and Instrumentation Diagram
PA	Programmatic Agreement
PA&E	Office of Program Analysis and Evaluation
PAM	Partnership Agreement Maker
PCSD	President's Council on Sustainable Development
PD	Program Direct
PDRI	Project Definition Rating Index
PER	Preliminary Engineering Report

PES	Preliminary Environmental Survey
PGM	Programmed Maintenance
PMC	Program Management Council
PM	Preventive Maintenance
PMP	Project Management Plan
PP&E	Property, Plant and Equipment
PPBE	Programming, Planning, Budgeting and Execution
PPBES	Programming, Planning, Budgeting and Execution System
PR	Procurement Request
PRG	Program Resource Guidance
PT&I	Predictive Testing and Inspection
PY	Program Year
QA	Quality Assurance
R&D	Research and Development
RAC	Risk Assessment Code (Used by Safety and Health)
RbyIR	Renewal by Incremental Repair
RCB&EA	Reliability Centered Building and Equipment Acceptance
RCM	Reliability- Centered Maintenance
RCRA	Resource Conservation and Recovery Act
RECO	Real Estate Contracting Officer
REV	Review or Revision
RFI	Request for Information
RFP	Request for Proposal
RFQ	Request for Quote
RG	Resource Guidance
ROD	Record of Decision
ROI	Repair of Obsolete Items
RPAO	Real Property Accountable Officer
RPMP	Real Property Management Plan
RPMS	Real Property Management System
SAP	NASA's Core Financial System (Software Package)
SBIC	Sustainable Buildings Industry Council

SBPD	Summary Brief Project Document
SCAP	Strategic Capabilities Asset Program
SEMP	Systems Engineering Management Plan
SF	Standard Form or Subcontractor-Furnished or Square Feet
SHPO	State Historic Preservation Office
SIES	Supervision, Inspection, and Engineering Services
SII	Strategic Investment Initiative
SMACNA	Sheet Metal and Air Conditioning National Association
SMC	Strategic Management Council
SME	Subject Matter Expert
SOW	Statement of Work
SpecsIntact	Specifications-Kept-Intact
SPG	Strategic Planning Guidance
SR	Service Request
SS	Special Studies
SSA	Source Selection Authority
SSC	Stennis Space Center
STE	Special Test Equipment
SUB	Subcontractor
TAB	Testing, Adjusting, and Balance
TBCx	Total Building Commissioning
TC	Trouble Call
TCRPMD	Technical Capabilities and Real Property Management Division
TM	Technical Manual
UCS	Utilities Control System
UESC	Utility Energy Service Contract
UPN	Unique Project Number
USACE	United States Army Corp of Engineers
U.S.C.	United States Code
USDA	U. S. Department of Agriculture
USGBC	U. S. Green Building Council
VA	Value Assessment

VE	Value Engineering
VM	Value Management (incorporates Value Engineering and Value Assessment)
WBDG	Whole Building Design Guide
WBS	Work Breakdown Structure (or Work Breakdown Structure number)
WFF	Wallops Flight Facility (Component Facility, GSFC)
WSTF	White Sands Test Facility (Component Facility, JSC)
YR	Year

Appendix C. Compliance Matrix

Doc. Sec.	Requirement	Compliance			Waiver		Reference/ Comment
		Yes	No	Partial	Yes	No	
1.3.3	FRED issues a yearly Program-Direct CoF Data Call to the Mission Directorates for candidate projects in accordance with the Strategic Programming Guidance (SPG) and the Program Resource Guidance (PRG) budget process. The Exploration CoF, Space Operations CoF, Science CoF and Aeronautics CoF Programs will each have a designated individual to coordinate the CoF Projects for that given Program. The purpose of this data call is to ensure that FRED understands the intent of candidate projects and to ensure compliance with applicable Agency and Federal policies. Candidate projects should be clearly identified and supported by both programmatic and facilities personnel at the Center in which the project is to be executed. In addition, the Center CoF Program Manager shall clearly understand and support the candidate project(s).						
1.3.8	All project increments and AFPCEs will be clearly defined and fully disclosed to FRED using NF-1509, Facility Project Approval & Cost Estimate Document prior to execution of the first project increment. Also, the FPM shall submit a separate NF 1739, CDF for all project increments and an NF-1046 within 30 days of completion of each increment.						
1.5.3	Center CoF Program Managers also shall assume responsibilities for their component facilities.						

1.5.3.1	Center Program Managers also shall be involved on a regular basis in their relevant communities of practice supported by FRED.						
1.6.1.1	Center CoF Program Managers shall provide full disclosure of the facility project's scope, justification, and overall cost to FRED, who will subsequently inform Congress (as applicable).						
1.6.1.5	In accordance with NPR 8800.15, Real Estate Management Program, Chapter 2 Real Property Accountability, FPMs shall notify the Center RPAO of the completion of a facilities project.						
1.7.3	The Center-assigned FPM shall establish the project scope in cooperation with Center management, other project stakeholders, and affected Safety and Mission Assurance discipline leads.						
1.7.5 a	The FPM shall include a statement on the NF-1509 that explains the scope of the phase, how many phases are planned, and the associated estimated AFPCE of all phases.						
1.7.5 b	The FPM shall submit a separate NF 1739, CDF for all project phases and an NF-1046 within 30 days of completion of each phase.						
1.7.5.1	The Agency CoF Program Manager, in accordance with the Control Account Manager (CAM), shall develop and submit a budget request (five-year plan) in accordance with the annual guidance issued through the NASA OCFO. (See NPR 9420.1, Budget Formulation.)						
1.7.6	The Center CoF Program Manager, CD PM, and Energy Program Manager (as applicable) shall prepare documentation to be uploaded into the FRED-approved database for approval.						

1.7.6 a	The FPM shall generate [NASA Form 1509] at the time of project formulation and update and resubmit this form for all subsequent funding requests (e.g., final design funding, construction funding, construction funding, and as funding is added to or subtracted from the AFPCE during execution).						
1.7.6 e	For projects with an AFPCE equal to or greater than $1 million, Center CoF Program Managers shall upload the LCCA into the FRED-approved database for approval prior to the release of final design funds.						
1.7.6 f	For each COF project, the FPM shall complete a Compliance Matrix (See Appendix C) and upload it into the FRED-approved database.						
1.7.7	FRED leads the review and prioritization of Institutional CoF Facility Projects proposed for NASA's five-year plan based on documentation provided by the Centers. This review includes an evaluation of existing capabilities to minimize or eliminate the creation of excess capacity within NASA or the private sector, e.g., construction of a ground-based test facility at a particular Center when there is adequate availability and capability to accomplish the same requirements at a different Center or in the private sector. For Facility Projects funded from other sources (e.g., Program-Direct, or local funds), FRED and the associated Mission Directorate shall coordinate the process.						
1.7.9.1	The Center CoF Program Manager< shall identify at risk projects to FRED as early in the FY as possible.						

1.8.1	Each Facility Project with an AFPCE of $100,000 or more will be documented on form NF-1509 and uploaded into the FRED-approved database. At a minimum, the Center POC (CoF Program Manager, FPM, or local authority project manager) shall submit the document and require concurrence and/or approval by the Agency POCs (CoF Program Officer or other) and the Director of FRED.						
1.8.2	Although Centers and Programs approve and fund these projects, FRED shall review the NF-1509 to ensure compliance with NASA policies and to prevent the appearance of fragmentation.						
1.8.2.1	For Locally Funded ROI Repair Projects with an AFPCE equal to or greater than $1 million (i.e., projects that conform to NPR 8831.2 requirements), FRED shall approve the NF-1509 prior to obligation of a construction contract.						
1.8.3.1	Center CoF Program Managers shall request funds for Preliminary Engineering Reports (PERs), final designs, and project-specific environmental and cultural resources assessments by updating and uploading the NF-1509 into the FRED-approved database.						
1.8.3.2	Center CoF Program Managers shall request construction funds by updating and uploading the NF-1509 and additional documentation (as defined by FRED) into the FRED-approved database.						
1.8.8	FPMs shall request facility project approval by submitting a record via the FRED-approved database.						

1.8.13	Center CoF Program Managers shall maintain records of their Center's ongoing CoF Program in each FY in accordance with NPR 1441.1, NASA Records Management Program Requirements.						
1.9.3	If the matter relates to Institutional Safety Authority, where disagreement involves an Institutional Safety Discipline Lead (as defined in NPR 8715.1, Section 2.6), the FPM's supervisor shall document their decision via the request for a relief process as outlined in NPR 8715.1 Section 3.2.						
1.10.1.1	FPMs shall ensure that all major modification and new construction projects comply with the requirements of under the Guiding Principles for Sustainable Federal Buildings, Council on Environmental Quality, as well as Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability, E.O. 14057.						
1.10.2.1	The FPM, in concert with the Center CoF Program Manager, the Center Sustainable Facilities Coordinator, and the RPAO shall ensure that construction of new buildings or major modification of existing buildings is certified per the requirements of one of the following third-party certification systems (at the indicated certification level or higher): a. Leadership in Energy and Environmental Design (LEED) v4 for Building Design and Construction, U. S. Green Building Council (USGBC) – for new building construction and major modifications of buildings. Projects are to strive to achieve a minimum level of LEED Silver certification. b. Green Globes® for New Construction (NC), Green Building Initiative – for new building construction and major						

	modifications of buildings. Projects are to strive to achieve a minimum level of two Green Globes.						
1.10.3	If the FPM does not think compliance with the minimum USGBC LEED and/or GBI Green Globes requirements is reasonable for a particular project, the FPM shall submit a letter to the Director of FRED requesting a waiver that explains why compliance is impractical.						
2.1.1	The Center CoF Program Manager shall develop a systematic process for developing projects for submission in response to CoF data calls issued by the FRED.						
2.2.1	The FAR and the NASA FAR Supplement specify the requirements for contract acquisitions that support all phases of Facility Projects. The FPM and the Center's Facility Planning Office shall coordinate all acquisition planning and execution, including the utilization of Regionalized or Centralized facilities contracts, with the Center's Procurement Office to ensure compliance with these regulations.						
2.2.3	For Program-Direct CoF projects, the FPM shall coordinate with the sponsoring Mission Directorate to capture the necessary project requirements.						
2.2.4	With support from an assigned project team (see section 2.2.4.4), the FPM shall organize, manage, and direct Facility Projects in accordance with the requirements of this NPR.						
2.2.6.4	The Center Facilities Planning Office shall complete a Functional Requirements Document that contains the comprehensive project requirements obtained from the Facility Project Team and details for all the necessary project disciplines.						

	disciplines.						
2.2.7	For Institutional and Program-Direct CoF projects, the FPM shall prepare a FPMP that establishes a schedule for implementing a facility project, assigns roles and responsibilities, and indicates technical and budget decision authorities required to execute the project.						
2.2.7.2	Prior to the start of final design work, the FPM shall present the FPMP to the Center official(s) exercising project technical approval authority.						
2.2.7.2 a	The FPM shall submit the FPMP to the FRED CoF Program Officer for review and approval.						
2.2.7.2 b	The FPM shall provide the FPMP to the FRED CoF Program Officer upon request.						
2.3.4	For Facility Projects where BIM is to be used, the FPM shall reference NASA-STD-10001, NASA BIM Scope of Services and Requirements for Architects and Engineers.						
2.3.8.1	The FPM and the Center Institutional Safety Discipline Leads shall identify safety and occupational health requirements as required by NPR 8715.1 and NPR 8715.3, NASA >General Safety Program Requirements. The FPM will then prepare a Preliminary Hazards Analysis and a Preliminary Hazards List.						
2.3.8.2	The FPM, in collaboration with the Center Institutional Safety Discipline Leads, shall initiate the preparation of the FSMP to ensure that facility safety requirements are addressed throughout the entire life cycle of the facility project.						

2.3.10	Facility Projects often require construction/installation of new IT infrastructure or the repair/replacement of existing antiquated IT infrastructure. In these cases, the FPM shall coordinate these project requirements with the Center's OCIO to ensure that the IT infrastructure meets current NASA standards, integrates with existing NASA systems includes establishing and implementing appropriate IT system security plans security plans.						
2.4.2	For new construction and major modification projects, the Center Master Planner shall coordinate the development of the LCCA during the planning phase in accordance with the NASA Business Case Guide for Real Property and Facilities Project Investments.						
3.1.2	The FPM shall keep the Facility Project Team, the FRED Executive Project Manager (if applicable), the FRED CoF Program Officer, the CNM, and the Center CRM, apprised of all changes or proposed changes in project requirements.						
3.1.3	For Program-Direct CoF Space Flight and/or R&D projects, the FPM shall coordinate the final design effort with the sponsoring Mission Directorate POC.						
3.2.1	Whenever commercial A-E services are required, the FPM and the Center Procurement Office's assigned CO shall acquire those services in accordance with the FAR Part 36 and NFS.						
3.4.5	The FPM and the Facilities Project Team shall perform a PDRI exercise immediately upon the completion of the PER.						

3.5.2	The FPM shall plan and manage the procurement of final design services to achieve the goal of obligating 85 percent of all approved design funding by the end of the FY (assuming that the remaining 15 percent of unobligated funding is required for Contingency and Other Burden Costs).						
3.5.3	For all Facility Projects, the FPM shall include a statement in the A-E SOW indicating that the design entity is responsible for designing the project in accordance with the estimated cost of construction provided by the Government.						
3.5.7	The FPM shall develop an SOW such that the A-E contractor can provide a firm fixed-price cost to provide the design required services.						
3.5.8	At the conclusion of the design-build contract, the FPM shall ensure that a complete set of as-built drawings and/or a BIM is provided by the A-E contractor.						
3.6.1	The FPM shall ensure that the design-bid-build final design SOW specifies formal submissions from the A-E firm (and subsequent NASA reviews) at the 30 percent, 60 percent, and 90 percent level of final design completion.						
3.6.1.2	The FPM shall engage an independent entity (e.g., third-party Center individual, Agency PDRI team) to score the project using the PDRI process within two weeks after receipt of the 30-percent design documents.						
3.6.1.2 a	If the 30-percent final design PDRI score is over 200 out of a possible 1,000 points, the FPM shall immediately notify the assigned FRED CoF Program Officer and the Executive Project Manager (if applicable).						

	Manager (if applicable).						
3.6.1.2 b	If the PDRI score is 200 or below, the FPM shall provide the score to the assigned FRED CoF Program Officer and the Executive Project Manager (if applicable) for information only and proceed with the remainder of the final design activities.						
3.6.1.2 c	The FPM shall record the 30-percent PDRI score on the NF-1509 when requesting construction funding.						
3.6.1.3	The A-E firm shall furnish the following deliverables for [the 60- Percent Final Design] submission: a. A drawing package with a cover sheet including a drawing index, initial versions of drawings and equipment schedules for all required disciplines. Although the drawings will be in varying states of maturity, the set should be complete enough to validate the construction cost estimate. The drawings should reflect adequate M&O clearances around all equipment and systems. b. First draft of construction specifications including all required sections for each discipline that are edited to reflect the project requirements. c. Completed design analyses and supporting engineering calculations. d. A second draft of the construction phasing plan and the commissioning plan. e. First draft of the construction schedule identifying key milestones and utility tie-in requirements. f. Identification of any constructability issues. g. A comprehensive construction engineering estimate and AFPCE in accordance with Section 3.5.7.2.f above.						

3.6.1.4	The A-E firm shall address all of NASA's 90-percent comments prior to receipt of final payment.						
3.7.1	For each of the submission milestones indicated in Section 3.6, the FPM shall immediately distribute all materials received from the A-E firm to the Facility Project Team and any other project stakeholders including the FRED CoF Program Officer and the Executive Project Manager (if applicable), and the Center Institutional Safety Discipline Leads.						
3.8.1	NASA's Mission-Critical Technical Facilities per NPR 7120.5. These facilities are constructed or significantly modified for ground testing or deployment of space flight hardware and systems. The FPM (per NPR 7120.7 and per NPR 7120.8) shall comply with the requirements of NPR 7120.5 and this document.						
3.9.1	During the Final Design phase, the FPM shall complete the estimate of the activation budget started during the planning process.						
3.9.5	The FPM shall identify the full activation cost requirements on NF 1509.						
4.1.3 a	For Facility Projects with an AFPCE of $500,000 or greater, the FPM shall complete form NF-1739 prior to generating any project purchase requests (e.g., contracted A/E services for a PER of Final Design) and submit the completed form to the Center OCFO's property accountants and the RPAO.						
4.1.3 b(1)	For Facility Projects with an AFPCE of $100,000 or greater, the FPM shall complete form NF-1046upon completion of the construction activity per the requirements in NPR 8800.15.						

	per the requirements in NPR 8000.4B.						
4.1.3 b(2)	For new construction and major modification, the FPM shall submit a completed NF-1046 to the RPAO at the time of issuance of Beneficial Occupancy and updated and resubmitted at the time of project financial completion.						
4.1.3 b(3)	For Repair and Energy Projects, the FPM shall submit a completed NF-1046 to the RPAO at the time of project financial completion.						
4.2.1	The Center CoF Program Manager shall submit documents for FRED review and approval via the FRED-approved database.						
4.2.3	The Center CoF Program Manager shall ultimately obtain approval from the assigned Agency CoF Program Officer on the method of construction.						
4.2.3.4	If a Center service contract (e.g., M&O contract, engineering service contract) is being considered for construction execution, the FPM shall consult with the Center CoF Program Manager and the CO/COR assigned to the contract during the final design phase.						
4.2.4 b.	The CO shall provide direction for the required content of the acquisition package; however, at a minimum for design-bid-build contracts, the package includes a Government cost estimate, the design documents, and either funds or a planning purchase request with the funds source identified.						
4.2.4 d	The CO shall issue Notice to Proceed (NTP) to the Contractor after the contract is awarded.						

4.2.6	The FPM, in conjunction with the Center CoF Program Manager, shall prepare and submit an NF 1579 to the assigned Agency CoF Program Officer for all Institutional and Program-Direct CoF Projects (MCR and Discrete).						
4.3.2	During the administration of the construction contract, the COR shall establish a formal Partnering program for all facilities projects with an AFPCE of $20 million and greater, as defined in Partnering, NFS Subpart 1836.70; 48 CFR Chapter 18; and Construction of Facilities: NASA Partnering Desk Reference.						
4.3.6	For projects that include a BIM model as part of the final design deliverables, the FPM shall include requirements within the construction contract for the contractor to maintain the BIM model throughout the construction process.						
6.5.1.1	The CDPM and the RPAO shall submit a draft of the Title V – Property Survey, Federal Property Information Checklist to FRED via the FRED-approved database.						
6.5.1.3	Upon completion of the evaluation of alternatives to demolition, the CDPM and the RPAO shall submit a formal Authority to Dispose/Demolish letter to the Center Director for signature.						
6.6.2	The CDPM shall identify the earliest demolition date for candidate projects within the 5-year period and identify any schedule constraints.						
6.6.3	For projects to be executed in the first year of the five-year Demolition Plan, the CDPM shall submit a project narrative, form NF-1509, the Approved Authority to Dispose/Demolish Letter, and the HUD Screening Documentation via the FRED-approved database.						

	via the FRED-approved database.						
6.7.2.	The CPDM shall utilize the Demolition Planning Checklist to create a Demolition Project Management Plan.						
6.7.3.2	The CDPM shall request funding for the demolition of facilities by submitting updated form NF-1509 in the FRED-approved database and other documentation as identified by the ADPM.						
6.7.4.2	The FPM shall complete an Environmental Checklist, as detailed in Chapter 2, to ensure compliance to NEPA, NHPA, and other environmental compliance requirements.						
6.7.10	The CDPM or the FPM shall ensure that a Safety Baseline Survey that conforms with NPR 8800.15, Chapter 7 is performed as part of the decommissioning process.						
6.7.11	12 months prior to the start of demolition, the CDPM or the FPM shall communicate information about the proposed demolition and the associated impacts to Center stakeholders.						
6.7.13	Upon completion of a demolition project, the FPM shall submit form NF-1046 to the RPAO.						
7.1.1	Mission Directorate POCs, Agency Portfolio Managers, Center CoF Program Managers, FPMs, RPAOs , COs, and RECOs shall ensure that the requirements of Chapter 7 are included in real estate agreements that include construction activities.						
7.1.3	The NASA personnel involved in developing real estate agreements shall stipulate that new facilities constructed by tenants on NASA-owned property will be demolished upon expiration of the agreement.						

7.4.1	The NASA-designated FPM representing a Federal or commercial entity shall submit a waiver request and a supporting business case when the planned project seeks relief from the design and construction requirements specified in this NPR.						
7.4.2	Along with the justification for a waiver, the requestor shall include the alternative solution proposed to compensate for the relief requested.						

Appendix D. Facility Project Construction Cost Estimates

D. 1 Engineering Estimate (EE) for Construction. The EE is typically the construction estimate that is either generated in-house or received from an Architectural/Engineering (A/E) firm that does not account for escalation nor include markups for contingency, SIES, or other burden costs. For a facility project, a comprehensive EE includes but is not limited to the current local costs of the following:

a. Land acquisition (not typically a requirement of most Facility Projects).

b. Environmental and Cultural Resource compliance, protection, and hazardous material mitigation.

c. Construction labor and materials including:

(1) Any required demolition of facilities, foundations, equipment, or systems to clear a site for new construction or areas within an existing building to facilitate repairs or major modifications.

(2) Civil site preparation, utilities, and pavements.

(3) Concrete foundations, structural steel, and carpentry.

(4) Architectural conveyances (lifting devices, elevators, etc.), interior/exterior systems and finishes.

(5) Heating, ventilating, and air conditioning HVAC equipment, systems, and controls.

(6) Plumbing fixtures and systems.

(7) Process systems liquid/gas storage, piping distribution, and controls.

(8) Electrical power distribution, lighting systems, and controls.

(9) Life safety systems and fire detection and suppression systems.

(10) IT communications backbone (internal building cable plant and terminations at signal outlets; not including computer servers or racks).

(11) Physical security systems and access control.

d. General conditions, insurance bonds, and taxes.

e. Prime contractor and subcontractor costs including mobilization/demobilization, supervision, overhead, and profit.

f. Material and equipment tests performed at the construction site or at an offsite location (e.g., hydrostatic pressure testing or weld inspection of piping and vessels, end-to-end wire checks, rotational checks of installed motors).

g. Outfitting items to be purchased and installed under the construction contract (refer to Appendix E).

h. LEED, Green Globes, or ENVISION requirements of the construction contractor.

i. Recordation of as-built conditions by the construction contractor (e.g., delivery of red-lined construction drawings and/or updated BIM models).

j. Third-party commissioning services during construction (purchased from an independent contract).

D. 2 AFPCE for Construction. The AFPCE is the value used to determine the type of facility project in accordance with the Agency-defined cost thresholds (e.g., Local, Minor CoF, Discrete CoF). Calculation of the AFPCE is accomplished by adding percentage amounts of the EE to account for items necessary to produce a functional (complete and usable) project. These items are as follows:

a. Escalation Amount to Midpoint of Construction. A percentage of the total EE to account for the escalation of costs from the time of the estimate to the mid-point of the construction phase. Percentages used for escalation can be based on OMB historical calculations or as directed by FRED.

b. Construction Contingency. A percentage of the escalated total EE (original EE plus the escalation amount to midpoint of construction) to account for unforeseen field conditions, construction package errors and/or omissions, and minor adjustments to the project scope (adjustments should not deviate significantly from the general scope outlined on the NF-1509). A typical construction contingency is 10 percent; however, this value should be adjusted based on the size and complexity of the project, 30 percent final design PDRI scores, and other factors.

c. SIES is an allocation of funds to procure services (typically from independent contracts) that are required to ensure construction contractor conformance to the Government-furnished drawings and specifications. This includes, but is not limited to, construction management, quality assurance inspection, surveying during construction, and review of equipment submittals, shop drawings and requests for information (referred to as “construction administration” services). A typical SIES allocation is 10 percent of the sum total of the escalated total EE and the amount allocated for construction contingency; however, this value should be adjusted based on the size and complexity of the project.

d. Other Burden Costs. An allocation of funds to procure services from independent contracts (e.g., in- house M&O contracts) such as existing utility isolation to facilitate construction contractor tie-ins; drafting services to produce formal as-built drawings from construction contractor-furnished red-line drawings; refurbishing, processing, testing, and/or shipping Government-furnished equipment (GFE) or systems for construction contractor installation; Cultural Resource mitigation; disposal of solid waste or hazardous materials. A typical Other Burden Cost allocation is from 2 percent to 4 percent of the escalated total EE amount; however, this value should be adjusted based on the size and complexity of the project.

D. 3 Other Related Costs. Facility project costs that are not included in the AFPCE but are required for facility operability and functionality. Funding for these items is not included under the CECR Account; hence, local Center funds or Program funds are required. Services, equipment, or systems considered as “Other Related Costs” include, but are not limited to, the following:

a. Site-wide Environmental Assessments (EAs) or Environmental Impact Statements (EIS).

b. Site-wide Cultural Resource compliance.

c. Permit actions.

d. Program scheduling.

e. STE.

f. Integrated Systems Tests.

g. Outfitting items not covered under the CoF budget (see Appendix E).

h. Personnel moving costs.

i. Personnel travel required for the project.

j. Temporary housing.

k. Spare parts.

l. Extended warranties.

Appendix E. Facility Project Funding Guidance Table

(Items not included below are subject to the approval of FRED)

Items that Need to be Included Within a CoF Project AFPCE (e.g., funded under the CECR Account)	Funded by Either CoF or Non-CoF Sources (Requires FRED Approval)	Items Requiring Non-CoF Funding Sources (e.g., I&TC, 2-Year Program Funds)
Architectural/Structural/Civil Systems: • Building structural systems (foundations, walls, floors, structural steel). • Civil site work. • Underground utilities including water, sewers, natural gas, steam, chilled water, and high/low voltage electrical. • Pavements including roads, bridges, parking lots, and sidewalks. • Roofs (including access hatches & platforms). • Doors (manual, automatic, roll-up, etc.). • Original finished flooring treatments and ceiling placement. • Elevators and support systems including controls and software programs. • Cranes including control systems and software programs. • Interior/exterior affixed platforms. • Demountable partitions included as a designed	**Note: These items are not required to produce a functional project.** **Architectural/Structural/Civil Systems:** • Office furniture including Systems, Modular or Conventional. • Office chairs. • Trash & waste cans and receptacles. • Demountable partitions. • Furniture for file/storage rooms, break rooms, lobbies, mail/copy rooms. • Janitorial room furnishings. • Laboratory furniture (not including laboratory specialties such as microscopes, test equipment, etc.). • Building exterior furniture (benches, picnic tables, chairs, etc.). • File or material storage & handling systems such as heavy-duty shelving. • Appliances for breakrooms - Standard 120 V power draw (is to be Energy-Star rated). • Vehicle and ground	**Note: These items are not required to produce functional project.** **Architectural/Interior Design Requirements:** • Clocks (120 V powered, or battery powered). • Stand-alone building/lobby displays or display cabinets. • Window treatments such as traditional curtains and manually controlled blinds, etc. • Workspace accessories. • Copy machines, FAX machines and scanners. • Computers for personnel use. • Removable platforms. • Platform-vehicle specific interfaces. • User supplied equipment and associated installations.

wall.
- Building/lobby built-in display elements (included in design drawings).
- Window treatment systems that are controlled or are included in building design drawings.
- Raised, electrostatic discharge (ESD) or conductive flooring.
- Chemical storage areas.
- Affixed laboratory equipment and systems including work benches, sinks, cabinets, exhaust hoods.
- Affixed cafeteria, kitchen and breakroom equipment, sinks, cabinets, and exhaust hoods.
- Display areas - built in (included in design).
- Built-in lockers (included in design drawings.
- Building signage (interior & exterior).
- Petroleum, oils, & lubricants storage and handling buildings & sheds.

Mechanical, Plumbing & HVAC Systems:

- Interior potable & non-potable water distribution including backflow prevention and metering.
- Interior building sanitary & storm sewer plumbing

command, control, and range systems.

Personnel & Equipment Moves/Relocations:
Personnel & equipment temporary moves to facilitate construction activities. Includes relocation costs for occupants, equipment, and material storage.
Examples:

- Infrastructure Project: Work scope includes relocation of outside exhibits in support of below-grade work, and subsequent reinstallation.
- Repair Project: Scope includes the temporary relocation of employees from areas to facilitate repairs and subsequent returns to the space.
- Modifications of underutilized spaces to accommodate personnel & equipment moves to enable building demolition (Consolidation Project), associated move costs for personnel and equipment.

Electrical Power, Lighting & Communications Systems:

- Uninterruptable Power System (UPS) battery and inverter replacements.
- Communications - cross country distribution & network systems running in duct banks (outside the building 5 ft. boundary).
- Communications -

- User specific/beyond project scope activities. Example: Wall/Ceiling mods in support of users' 3-D analysis system being brought into a new conference room.

Personnel Moves/Relocations:

- Move costs for personnel permanently relocating into a new or modified facility.

Mechanical/Electrical Systems:

- Connections between mobile mechanical/electrical items and building interfaces such as flexible hoses, removable connector piping, electrical umbilical cords, etc.
- Spare Parts.
- Mobile equipment such as forklifts, pallet jacks, electrical equipment to remove motor control center buckets, etc.
- Purchase, installation, and calibration of user-supplied mechanical/electrical equipment.

New Construction or

& vents.
- Plumbing fixtures (sinks, toilets, drinking fountains, janitorial slop sinks, hose bibs).
- Water treatment systems.
- HVAC equipment (central, underfloor, and/or permanently affixed.
- HVAC ductwork, louvers, distribution boxes and grills.
- HVAC environmental control systems, instrumentation, and meters.
- Interior building steam, chilled water, heated hot water, and natural gas distribution systems and metering.
- Process piping, control valves and components.
- Affixed exhaust systems.
- Fluids & compressed gas systems (storage, transfer & distribution, regulator panels, controls & meters).
- Cryogenic storage, transfer & distribution systems.
- Hydraulic systems that support institutional systems.
- Affixed propellant and fuel storage, transfer & distribution systems.
- Laboratory exhaust hoods & snorkels.

Electrical Power, Lighting & Communications Systems:

- Power systems equipment building backbone systems including trunk wiring, raceways, cable trays, conduits, conduits, junction & terminal boxes, and endpoint termination devices.
- Communication and video system electronics including telephone switches, LAN, VOIP, SONET, BCDS, OTV, SODN, video, OIS-D, and antennas.
- Communication/Security "end item" equipment and components to include, but not be limited to, equipment racks, floor box and wall outlets units including face plates, telephones, computers that support building support systems, wall-mounted monitors, paging & warning systems, cell signal amplifiers & support equipment, conference room system components, cameras, key card readers, and physical locks.

Other:

- Costs for adaptive reuse of a building to repurpose while keeping historic features.

Major Modification of Facilities Specific to a Program (e.g., Program-Direct CoF Project):

- Special Test Equipment (STE) purchase and installation including data collection and control systems specific to a test program.
- Integrated Systems Test (IST) of facility using STE.

including high & low voltage AC, DC & photovoltaic, transformers & panels.
- Power and communications distribution systems (above ground conduits, underground duct banks, etc.).
- Building lighting systems & controls (interior and exterior).
- Parking lot lighting.
- Premise wiring to signal outlets (LAN, telephone, VOIP, BCDS, OISD, fiber optics).
- Cross country distribution & network systems - Per Agency requirements.
- Initial affixed Uninterruptable Power Systems (UPS).
- Affixed emergency power generation systems.
- Paging & Area Warning Systems (PAWS).
- White noise systems.
- Labor for connecting electrical interfaces to Center-wide systems (typically provided by onsite contracts).
- Labor to support outages during installation (onsite contracts).

Life Safety & Security Systems:

- Fire suppression systems (water sprinkler systems, other fire suppression mediums)

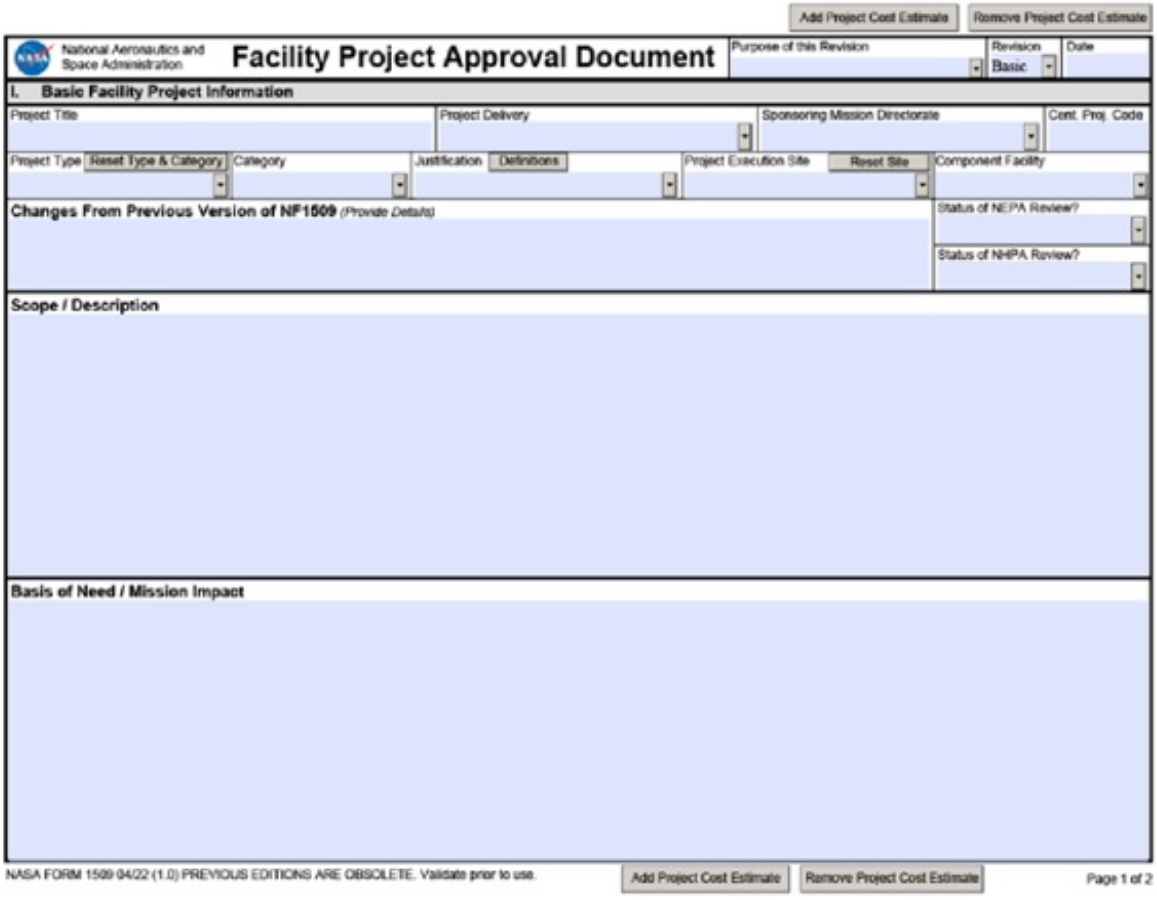
• Mechanical fire dampers and curtains. • Fire & smoke alarm, detection & monitoring systems. • Emergency lighting systems. • Egress signage. • Physical security access control systems (per Agency requirements). **Demolition:** • Any demolition activities required for a major modification (including but not limited to interior building demolition, collateral equipment • demolition, etc.).		

Appendix F. Instructions for Completion of NASA Form (NF) 1509, Facility Project Approval & Cost Estimate Document

F-1 General

Form NF-1509 Facility Project Approval & Cost Estimate Document provides the means for Centers to fully disclose facility project scope, justification, cost, and schedule to FRED and subsequently to Congress. This form, which replaces previous forms NF-1509 Facility Project – Brief Project Docment and NF-1510 Faciltiy Project Cost Estimate, should be updated several times as a facility project matures.

F-2 Instructions for Completion of NF-1509, Sections I through VIII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National Aeronautics and Space Administration
Facility Project Approval Document
Purpose of this Revision
Revision
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Date
I. Basic Facility Project Information
Project Title
Project Delivery
Sponsoring Mission Directorate
Cent. Proj. Code
Project Type
Reset Type & Category
Category
Justification
Definitions
Project Execution Site
Reset Site
Component Facility
Changes From Previous Version of NF1509 (Provide Details)
Status of NEPA Review?
Status of NHPA Review?
Scope / Description
Basis of Need / Mission Impact
NASA FORM 1509 04/22 (1.0) PREVIOUS EDITIONS ARE OBSOLETE. Validate prior to use.
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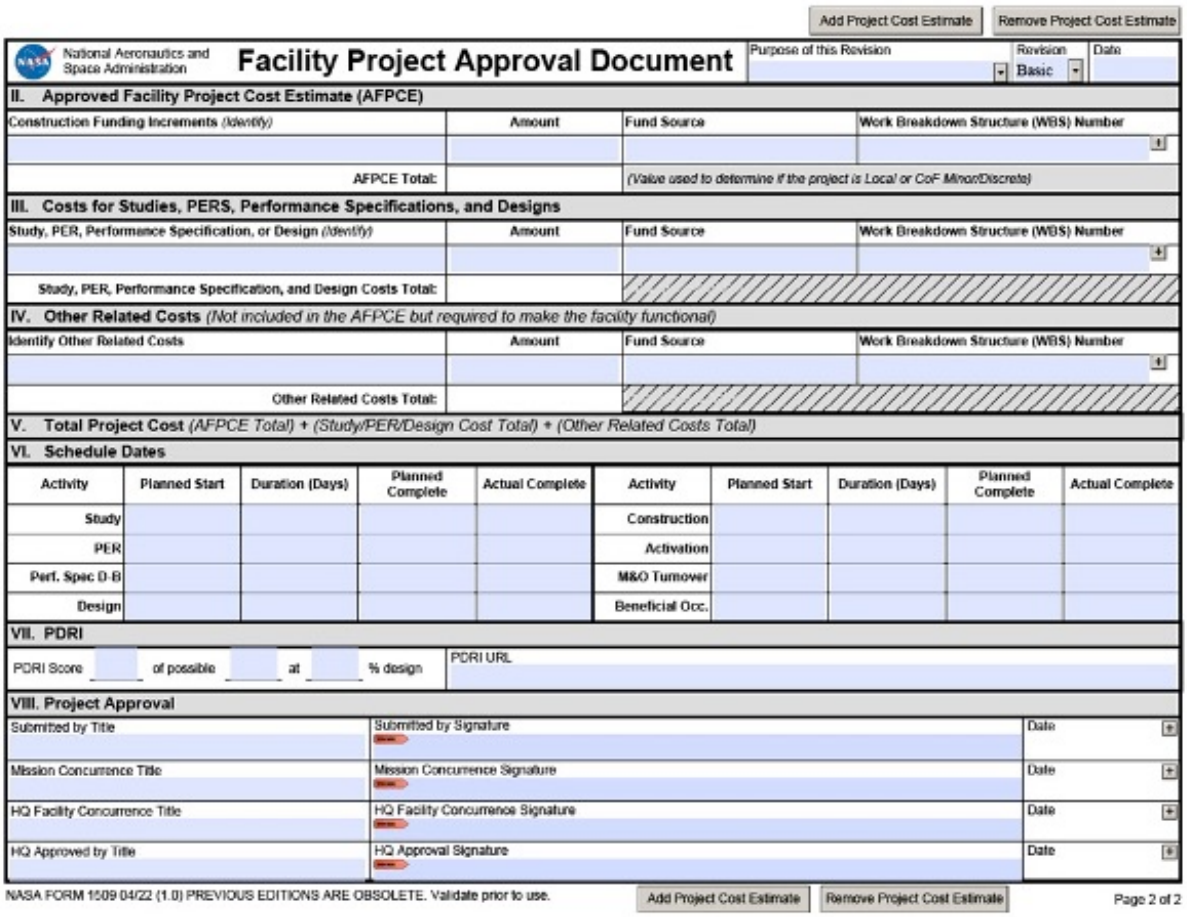
Page 1 of 2

Figure F-1, NASA Form 1509, Facility Project Approval & Cost Estimate Document, Page 1 of 4



Add Project Cost Estimate | Remove Project Cost Estimate

National Aeronautics and Space Administration

Facility Project Approval Document

Purpose of this Revision | Revision: Basic | Date

II. Approved Facility Project Cost Estimate (AFPCE)

Construction Funding Increments *(Identify)*	Amount	Fund Source	Work Breakdown Structure (WBS) Number
AFPCE Total:		*(Value used to determine if the project is Local or CoF Minor/Discrete)*	

III. Costs for Studies, PERS, Performance Specifications, and Designs

Study, PER, Performance Specification, or Design *(Identify)*	Amount	Fund Source	Work Breakdown Structure (WBS) Number
Study, PER, Performance Specification, and Design Costs Total:			

IV. Other Related Costs *(Not included in the AFPCE but required to make the facility functional)*

Identify Other Related Costs	Amount	Fund Source	Work Breakdown Structure (WBS) Number
Other Related Costs Total:			

V. Total Project Cost *(AFPCE Total) + (Study/PER/Design Cost Total) + (Other Related Costs Total)*

VI. Schedule Dates

Activity	Planned Start	Duration (Days)	Planned Complete	Actual Complete	Activity	Planned Start	Duration (Days)	Planned Complete	Actual Complete
Study					Construction				
PER					Activation				
Perf. Spec D-B					M&O Turnover				
Design					Beneficial Occ.				

VII. PDRI

PDRI Score ____ of possible ____ at ____ % design | PDRI URL

VIII. Project Approval

Submitted by Title	Submitted by Signature	Date
Mission Concurrence Title	Mission Concurrence Signature	Date
HQ Facility Concurrence Title	HQ Facility Concurrence Signature	Date
HQ Approved by Title	HQ Approval Signature	Date

NASA FORM 1509 04/22 (1.0) PREVIOUS EDITIONS ARE OBSOLETE. Validate prior to use.

Add Project Cost Estimate | Remove Project Cost Estimate

Page 2 of 2

Figure F-2, NASA Form 1509, Facility Project Approval & Cost Estimate Document, Page 2 of 4

The bolded titles in the following paragraphs provide cross references to the NF-1509 data cells shown in Figures F-1 and F-2.

Purpose of this Revision – Indicates the reason the author is issuing this version of the NF-1509. Select an entry from the drop-down menu that includes:

- Formulation
- Request Preliminary Engineering Report (PER) Funding
- Request Facilities Planning and Design (FP&D) Funding
- Request Additional Facilities Planning and Design (FP&D) Funding
- Request Construction Funding
- Request Additional Construction Funding
- Information Only
- Seek Headquarters (HQ) Approval
- Data Correction
- Project Completion
- Other

Revision – Indicates the version (or revision sequence) of an NF-1509 for a specific facility project. Updated revisions of the form are required as the project matures from the formulation phase through planning, study, PER, final design, construction, etc. Select an entry from the drop-down menu that includes:

- Basic (an indicator that this is the first version of the form to be submitted – usually at project formulation)
- A (the first revision of the form)
- B (the second revision of the form)
- C, D, E….as required for subsequent revisions.

Date – Select the submission date for this version from the drop-down calendar. This is often the same date as that selected for the "Submitted by Title Date" entry in Section VIII (but a matching date is not a requirement).

Section I. Basic Facility Project Information

Project Title – Manually enter a short, representative statement of the project. The title should start with the Project Category (Renewal, Repair, etc.), the system or property/building to be impacted, and the property/building number. The property/building name and number should match the official name and number recorded in the Agency's RPMS.

Examples: Repair City Water Piping System, Property No. 3907
Repair HVAC and Plumbing Systems, Engine Research Building No. 5

Project Delivery – Facility Projects can be executed through several industry-recognized delivery methods. Select an entry from the drop-down menu that includes:

- Design-Bid-Build
- Design-Build
- Construction Manager as Contractor (CMc)
- Construction Manager at Risk (CMr)
- Other

Note: If "Other" is selected, indicate the project delivery method in the "Scope/Description" Cell)

Sponsoring Mission Directorate – Funding for Facility Projects can be furnished by any of NASA's Mission Directorates. Depending on the project category and the AFPCE amount, projects can be either funded directly or by transferring funds into the Construction, Environmental Compliance, and Restoration (CECR) Mission. Some projects can also be split-funded amongst multiple Mission Directorates. Select an entry from the drop- down menu that for the Mission Directorate that is sponsoring (supplying funds for) this Facilities Project:

- Mission Support
- Exploration Systems Development
- Space Operations
- Aeronautics Research
- Science
- Space Technology
- Split-Funded
- Other

If this is a Local Project (e.g., funded with Center I&TC) or an Institutional CoF Minor/Discrete project, enter "Mission Support." If the project is split-funded, select "Split-Funded" and indicate the

Mission Directorate sponsors under the “Scope/Description” section and the respective funding allocations for design or construction in Sections II and III.

Center Project Code – Manually enter a Center-designated project number (Center’s determine the numbering convention). This number is typically used at Centers to track internally track project progress. This number has no significance to NASA HQ.

Project Type and Project Category
The data cells for Project Type and Project Category are interconnected. Depending on the selection from the drop-down menu for the Project Type cell, the available Project Category selections will be automatically determined. Fields in both cells can be cleared by hitting the “Reset Type & Category” button.

The Project Type identifies the nature of the facilities project to be executed. Select an entry from the drop- down menu that includes:

- Local Project
- Institutional CoF - Minor
- Institutional CoF - Discrete
- Program Direct CoF - Minor
- Program Direct CoF - Discrete
- Supplemental - Minor
- Supplemental - Discrete
- Enhanced Use Lease (EUL)
- National Historic Preservation Act (NHPA)
- Energy Savings Performance Contract (ESPC)
- Utility Energy Services Contract (UESC)
- Tennant Improvement
- Category C (Cat C)
- Other

The Project Category identifies the nature of the work scope being accomplished under the Project Type. Once the Project Type is selected from the drop-down menu, a selected set of Project Categories can be selected from the drop-down menu as follows:

Project Type: Local Project	**Project Type: Inst. CoF-Minor**	**Project Type: Inst. CoF-Discrete**
Available Project Categories	*Available Project Categories*	*Available Project Categories*
• Maintenance	• Renewal	• Renewal
• Repair	• Repair	• Repair
• ROI	• Renewal by Incremental Repair	• Renewal by Incremental Repair
• Trouble Call	• Demolition	• Demolition
• Service Request (Construction)	• Consolidation	• Consolidation
	• Energy	• Energy
	• Other	• Other

Project Type: Prog. Dir. - Minor	**Project Type: Prog. Dir. - Discrete**	**Project Type: Suppl. - Minor**
Available Project Categories	*Available Project Categories*	*Available Project Categories*
• New Construction	• New Construction	• Repair
• Major Modification	• Major Modification	• Demolition
• Repair	• Repair	• Other
• Repair Obsolete Item (ROI)	• Repair Obsolete Item (ROI)	
• Demolition	• Demolition	
• Other	• Other	

Project Type: Suppl. - Discrete	**Project Type: EUL**	**Project Type: NHPA**
Available Project Categories	Available Project Categories	Available Project Categories
• Repair	• Maintenance and Repair	• Maint. of Historic Properties
• Demolition	• Capital Revitalization	• Repair of Historic Properties
• Other	• Improvements	
Project Type: ESPC	**Project Type: UESC**	**Project Type: Tenant Impr.**
Available Project Categories	*Available Project Categories*	*Available Project Categories*
• Energy	• Energy	• New Construction
		• Major Modification
		• Other

Project Type: Cat C	**Project Type: Other**
Available Project Categories	*Available Project Categories*
• Emergency Repair	Allows for manual input

Justification – Select the "Definitions" button for clarification of the options available in the drop-down menu. Then, select an entry from the drop-down menu as follows:

- Cost Effective – Work that is not program or institutional critical but, if accomplished, would result in demonstrable cost savings or other benefits over the expected life of the project.
- Emergency Repair – Work that qualifies for funding from the CECR Account under the provisions of the Cat C process.
- Energy Conservation – CoF Institutional Energy Projects that are principally justified to reduce energy or water consumption and associated costs.
- Environmental – Work required to correct an existing condition that might pollute the environment or to meet an environmental regulatory requirement.
- Institutional Critical – Work urgently required to correct an existing condition involving institutional facilities (not program related).
- Institutional Routine – Work on institutional facilities that is clearly necessary in the future but could be deferred to a subsequent year if necessitated by budget constraints.
- Life Critical – Work required to correct conditions that are dangerous to the life and health of personnel with the potential of fatal injuries if not corrected.
- Occupational Safety and Health – Work required to meet current standards of the latest version of the Occupational Safety and Health Act and any current Executive Orders.
- Program Critical – Work that is urgently needed to support specific R&D Program or Missions and should be completed by a stated date for successful accomplishment of testing or operations for that Program or Mission.
- Program Support – Work required to correct deficiencies in facilities that support R&D Programs or Missions but does not qualify as Program Critical.
- Safety – Work required to correct a safety hazard or to provide adequate fire protection for personnel, high- value equipment, materials, or records that are difficult or impossible to replace.
- Security – Work that is required to mitigate a security risk to the Center (personnel or property) identified in the latest versions of NASA's Physical Security NPDs and NPRs.

Project Execution Site – This cell identifies the field center where the facility project work will be physically executed. Select an entry from the drop-down menu as follows:

- Ames Research Center (ARC)
- Armstrong Flight Research Center (AFRC)
- Glenn Research Center, Lewis Field (GRC)
- Goddard Space Flight Center (GSFC)
- Jet Propulsion Laboratory (JPL)
- Johnson Space Center (JSC)
- Kennedy Space Center (KSC)
- Langley Research Center (LaRC)
- Marshall Space Flight Center (MSFC)
- Stennis Space Center (SSC)
- NASA Headquarters (HQ)
- Other (Specify the location in the Scope/Description section)

Component Facility – Many (but not all) of the field centers have component facilities. If the work scope is to occur at a component facility, select an entry from the drop-down menu options below. If the work scope is to occur at the primary field center, select "N/A" from the drop-down menu.

Project Execution Site: Ames Research Center	**Project Execution Site: Armstrong Fl. Research Cntr.**
Available Component Facilities	*Available Project Categories*
• N/A *(This will be selected automatically)*	• N/A *(This will be selected automatically)*

Project Execution Site: Glenn Research Center	**Project Execution Site: Goddard Space Flt. Center**
Available Component Facilities	*Available Project Categories*
• Armstrong Test Facility (ATF) • N/A *(Select this if work is at GRC Lewis Field)*	• Ground Network (GN) at KSC • Katherine Johnson Independent Verification & Validation Facility (IV&V)• Wallops Flight Facility (WFF)• Space Network at White Sands (SNAWS)• Columbia Scientific Balloon Facility (CSBF)• Goddard Institute for Space Studies (GISS)• N/A (Select this if work is at GSFC, Greenbelt)• Other (See Below) – *Specify in Scope/Description*

Project Execution Site: Jet Propulsion Lab (JPL)	**Project Execution Site: Johnson Space Center (JSC)**
Available Component Facilities	*Available Project Categories*
• N/A *(This will be selected automatically)*	• White Sands Test Facility (WSTF) • N/A *(Select this if works is at JSC)*

Project Execution Site: Kennedy Space Center (KSC)	**Project Execution Site: Langley Res. Cntr. (LaRC)**
Available Component Facilities	*Available Project Categories*
• N/A *(This will be selected automatically)*	• N/A *(This will be selected automatically)*

Project Execution Site: Kennedy Space Center (KSC)	**Project Execution Site: Langley Res. Cntr. (LaRC)**
Available Component Facilities	*Available Project Categories*
• N/A *(This will be selected automatically)*	• N/A *(This will be selected automatically)*

Project Execution Site: Marshall Sp. Flt. Cntr. (MSFC)	**Project Execution Site: Stennis Sp. Cntr. (SSC)**
Available Component Facilities	*Available Project Categories*
• Michoud Assembly Facility (MAF) • N/A (Select this if work is at MSFC)	• N/A *(This will be selected automatically)*

Project Execution Site: NASA HQ	**Project Execution Site: Other (See Below)**
Available Component Facilities	*Enter location information under "Scope/Description"*
• N/A *(This will be selected automatically)*	• N/A *(This will be selected automatically)*

Changes From Previous Version of NF 1509 – If this is the "Basic" version of this form, no input is required. If this is a Revision "A" or subsequent revision, manually enter the changes made from the previous version of the form (222 characters maximum).

Examples: "This revision includes modifications to the scope/description section."
"FP&D funding requested; Funding Number & WBS Number included."

Status of NEPA Review? – Select a status option for National Environmental Policy Act (NEPA) review from the drop-down menu as follows:

- Not Initiated
- In Progress
- Completed
- Not Applicable

Status of NHPA Review? – Select a status option for the National Historic Preservation Act (NHPA) review from the drop-down menu as follows:

- Not Initiated
- In Progress
- Completed
- Not Applicable

Scope/Description – Manually enter a description of the project's work scope to the maximum extent possible including property name and number, physical size, capacities, characteristics, and work tasks.

If the facility project is planned to have future phases, the high-level scope of these phases and the associated planned year(s) of execution should be identified in this section. This section is limited to 1,183 characters in length.

Basis of Need/Mission Impact – Manually enter a statement of the project's justification and include the impact if the project is not accomplished. If the work involves an existing property, clearly state the latest facility condition index (FCI), the current deferred maintenance (DM) value

any recent M&O history that supports the work actions, life safety concerns, and environmental hazards. For projects justified by non-conformance to Federal, State, or local regulations, cite the regulation. Identify any supporting engineering studies, economic evaluations, trade studies, or other considerations outlining the need for the project.

In addition, clearly and accurately state the NASA Missions supported by this project. If the building or system addressed by this facility project were to fail, include any impacted programs and projects and the associated schedule impacts. Attach any known program milestones, schedules, flight schedules, or any other type of data that supports the justification. For projects replacing an existing capability, state the existing conditions and why they are unacceptable.

Support facilities, such as libraries, auditoriums, and cafeterias, need to be justified separately and specifically. State any known specific project benefits. State known natural hazards, such as floods or earthquakes that are unacceptable risks to mission. Briefly explain the unacceptable risks or cite the study that led to identification of the need.

This section is limited to 1,183 characters in length.

Section II. Approved Facility Project Cost Estimate (AFPCE)

This section is used for identifying the AFPCE for construction. It is necessary to manually enter information into this section regardless of the version of the form (Basic, Revision A, Revision B, etc.). Depending on the version (or revision letter) of this form, information in these cells will be populated differently.

Construction Funding Increments – Cells under this column are used to identify construction funding increments for this facility project. Manually enter a brief version of the project title and an identifier of the funding increment (e.g., Repair Dom. Water – Incr. 1; Construct Fl. Control Bldg. – Incr. 1).

• **Amount** – Manually enter the exact amount of the construction funding increment.

• **Fund Source** – This is an indicator of which sponsor (or Mission) is providing funding for the project. Manually enter the fund number, used in NASA's financial management system (SAP), for which funding will be allocated for construction. Fund Source examples for FY 2022 could include the CECR Account funding (CECX62022D), Enhanced Use Lease funding (EULX52022E), Center I&TC funding (SSMX22022D), or funding numbers provided other Mission Directorates. If this is an early version of this form (e.g., any version prior to requesting this funding), no input is required in this cell.

• **Work Breakdown Structure (WBS) Number** – Manually enter the specific WBS number that is used to identify the funding in NASA's financial management system (SAP). If this is an early version of this form (e.g., any version prior to requesting this funding), no input is required in this cell.

Many Facility Projects will have only one funding increment for construction; hence, there will be only one row of information entered under Section II. However, there are several scenarios where additional rows of AFPCE funding information may be required. Examples could include, but are not limited to, the following:

• There is more than one Mission is providing funding for a construction project (a split-funded project).

• A project experiences a “bid bust” during the construction procurement process and more funding is required to award a contract.

• A construction contractor issues a request for equitable adjustment (REA) resulting from project delays from a Government shutdown (furlough) or another unpredictable event. Hence, more funding is required to complete a functional project.

• Significant unforeseen field conditions or errors in the Government-furnished construction package result in the need for additional funding to complete a functional project.

• Favorable construction bids result in residual funding that can be sent back to HQ/FRED. Hence, a negative number will be entered under the Amount column.

For any of these scenarios, the “+” button can be used to add rows for additional construction funding information (including the Amounts, Fund Sources, and WBS Numbers).

Section III. Costs for Studies, PERs, Performance Specifications, and Designs

Study, PER, Performance Specification, or Design – Manually enter the event for which architectural/engineering (A/E) services are being procured (e.g., Study, Preliminary Engineering Report, Performance Specification for a Design-Build Contract, Final Design).

• **Amount** – Manually enter the exact amount of the funding for this event.

• **Fund Source** – Manually enter the fund number, used in NASA’s financial management system (SAP), for which funding will be allocated for this event. As an example, if this is an Institutional CoF project funding for a PER or final design will be issued under the CECR Account, FP&D element. Hence, the Fund Source number should reflect the FP&D funding from a given FY. If this is a Program-Direct CoF project, the sponsoring Mission Directorate will provide funding information accordingly. If this is an early version of this form (e.g., any version prior to requesting this funding), no input is required in this cell.

• **Work Breakdown Structure (WBS) Number** – Manually enter the specific WBS number that is used to identify the funding in NASA’s financial management system (SAP). If this is an early version of this form (e.g., any version prior to requesting this funding), no input is required in this cell.

For instances where there are multiple A/E events procured for a given project, the “+” button can be used to add additional rows to manually enter funding information (including the Amounts, Fund Sources, and WBSs).

Section IV. Other Related Costs

Other Related Costs – Manually enter the Other Related Cost event which is being procured. These are costs for services that are not covered by the CECR Account. Examples include costs for non-CoF outfitting, personnel moves, special test equipment (STE), integrated systems testing (IST), other real estate (land purchases, easements, and rights-of-way needs), transfer of excess equipment

• **Amount** – Manually enter the exact amount of the funding for this event.

• **Fund Source** – Manually enter the fund number, used in NASA’s financial management system (SAP), for which funding will be allocated for this event. If this is an early version of this form (e.g., any version prior to requesting this funding), no input is required in this cell.

• **Work Breakdown Structure (WBS) Number** – Manually enter the specific WBS number that is used to identify the funding in NASA's financial management system (SAP). If this is an early version of this form (e.g., any version prior to requesting this funding), no input is required in this cell.

Section V. Total Project Cost

This section will automatically calculate the sum the facility project AFPCE Total (from Section II), the Study, PER, Performance Specification, and Design Costs Total (from Section III), and the Other Related Costs Total (from Section IV).

Section VI. Schedule Dates

For the various facility project life-cycle milestones, select the planned start dates from the drop-down calendars. If the duration of an event in days is known (example - the date is associated with a contract that has a duration of 180 days), the duration can be manually entered under the "Duration (Days) column, and the date in the "Planned Complete" Cell will automatically generate. If the duration is unknown, the "Planned Complete" date can be selected from the drop-down calendar

> *Note: A system-generated window may appear indicating "The value you entered cannot override a calculated value. To ignore the calculated value, click Ignore." Hence, by clicking "Ignore," a date can be entered from the drop-down calendar.*

For the last iteration of the NF-1509 (Project Completion), select the date from the drop-down calendar in the cell under the "Actual Complete" column. This is necessary for future facility project audits.

Section VII. PDRI

During the life of a facility project, multiple Project Definition Rating Index (PDRI) activities can be executed. For the latest PDRI event, manually enter the PDRI score achieved, the total number of possible points, and the design percentage milestone at which the event was executed.

If the PDRI documentation can be accessed using a Uniform Resource Locator (URL) address, manually enter the address accordingly.

Section VIII. Project Approval

This section documents the title, signature, and date of those POCs from a Center that submit an NF-1509 for a facility project, those POCs from a sponsoring Mission Directorate (if applicable) that concur with the submitted document, those POCs from NASA HQ that concur with the submitted document, and those POCs from NASA HQ that formally approve the actions requested on the document (e.g., funding requests, scope changes). In each case, the form allows for the manual entry of the individual's title, and the generation of an electronic signature and date. Additional individuals can also be added for each category by using the "+" button.

Submitted By – Manually enter the title(s) of the Center POC(s) for the facility project (e.g., Center CoF Program Manager if the project is either an Institutional or Program-Direct CoF Project, Center Energy Manager). An electronic signature of the POC and the date of the signature can be added by choosing the red arrow in the "Submitted by Signature" cell.

Mission Concurrence – Manually enter the title(s) of the Mission Directorate POC(s) for the facility project (e.g., if Mission funding is to be used for a Program-Direct CoF project). An electronic signature of the POC and the date of the signature can be added by choosing the red arrow in the "Mission Concurrence Signature" cell.

HQ Facility Concurrence – Manually enter the title(s) of the NASA HQ Facilities POC(s) that are required to concur with a submitted facility project (e.g., Agency CoF Program Officer, Agency Executive Project Manager). An electronic signature of the POC and the date of the signature can be added by choosing the red arrow in the "HQ Facility Concurrence Signature" cell.

HQ Approved By – Manually enter the title(s) of the NASA HQ Facilities POC(s) that are required to approve actions requested on the form (e.g., Director of FRED). An electronic signature of the POC and the date of the signature can be added by choosing the red arrow in the "HQ Approval Signature" cell.

F-3 Instructions for Completion of NF-1509, Sections IX through XII (Facility Project Cost Estimate)

Remove Project Cost Estimate

National Aeronautics and Space Administration

Facility Project Cost Estimate

Purpose of this Revision	Revision	Date
	Basic	

Project Title	Project Execution Site	Component Facility

Basis of Cost Estimate

IX. Buildup of Engineering Estimate - EE *(Estimate from an A/E with no escalation, does not include contingency, SIES, or other)*

1. Description	2. Unit of Measure	3. Quantity	4. Unit Cost	Total Cost 5. Engineering Estimate (EE)
(Value will be auto-populated in Part II, Cell 1a below)			**6. Engineering Estimate (EE) Total:**	

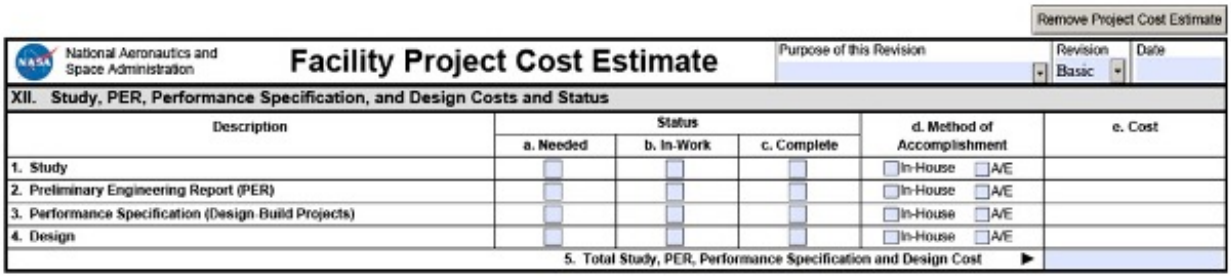
X. Summary of Approved Facility Project Cost Estimate (AFPCE)

Description	a. Amount	b. Percent
1. Engineering Estimate (EE) Total		
2. Escalation Amount to Mid-point of Construction *(Enter percentage of cell 1a to the right in cell 2b)*		
3. Estimated Construction Contract Award Amount *(Subtotal of cells 1a and 2a)*		
4. Contingencies *(Enter percentage of cell 3a to the right in cell 4b)*		
5. Supervision, Inspection, and Engineering Services (SIES) *(Enter percentage of the sum of cells 3a and 4a to the right in cell 5b)*		
6. Other Burden Costs *(Enter percentage of cell 3a to the right in cell 6b)*		
7. Approximate AFPCE Total:		
(Rounded value of Cell 7 that matches AFPCE on Facility Project Approval Document) **8. Final AFPCE Total:**		

XI. Construction Contract Structure *(Explain the details of the construction Base Bid and Options)*

Bid Package	Bid Package Estimate	Bid Package Contents
Base Bid		
Option 1		

Figure F-3, NASA Form 1509, Facility Project Approval & Cost Estimate Document, Page 3 of 4



Remove Project Cost Estimate

National Aeronautics and Space Administration

Facility Project Cost Estimate

Purpose of this Revision | Revision: Basic | Date

XII. Study, PER, Performance Specification, and Design Costs and Status

Description	Status			d. Method of Accomplishment	e. Cost
	a. Needed	b. In-Work	c. Complete		
1. Study	☐	☐	☐	☐In-House ☐A/E	
2. Preliminary Engineering Report (PER)	☐	☐	☐	☐In-House ☐A/E	
3. Performance Specification (Design-Build Projects)	☐	☐	☐	☐In-House ☐A/E	
4. Design	☐	☐	☐	☐In-House ☐A/E	
5. Total Study, PER, Performance Specification and Design Cost ▶					

Figure F-4, NASA Form 1509, Facility Project Approval & Cost Estimate Document, Page 4 of 4

The bolded titles in the following paragraphs provide cross references to the NF-1509 Facility Project Cost Estimate Section data cells shown in Figures F-3 and F-4. It should be noted that this information was previously captured on form NF-1510, which is now obsolete. This section is generated by selecting the "Add Project Cost Estimate" button that is available at the top and bottom of every page. Subsequently, if this section were generated in error, it can be removed by selecting the "Remove Project Cost Estimate" button.

The following cells will be automatically populated from information previously entered:

- Purpose of this Revision
- Revision
- Date
- Project Title
- Project Execution Site
- Component Facility

Basis of Estimate – Manually enter the source of the cost estimate information included in this cell (e.g., "In- House Estimate," "Vendor Estimate," "A/E Final Design Estimate").

Section IX. Buildup of Engineering Estimate (EE)

This section identifies how the total Engineering Estimate (EE) for a facility project is calculated from the sum of the EEs of the major work scope elements. Additional work scope elements can be added by using the "+" button.

1. Description – Manually enter a short description of the facility project work scope element (e.g., Civil/Site Work, Architectural, HVAC, Plumbing, Electrical).

2. Unit of Measure – Select one of the following options from the drop-down menu:

- Each (EA) – represents a cost for single quantity of the work scope element.

- Lump Sum (LS) – represents the lump sum cost for a given element of the work scope.

- Lineal Feet (LF) – represents a work scope element that can be measured in lineal feet such as piping, cabling

- Cubic Yards (CY) – represents a work scope element that can be measure in cubic yards such as concrete, backfill material, topsoil

- Square Feet (SF) – represents a work scope element that can be measured in square footage such as

office space, conference space, laboratory space.

3. Quantity – Manually enter the quantity of the work scope element. If the unit of measure is EA or LS, this could indicate the number of given units (e.g., the number of new transformers, air handling units). If the unit of measure is LF, CY or SF, the quantity could indicate the total number of lineal feet, cubic yards, or square feet of the work scope element.

4. Unit Cost – Manually enter the estimated cost per unit (e.g., lump sum cost, cost of each, cost per lineal foot, cost per cubic yard)

5. Engineering Estimate (EE) – The work scope element EE will automatically be calculated by multiplying the Quantity and the Unit Cost.

6. Engineering Estimate (EE) Total – The EE Total will automatically be calculated by summing the EEs of all work scope elements.

Section X. Summary of the Approved Facility Project Cost Estimate (AFPCE)

This section identifies how the AFPCE Total is calculated from various markups of the EE Total.

1. Engineering Estimate (EE) Total – This value will be automatically transferred from Section IX, cell 6 above.

2. Escalation Amount to Mid-point of Construction – Manually enter a whole number percentage in Cell 2b that accounts for the percentage of inflation of the EE Total from the time the estimate was generated to the assumed midpoint date of construction. OMB or FRED will often determine the escalation percentage to be used. If higher rates for cost growth are needed to reflect local conditions, they need to be supported by a special rationale establishing the uniqueness of the local conditions for the project. The Escalation Amount to Mid-Point of Construction in Cell 2a will be automatically calculated by multiplying the Engineering Estimate (EE) Total in Cell 1a by the Escalation percentage entered in Cell 2b.

3. Estimated Construction Contract Award Amount – This value in Cell 3a is automatically calculated by adding the Engineering Estimate Total in Cell 1a and the Escalation Amount to Mid-point of Construction in Cell 2a. This is the value of the anticipated construction contract award.

4. Contingencies – Enter a whole number percentage in Cell 4b that reflects the percentage of the Estimated Construction Award Amount in Cell 3a required for construction contingency. Contingency amount in Cell 4a will be automatically calculated by multiplying the Estimated Construction Contract Award Amount in Cell 3a by the percentage entered in Cell 4b.

5. SIES – Enter a whole number percentage in Cell 5b that reflects the necessary amount of SIES required for the facility project. The SIES amount in Cell 5a will be automatically calculated by multiplying the percentage entered in Cell 5b by the sum of the Estimated Construction Contract Award Amount in Cell 3a and the Contingency Amount in Cell 4a.

6. Other Burden Costs – Enter a whole number percentage in Cell 6b that reflects the necessary Other Burden Costs for the facility project. The Other Burden cost amount in Cell 6a will be automatically calculated by multiplying the percentage entered in Cell 6b and the Estimate Construction Contract Award Amount in Cell 3a.

7. Approximate AFPCE Total – This value will be automatically calculated by summing the values

in Cells 3a, 4a, 5a, and 6a.

8. Final AFPCE Total – Manually enter a rounded-up dollar value of the Approximate AFPCE Total. Rounding is typically to the nearest $1,000 or $5,000. This value, and the value shown in Section II, the AFPCE Total cell should be identical. If the numbers are identical, the cell background color will be white. If the numbers are not identical, the cell background color will be red, and new calculations should be performed or changes made to ensure that the numbers become identical.

Section XI. Construction Contract Structure

Centers should ensure that construction contracts are structured with base bid and option packages to provide protection from bid-busts. This section allows for identification of the structure of the facility project construction package.

Base Bid – In the "Bid Package Estimate" Cell, manually enter the dollar value of the Base Bid construction package (which must be structured to produce a complete and functional project) under the "Bid Package Estimate" cell. This dollar value should be equal to or less than the Estimated Construction Contract Award Amount in Section X, Cell 3a. In the "Bid Package Contents" Cell, enter a short, one sentence description of the Base Bid Package work scope.

Option 1 – In the "Bid Package Estimate" Cell, manually enter the dollar value of the Option 1 construction package. Preferably, "Option 1" would be the highest priority construction package to award after awarding the Base Bid Package. In the "Bid Package Contents" Cell, enter a short, one sentence description of the Option 1 work scope.

Additional construction options can be added by using the "+" button.

Section XII. Study, PER, Performance Specification, and Design Cost and Status

This section identifies the status, execution method, and cost for facility project design-related activities. For design activities 1 through 4 (Study, Preliminary Engineering Report, Performance Specification for Design- Build Projects, and Design):

• Under the "Status" column, check only one of the boxes to indicate the current status of the design activity (Needed, In-Work, or Complete).

• Under the "Method of Accomplishment" column, check either "In-House" or "A/E."

• If "In-House" is selected, a dollar value of "$0" will automatically be populated under the "Cost" column. If "A/E" is selected, manually enter the dollar value of the design activity in the "Cost" column.

Total Study, PER, Performance Specification and Design Cost – The dollar value for design-related activities will be automatically calculated from the sum of the four costs identified above (Cells 1e + 2e + 3e + 4e). This dollar value should be identical to the value identified in the Section III, "Study, PER, Performance Specification, and Design Cost Total" Cell. If the numbers are identical, the cell background color will be white. If the numbers are not identical, the cell background color will be red, and new calculations should be performed or changes made to ensure that the numbers become identical.

Appendix G. Demolition Planning Checklist

(To be used in concert with Chapter 6. Demolition/Deconstruction)

Item and Chapter 6 Reference	Description	Other Reference Requirements	Notes	Lead Time Before Demolition (Months)
Sustainment Plan– Section 6.3.3(f)	Determine protection and maintenance requirements (safety, property, security, environmental) between facility deactivation and demolition.		Complete as part of decommissioning.	
Evaluation of alternatives and determination to demolish (HUD Determination) – Section 6.5.1.1	RPAO completes the Title V document for candidate properties and submits to FRED who interacts with HUD on behalf of the Agency.	NPR 8800.15, Chapter 7 Disposition of Real Property.	Evaluate disposal alternatives such as transfer to another agency or adaptive reuse (42 U.S.C. § 11301 et seq. screening).	12 – 24
Evaluation of alternatives, completion of the NHPA Section 106 process – Section 6.5.1.2	Determine historic eligibility, conduct alternatives analysis for historic properties, complete NHPA Section 106 review process (including mitigation), as appropriate, in accordance with the executed agreement	NPR 8580.1, Implementing the National Environmental Policy. Also, NPR 8800.15, Chapter 7 Disposition of Real Property.	If eligible, consultation with SHPO and other stakeholders may be required.	12 – 24 (prior to execution of demolition)

	agreement document.			
Authority to Dispose/Demolish – Section 6.5.1.3	Submit a letter, signed by the Center Director or designee, requesting authority to proceed with the demolition.	NPR 8800.15, Chapter 7 Disposition of Real Property.	This authority is separate from the request to include the facility in the demolition program as part of the PPBES process.	
Request inclusion into the Demolition Program – Section 6.6	Request funding for demolition of the facility as part of the PPBES process.	Annual PPBES Guidance; NPR 8800.15, Chapter 7 Disposition of Real Property.	Identify earliest demolition date and any schedule constraints.	24 – 36
Funding NASA Interagency Purchase Request (NIPR) to the USACE – Section 6.7.1	Transfer of NASA Demolition Program funding to the U.S. Army Corps of Engineers (USACE).	Identify earliest demolition date and any schedule constraints.	This is required only if Center's use NASA's centralized USACE demolition execution capability.	
Compliance with NEPA – Section 6.7.4	Complete Record of Environmental Planning and Environmental Checklist (additional actions may be required).	NPR 8580.1, Implementing the National Environmental Policy. NPR 8800.15, Chapter 7 Disposition of Real Property.		24
Environmental Checklist – Section 6.7.4.2	Identify hazardous substances to be removed as part of demolition (asbestos, lead) and prior to demolition (chemical containers).	NPR 8800.15, Chapter 7 Disposition of Real Property.		

Salvage Material Inventory/ Diversion Plan – Section 6.7.6	Estimate the types and amount of materials that could have salvage value as recycled material or reuse. Evaluate how to minimize waste to landfill.	NPR 8800.15, Chapter 7 Disposition of Real Property.	During final design.	6 – 12
Clear the building of non-collateral equipment and debris – Section 6.7.6	Ensure that any personal property is properly disposed of separate from facility demolition.		Coordinate with the Center's Property Disposal Officer.	6 – 12
Pollution Prevention and Hazardous Material Abatement Plan – Section 6.7.6	Identify potential environmental risks associated with the work such as hazardous waste disposal, run off/erosion, underground storage tank systems, wetlands, and floodplains. Determine required remediation.	NPR 8800.15, Chapter 7 - Disposition of Real Property.	Complete as part of building decommissioning.	
Personal Property Reuse Plan – Section 6.7.8	Identify equipment, property, and artifacts for reuse by the Government or disposal by other means.	NPR 8800.15, Chapter 7 Disposition of Real Property.	Coordinate with the CRM, Property Disposal Officer, Program POCs, and any other special interest groups early in the process.	12 – 24
Evaluate infrastructure impact – Section 6.7.9	Look at impact to utilities, roads, other facilities, physical security, etc.		Demolition of a facility may remove either supply or demand of essential	12 – 24

			services, requiring modifications to associated systems.	
Safety Baseline Survey – Section 6.7.10	Identify potential safety hazards and concerns such as: a. Facility safety b. Fire protection c. Confined space entry d. Nuclear safety e. Radiation protection f. Explosives g. Pressurized systems	NPR 8800.15, Chapter 7 Disposition of Real Property.	Complete as part of decommissioning.	
Communication Plan (No Section Reference)	Determine if a plan for communicating the content of the demolition project (and associated impacts) to the Center and the surrounding community is required.		During final design.	6 – 12

Appendix H. Facility Project Documentation Requirements

The following chart identifies the required facility project documentation to be uploaded into the FRED- approved database for:

• Institutional CoF Projects – For the facility project formulation phase and for Center funding requests for subsequent phases.

• Program-Direct CoF Projects – For the facility project formulation phase and for the construction phase upon funding transfer into the CECR Account.

• – For the facility project formulation phase.

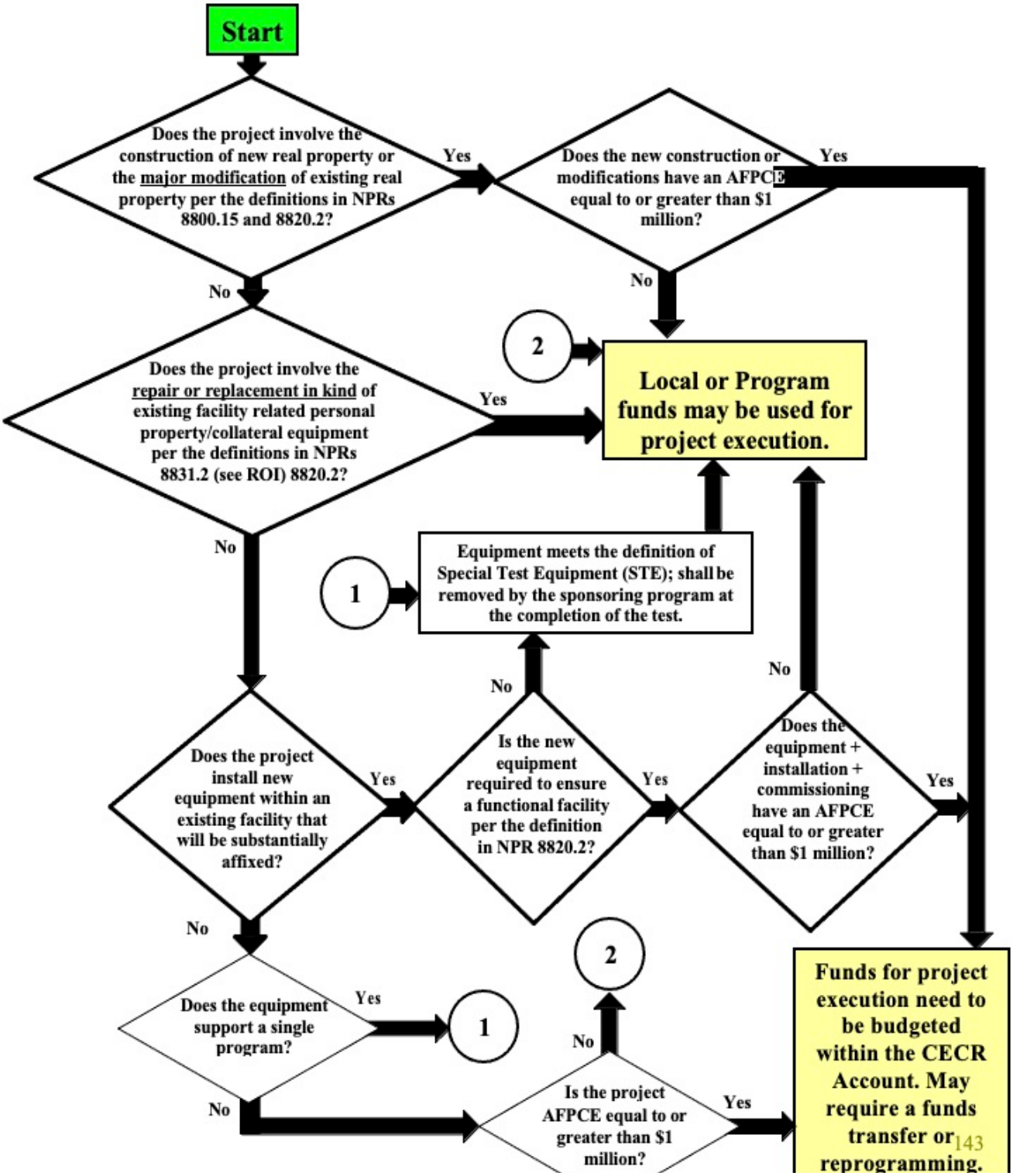
Project Type	Formulation	Final Design	Construction
Institutional CoF Program			
Renewal	NF-1509	Updated NF-1509	Updated NF-1509
	Quad Chart	Updated Quad Chart	Updated Quad Chart
	LCCA (ECONPACK)	Updated Project Narrative	Updated Project Narrative
	Project Narrative	Updated LCCA (ECONPACK)	Updated LCCA (ECONPACK)
		Missing items from formulation	Compliance Matrix
			Project Management Plan (Discrete)
			Missing items from formulation
Repair	NF-1509	Updated NF-1509	Updated NF-1509
	Quad Chart	Updated Quad Chart	Updated Quad Chart
	Risk Assessment (Normalized)	Updated Project Narrative	Compliance Matrix
	Project Narrative	Missing items from formulation	Project Management Plan (Discrete)
	LCCA (ECONPACK)		Missing items from formulation
	NF-1509	Updated NF-1509	Updated NF-1509

Demolition	Quad Chart (CRV > $20M)	Updated Quad Chart (CRV > $20M)	Updated Quad Chart (CRV > $20M)
	HUD/NHPA Screening Reports	Missing items from formulation	Compliance Matrix
	Approved Disposal Letter (Signed)		Project Management Plan (Discrete)
			Missing items from formulation
Energy	NF-1509	Updated NF-1509	Updated NF-1509
	Project Narrative	Updated Quad Chart (if required)	Updated Quad Chart (if required)
	Quad Chart	Updated Energy Fields	Project Management Plan (Discrete)
	LCCA		
	Energy fields in Formulation Tab		
Supplemental	Damage Assessment Document	NF-1509	Updated NF-1509
	Other info. as required by FRED	Other info. as required by FRED	Compliance Matrix
			Project Management Plan (Discrete)
			Other info. as required by FRED
Program-Direct CoF			
Repair (per NPR 8831.2)	NF-1509	N/A (Design funding from Program)	N/A (Constr. funding from Program, no transfer into CECR required)
All Other Projects	NF-1509	Program-funded design documentation (FRED to identify on a Funding Approval Document)	Updated NF-1509
	Quad Chart		Updated Quad Chart

Projects	LCCA (ECONPACK)		Compliance Matrix
	Project Narrative		Project Management Plan
Local Projects			
Repair (per NPR 8831.2)	NF-1509	N/A (Design funded locally)	N/A (Construction funded locally, no transfer into CECR required)
	Quad Chart		
All Other Projects	NF-1509 (For Information Only, AFPC < $1M)	N/A (Design funded locally)	N/A (Construction funded locally)

Appendix I. Local and/or Program Funded Project Flowchart

(Used to determine if project execution requires a funds transfer/reprograming into the CECR Mission of if local or program funcs can be used)



Appendix J. NASA's Real Estate History

J-1 NASA's Unique Real Estate Privileges. When NASA was established in 1958, it was anticipated that unique test facilities and laboratories would be necessary for the Agency to meet its aeronautics and space mission requirements. At that time, most Government Agencies were mandated to use the General Service Administration (GSA) for real estate acquisitions and divestments and for facility design/construction services. However, it was anticipated that NASA's infrastructure requirements would be beyond the capabilities typically provided by GSA.

J-2 National Aeronautics and Space Act of 1958. The Space Act of 1958 includes language that defines NASA's unique real estate privileges:

a. Title II *Functions of the Administration, Section 203 (c) (3):*

Authorizes construction, improvements or laboratories, research and testing sites and facilities as deemed necessary.

This statement that authorizes NASA to perform design and construction services for required infrastructure without having to involve GSA.

b. The Space Act also stipulates constraints for such performance as defined in Title III *Appropriations*, Section 310:

(A) There are hereby authorized to be appropriated such sums as may be necessary to carry out this Act, except that nothing in this Act shall authorize the appropriation of any amount for:

(1) the acquisition or condemnation of any real property OR

(2) any other item of a capital nature (such as plant or facility acquisition, construction, or expansion) which exceeds $250 thousand.

Hence, funding for new facility construction and/or major modification of existing facilities above an established threshold must be specifically appropriated by Congress.

J-3 Congressional Interest in Infrastructure. Congressional interest in NASA's infrastructure portfolio is driven by several factors:

a. High Life-Cycle Cost of Infrastructure. The life-cycle cost for infrastructure includes initial costs (studies, final design, construction, construction oversight, commissioning), outfitting costs, recurring costs (custodial, maintenance and repair, support utilities) and eventual demolition cost. Therefore, there is a desire to ensure that NASA constructs the minimum amount of infrastructure required to meets its missions.

b. Duplication Avoidance. Congress has a desire to ensure that requests for the construction of new infrastructure do not duplicate existing facilities at other Centers across the Agency.

c. Conformance to Federal Mandates. There is Congressional interest to ensure that all new NASA infrastructure conforms to current E.O.s) and other Federal Mandates. These include such requirements as ensuring that construction is being performed by Davis-Bacon labor, that facilities conform with the

requirements of 42 U.S.C. § 12131 and mandates for reduction of energy and water usage.

J-4 Inception of NASA's Construction of Facilities (CoF) Program. During the 1960s, there was a significant increase in NASA's budget for construction and major modification of infrastructure Agency- wide. Over the course of the decade, approximately $5 billion was invested in NASA's real property portfolio.

a. Congressional Reviews of 1972. The large real property expansion of the 1960s raised concerns within Congress that NASA was not adhering to the stipulations of the Space Act of 1958. Hence, three independent reviews were established: a Congressional Staff Review, a Comptroller General Study, and a General Accounting Office (GAO) Review. The findings of these reviews were documented in the Report on NASA Capital Plant Acquisition, February 1972. This report identified several irregularities:

i. Of NASA's roughly $5 billion of capital plant expansion, only about $1.6 billion (32 percent) could be traced to Congressional authorizations. Most of the unaccounted-for construction was acquired under NASA's Equipment Accounts.

ii. Facilities that were valued above the established threshold were constructed by stringing together multiple small projects that were below the threshold (a practice known as fragmentation).

iii. Unclear construction terminology and definitions led to miscommunication between NASA and Congress.

b. Establishment of the CoF Program. The findings from the Report on NASA Capital Plant Acquisition led to the establishment of NASA's formal Construction of Facilities Program. The hallmarks of this program include:

i. Methods for ensuring full disclosure of all Facility Projects across the Agency with AFPCEs that exceed the defined threshold (and thus, require appropriated funding). This includes methods for monitoring possible incidents of fragmentation.

ii. Clear and consistent language and definitions that are used among the facilities communities of practice, including such areas as design/construction, maintenance and operations, real property, and master planning. This has also improved communication between the NASA field Centers, HQ, and Congress.

Appendix K. References

K.1 Archaeological Resources Protection Act of 1979 (ARPA) as amended, 16 U.S.C, §§ 470aa–470mm.

K.2 Endangered Species, 16 U.S. Code Chapter 35.

K.3 Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. § 3001 et seq.

K.4 Selection of Architects and Engineers, 40 U.S.C § 11 (Brooks Act).

K.5 National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 et seq.

K.6 Energy Management Requirements, Large Capital Energy Investments, 42 U.S.C. § 8253(g).

K.7 Definitions, High Performance Green Buildings, 42 U.S.C. § 17061(13).

K.8 Environmental Effects Abroad of Major Federal Actions, Executive Order (E.O.) 12114.

K.9 Intergovernmental Review of Federal Programs, E.O. 12372, 24 CFR § 570.612.

K.10 Environmental Quality, 14 CFR pt. 1216.

K.11 Protection of Historic Properties, 36 CFR pt. 800.

K.12 Application of 6 Percent Architect-Engineer Fee Limitation, 48 CFR § 836.606-71.

K.13 NPD 1600.4, National Security Programs.

K.14 NPD 9250.1, Capital Asset Identification and Treatment.

K.15 NPR 4200.1, NASA Equipment Management Procedural Requirements.

K.16 NPR 8553.1, NASA Environmental Management System.

K.17 SNF-1046, Transfer and/or Notification of Acceptance of Accountability of Real Property.

K.18 NF-1509, Facility Project Approval Document.

K.19 NF-1579, Flash Bid Report.

K.20 NF-1739, CDF, (formerly the Alternative Future Use Questionnaire).

K.21 NF-1878, Funding Approval Document.

K.22 SpecsIntact: Army, NASA, Navy.

K.23 ECONPACK (Economic Analysis Package), U.S. Army Corps of Engineers (USACE).

K.24 P100 Facilities Standards for the Public Building Service (October 2021), U.S. General Services Administration.

K.25 BioPreferred Program, U.S. Department of Agriculture.

K.26 Labs 21 Environmental Performance Criteria 3. 0, U.S. Environmental Protection Agency

(EPA).

K.27 The Risk Management Process for Federal Facilities: An Interagency Security Committee Standard, November 2016, U. S. Department of Homeland Security (DHS).

K.28 Building Commissioning, Whole Building Design Guide, A program of the National Institute of Building Sciences.

K.29 Construction Industry Institute, CII Best Practices.

K.30 Design-Build Manual of Practice, Design-Build Institute of America.

K.31 Codes for Electrical Systems, Life Safety, and Fire Protection, Detection, and Suppression, National Fire Protection Association (NFPA).

K.32 ENVISION: The Blueprint for Sustainable Infrastructure, Institute for Sustainable Infrastructure.

K.33 National Building Information Modeling (BIM) Standard, National Institute of Building Sciences.

K.34 Unified Facilities Guide Specifications (UFGS), Whole Building Design Guide.

K.35 United States National CAD Standard (NCS), National Institute of Building Sciences.

K.36 International Building Code (IBC), International Code Council (ICC).

K.37 Leadership in Energy and Environmental Design (LEED) v4 for Building Design and Construction, U. S. Green Building Council (USGBC).

K.38 Green Globes® for New Construction (NC), Green Building Initiative.