NASA Procedural Requirements

NPR 8820.2G
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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

a. This NASA Procedural Requirements (NPR) document provides the minimum requirements for planning, approving, and acquiring all NASA facility projects.[1] It implements the policy established in NASA Policy Directive (NPD) 8820.2, Design and Construction of Facilities by supplementing the policies and requirements established in NPD 7120.4, NASA Engineering and Program/Project Management Policy and NPR 7120.7, Institutional Infrastructure and Information Technology Program and Project Management with specific facility construction requirements.

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[1] "Project" in this document refers to facility work (repair, modification, renovation, or new construction on NASA real property) with an estimated cost greater than or equal to $100,000 (excluding maintenance work).

P.2 Applicability

a. This NPR applies to NASA Headquarters (HQ), NASA Centers, and Component Facilities for all sources of construction funding. This NPR applies to the Jet Propulsion Laboratory, a Federally Funded Research and Development Center, and other contractor facilities to the extent specified or referenced in their contracts.[2] It also applies to non-NASA-owned facilities constructed on NASA real estate unless the NASA Headquarters Facilities Engineering Division (FED) 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.

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[2] For the rest of this document, the term "Centers" refers to NASA Centers, Component Facilities, and JPL to the extent specified in its contract.

P.3 Authority

a. Authority to enter into contracts, as amended (Energy Savings Performance Contracts (ESPC)), 42 U.S.C. § 8287 et seq.

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

c. Lease of non-excess property (Enhanced Use Lease (EUL)), 51 U.S.C. § 20145.

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d. NPD 8820.2, Design and Construction of Facilities.

P.4 Applicable Documents and Forms

National Historic Preservation Act (NHPA) Section 106 Review, 16 U.S.C. § 470 et seq.

a. Archaeological Resources Protection Act of 1979 (ARPA) as amended, 16 U.S.C. §§ 470aa-470mm.

b. Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. § 3001 et seq.

c. National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 et seq.

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

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

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

g. Large Capital Energy Investments, 42 U.S.C. § 8253 (g).

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

i. Consolidated Appropriations Resolution 2003, Public Law 108-7 section 418.

j. Executive Order (Exec. Order) No. 12114, Environmental Effects Abroad of Major Federal Actions.

k. Exec. Order No. 12372, Intergovernmental Review of Federal Programs, 3 C.F.R. (1982 Compilation), as amended by Exec. Order 12416, 3 C.F.R. (1983 Compilation).

l. Exec. Order No. 13423, Strengthening Federal Environmental, Energy, and Transportation Management.

m. Exec. Order No. 13514, Federal Leadership in Environmental, Energy, and Economic Performance.

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

o. Energy Efficiency Standards for New Federal Low-Rise Residential Buildings, 10 C.F.R. pt. 435.

p. Environmental Quality, 14 C.F.R. pt. 1216.

q. Protection of Historic Properties, of the National Historic Preservation Act (NHPA), 36 C.F.R. pt. 800.

r. Federal Acquisition Regulation (FAR), 48 C.F.R. pts. 1-99.

s. NASA/FAR Supplement (NFS), 48 C.F.R. pts. 1800-1899.

t. OMB Circular A-11, Preparation, Submission and Execution of the Budget (08/03/2012).

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

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Programs (10/29/1992).

v. NPD 1000.0, Strategic Management & Governance Handbook.

w. NPD 1600.2, NASA Security Policy.

x. NPD 7120.4, Program/Project Management.

y. NPD 7330.1, Approval Authorities for Facility Projects.

z. NPD 8810.2, Master Planning for Real Property.

aa. NPD 8820.2, Design and Construction of Facilities.

bb. NPR 1600.1, NASA Security Program Procedural Requirements.

cc. NPR 1620.2, Facility Security Assessments.

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

ee. NPR 2810.1, Security of Information Technology.

ff. NPR 4200.1, NASA Equipment Management Procedural Requirements.

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

hh. NPR 7120.7, Institutional Infrastructure and Information Technology Program and Project Management Requirements.

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

jj. NPR 8000.4, Risk Management Procedural Requirements.

kk. NPR 8510.1, NASA Cultural Resources Management.

ll. NPR 8570.1, NASA Energy Management Program.

mm. NPR 8580.1, NASA National Environmental Policy Act Management Requirements.

nn. NPR 8715.1, Occupational Safety and Health Programs.

oo. NPR 8715.3, NASA General Safety Program Requirements.

pp. NPR 8800.15, Real Estate Management Program.

qq. NPR 8810.1, Center Master Planning.

rr. NPR 8831.2, Facilities Maintenance Management.

ss. NPR 9420,1, Budget Formulation.

tt. NASA Building Information Modeling, Scope of Service and Requirements for Architects and Engineers.

uu. NASA Building Information Modeling Scope of Services and Requirements for Construction Contractor in a Design-Bid-Build Process.

vv. NASA Business Case Guide for Facilities Projects.

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ww. NASA Desk Guide for Enhanced Use Leasing of Real Property.

xx. NASA Financial Management Manual, http://www.hq.nasa.gov/fmm/9200/9250.pdf.

yy. NASA Partnering Desk Reference.

zz. NASA's Programmatic Agreement on Historical Preservation (1989), http://www.achp.gov/pa15.pdf.

aaa. PDRI: Project Definition Rating Index.

bbb. NASA Reliability Centered Building and Equipment Acceptance Guide.

ccc. NASA Reliability Centered Maintenance Guide for Facilities and Collateral Equipment.

ddd. NASA Self-Assessment Metrics.

eee. NASA, Specifications Kept Intact (SpecsIntact).

fff. NASA SP-2010-3403, NASA Schedule Management Handbook.

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

hhh. NASA Form NHQ DIV799DF Demolition of Facilities Project Approval.

iii. NASA Form NHQ DIV799EUL Enhanced Use Lease - Capital Projects Project Approval.

jjj. NASA Form NHQ DIV799PD Facility Planning and Design Project Approval.

kkk. NASA Form DIV80002 Minor Facility Projects.

lll. NASA Form 1046 Transfer and/or Notification of Acceptance of Accountability of Real Property.

mmm. NASA Form 1509 Facility Project-Brief Project Document.

nnn. NASA Form 1510 Facility Project Cost Estimate.

ooo. NASA Form 1579 Flash Bid Report.

ppp. NASA Form 1739, Alternative Future Use Questionnaire.

qqq. FED Form CoF Routine Transaction.

rrr. FED Form CoF Self-Assessment.

sss. FED Form CoF Quality Survey.

ttt. Facilities Engineering Division Form EUL Routine Transaction.

uuu. International Treaty, Montreal Protocol on Substances that Deplete the Ozone Layer.

vvv. OMB Presidential Memorandum, The Federal Acquisition Certification for Program and Project Managers

www. U.S. Army Corps of Engineers (USACE), ECONPACK (Economic Analysis Package).

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xxx. U.S. Department of Agriculture BioPreferred® Program.

yyy. U.S. Department of Homeland Security (DHS), The Risk Management Process for Federal Facilities: An Interagency Security Committee Standard, August 2013.

zzz. U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE), Labs21 program, Labs 21 Environmental Performance Criteria.

aaaa. American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., ASHRAE Guideline 0, The Commissioning Process.

bbbb. ANSI/ASHRAE Standard 55-2013, Thermal Environmental Conditions for Human Occupancy. Approved by the American National Standards Institute (ANSI).

cccc. ANSI/ASHRAE Standard 62.1-2013, Ventilation for Acceptable Indoor Air Quality.

dddd. ANSI/SMACNA 008-2008, Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) Indoor Air Quality (IAQ) Guidelines for Occupied Buildings under Construction 2nd Edition, 2008.

eeee. Construction Industry Institute "CII Best Practices" found at https://www.construction-institute.org/scriptcontent/bp.cfm?section=aboutcii.

ffff. Design-Build Institute of America "Design-Build Manual of Practice" found at http://www.dbia.org/pubs/manualofpractice/

gggg. International Code Council (ICC), International Building Code (IBC).

hhhh. National Building Information Modeling (BIM) Standard, http://www.nationalbimstandard.org/.

iiii. National Fire Protection Association (NFPA), http://www.nfpa.org. Requirements for electrical systems, life safety, and fire protection, detection, and suppression.

jjjj. National Institute of Building Sciences, United States National CAD Standard.

kkkk. U.S. Green Building Council (USGBC), Leadership in Energy and Environmental Design (LEED) Building Program and Certification System found at http://new.usgbc.org/.

llll. USGBC, LEED Green Building Design and Construction Reference Guide as Enhanced Commissioning.

mmmm. USGBC, Reference Guides for Existing Buildings: Operations & Maintenance and Commercial Interiors.

nnnn. Whole Building Design Guide, a program of the National Institute of Building Sciences, Commissioning Guidance, http://www.wbdg.org/project/buildingcomm.php.

oooo. Whole Building Design Guide, a program of the National Institute of Building Sciences, Unified Facilities Guide Specifications (UFGS).

P.5 Measurement/Verification

The FED verifies compliance with the requirements of this NPR by conducting annual Construction

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of Facilities (CoF) program reviews at the Centers. For the CoF reviews, the FED 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 the FED upon request.

P.6 Cancellation

NPR 8820.2F, Facility Project Requirements, dated January 28, 2008.

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Chapter 1. NASA's Facilities Program

1.1. Facility Program Content

1.1.1 The annual facility program is part of the Agency's five-year budget described in NPD 1000.0, NASA Governance and Strategic Management. The five-year budget includes the Construction of Facilities (CoF) program under the Construction, Environmental Compliance and Restoration (CECR) account for projects of more than $1 million. The CoF program comprises the first four project types:

1.1.1.1 **Discrete Projects**. Discrete projects have a Facility Project Cost Estimate of $10 million or more.

1.1.1.2 **Minor Revitalization and Construction Projects (MRCs)**. MRCs have a Facility Project Cost Estimate of more than $1 million but less than $10 million.

1.1.1.3 **Demolition Projects**. Demolition projects are independent and stand-alone projects to eliminate or reduce real property assets no longer required by NASA.

1.1.1.4 **Facility Planning and Design (FP&D) Funds**. FP&D funds are used to plan and design facility projects.

1.1.1.5 **Other Facility Project Types (Non-CoF Funded)**. The following alternative methods are currently the only methods authorized for facility projects (e.g., modifying real property) that may cost in excess of $1 million: Energy Savings Performance Contracts (ESPC), Utility Energy Services Contracts (UESC), Enhanced Uses Leases (EUL), and EUL net revenue.

1.2 Facility Program Best Practices

1.2.1 Center Facility Project Managers (FPMs) shall comply with NASA-required best practices regardless of the funding source (e.g., NASA Program, CECR Account, or external funds). Required best practices include the following:

a. Implementing front-end planning as 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. Investigating the site and providing sufficient preliminary design to develop a full project scope, assess risks, identify construction complexities, and provide a realistic Facility Project Cost Estimate prior to inclusion in the NASA budget submission to the Office of Management and Budget (OMB).

c. Using life-cycle cost vs. first cost to determine the best economic solution (e.g., new construction vs. renovation or adaptive reuse, mechanical and electrical systems, equipment, materials, and methods) (see NASA Business Case Guide for Facilities Projects). Ensure that any large capital energy investment in an existing building employs the most energy efficient and life-cycle cost-effective designs, systems, equipment, and controls.

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

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

f. Using environmentally friendly processes, materials, and equipment.

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

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

i. 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 NASA Partnering Desk Reference for more specific guidance.

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

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

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

1.3 Sustainability Requirements

1.3.1 For all CoF level projects, Center FPMs shall comply with the five guiding principles described for Federal High Performance and Sustainable Buildings (FHPSB) in Exec. Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance and Exec. Order 13423, Strengthening Federal Environmental, Energy, and Transportation Management.

1.3.2 For New Construction and Major Renovation, in addition to complying with the five guiding principles referenced in section 1.3.1, CoF FPMs shall ensure all projects are designed to meet a minimum level of Leadership in Energy and Environmental Design (LEED) Silver certification using United States Green Building Council (USGBC) criteria.

1.3.3 Variances to This Policy. If the FPM does not think compliance with the minimum LEED requirements is reasonable for a particular project, the FPM shall submit a letter requesting a waiver from the minimum LEED requirements explaining why compliance is imprudent along with a completed initial LEED checklist to the NASA Headquarters Office of Strategic Infrastructure. Compliance with the five guiding principles in accordance with the previously referenced Exec. Orders is mandatory.

1.4 CoF Program Formulation

1.4.1 The CoF project life cycle shown in Figure 1-1a (from NPR 7120.7) comprises the formulation phases of project planning/development and design and the implementation phases of construction, activation, operations and maintenance, and decommissioning. The figure shows the full life cycle and this NPR addresses all phases except Operations, Phase E. NASA Centers and Headquarters formulate the CoF program through a collaborative process that spans four consecutive phases:

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concept presentations are for out-year projects, prioritization of construction, design funding, and construction funding. The following paragraphs describe this process.

NASA Life-Cycle Phases	Formulation			Approval		Implementation		
	Pre-System Acquisition			*Systems Acquisition*		*Operations*		*Decommissioning*
Project Life-Cycle Phases	**Pre-Phase A:** *Concept Studies*	**Phase A:** *Concept Development*	**Phase B:** *Preliminary Design*	**Phase C:** *Final Design and Build*	**Phase D:** *System Assembly, Integration and Test*	**Phase E:** *Deployment, Operations, and Sustainment*		**Phase F:** *Decommissioning*
CoF Project Life-Cycle	Project Planning/ Development	Design		Construction		Activation	O&M	Decommissioning

Figure 1-1a CoF Project Life Cycle

1.4.2 **Guidance**. Each year, NASA's Office of the Chief Financial Officer (OCFO) issues guidance to the Centers for reporting their budget requests. The OCFO coordinates this through the Mission Directorates and Mission Support Offices.

1.4.3 **Establishing Project Scope**. The scope of a project defines the extent of the proposed work, project goals, and justification. The FPM shall establish the project scope in cooperation with Center management and other project stakeholders.

1.4.4 **Fragmentation**. FPMs shall ensure all CoF projects are complete and usable within the proposed scope of the project. Splitting project into parts with the intent of circumventing the CoF approval process is an example of fragmenting a project. NASA Centers do not have authority to fragment facility projects. In establishing a project scope, a NASA Center includes all of the necessary elements in a single project to avoid fragmentation or the appearance of fragmentation. (See Appendix A, Definitions for clarification of " fragmentation," "facility project," and "full disclosure concept.")

1.4.5 **Incremental Programming for Facility Requirements**. Incremental programming for facility requirements is a process of planning and executing CoF funding over more than one fiscal year for a specific purpose. Incremental programming differs from fragmentation in that it fully discloses the overall plan. NASA has no authority to formulate or execute CoF projects using incremental programming and shall not do so without special legislation.

1.4.6 **Phased Projects**. Phasing involves repairing or replacing a facility in segments. NASA is authorized to accomplish work in phases. A completed phase will be usable (e.g., a useful segment that stands alone and independent of subsequent phases). On the NASA Form 1509, the FPM shall include a statement that explains the scope of the particular phase, how many phases are planned, and the associated estimated total cost of all phases.

1.4.7 **Budget Request (Five-Year Plan)**. Center CoF Program Managers 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). See Figure 1-1b CoF Five-Year Plan for an overview and Figure 1-1c Institutional CoF Call and Programming Phase of Planning, Programming, Budgeting, and Execution System (PPBES) for a more detailed delineation of the three years from prioritization through construction. FED issues data calls (one for institutional and

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one for program direct) to the Centers and Mission Directorates in support of the OCFO budget guidance. Centers provide the required data to facilitate prioritization of the CoF program Agency-wide.

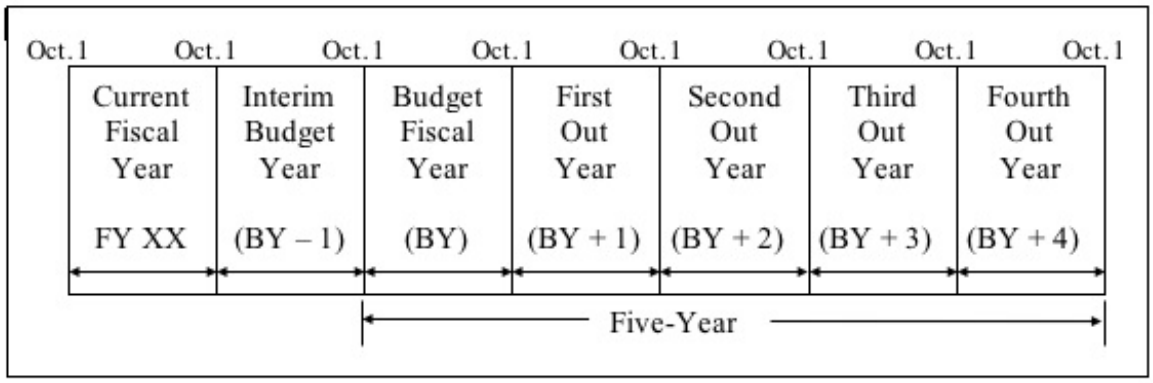

Figure 1-1b CoF Five-Year Plan

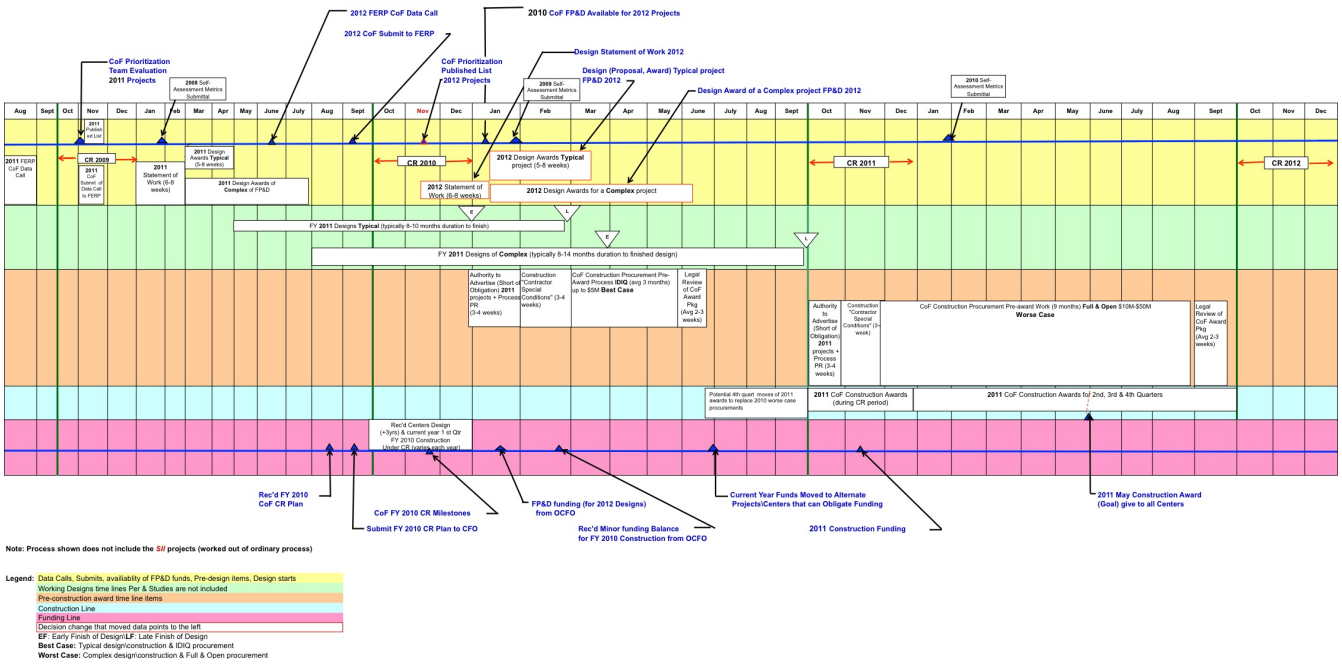

Figure 1-1c Institutional CoF Call and Programming Phase of Planning, Programming, Budgeting, and Execution System

1.4.8 **Documentation**. The CoF program manager shall prepare the following documentation for each CoF project:

a. A NASA Form 1509, Facility Project-Brief Project Document.

b. A NASA Form 1510, Facility Project Cost Estimate.

c. A Life-Cycle Cost Analysis (LCCA). LCCAs for discrete CoF projects are submitted during the data call, along with the draft budget narrative (see NASA Business Case Guide for Facilities Projects). LCCAs for all other CoF projects should be kept in the project folder and made available

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on request by FED.

d. A Risk Assessment. Risk assessment format and content will comply with the template provided in FED's annual data call.

1.4.9 Headquarters Review and Prioritization. The FED leads the review and prioritization of institutional facility projects proposed for NASA's five-year plan based upon 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 external funds), the FED and the associated Mission Directorate coordinate the process.

1.4.10 CoF Program Approvals. Figure 1-2 depicts the CoF program approval process. The CoF program is part of the annual appropriation request NASA submits to OMB.

1.4.11 Public Release. Until released by the appropriate committees of Congress, no project stakeholder (e.g. FPM, Architectural-Engineering (A-E) firm, NASA employee) shall publicly disclose CoF project information (including subprojects and/or work packages). A-E contracts will include a statement governing public release of project specifics.

1.4.12 NASA Headquarters. Based on the five-year plans submitted by the Centers, NASA Headquarters prepares and submits the draft appropriation request to OMB. This submittal is coordinated with the OCFO, Mission Directorates, Mission Support Offices, and Center Management. The NASA Administrator, through the OCFO, is responsible for NASA's appropriation request.

1.4.13 OMB Review. OMB reviews NASA's five-year plan and responds with changes, comments, and questions via a "passback." After NASA answers the passback, OMB provides a "markup" for use in preparing NASA's final submission. Using the OMB budget markup, NASA prepares and submits a final budget appropriation request to OMB. Following final approval, OMB incorporates NASA's planned budget into the President's budget for submission to Congress.

1.4.14 Facility Project Authorization and Appropriations. Using the President's budget as a starting point, committees in the Senate and House of Representatives develop the authorization and/or appropriation bills. The Congress approves and sends the bill(s) to the President for review and action. The bill becomes public law (or act) once the President has approved it.

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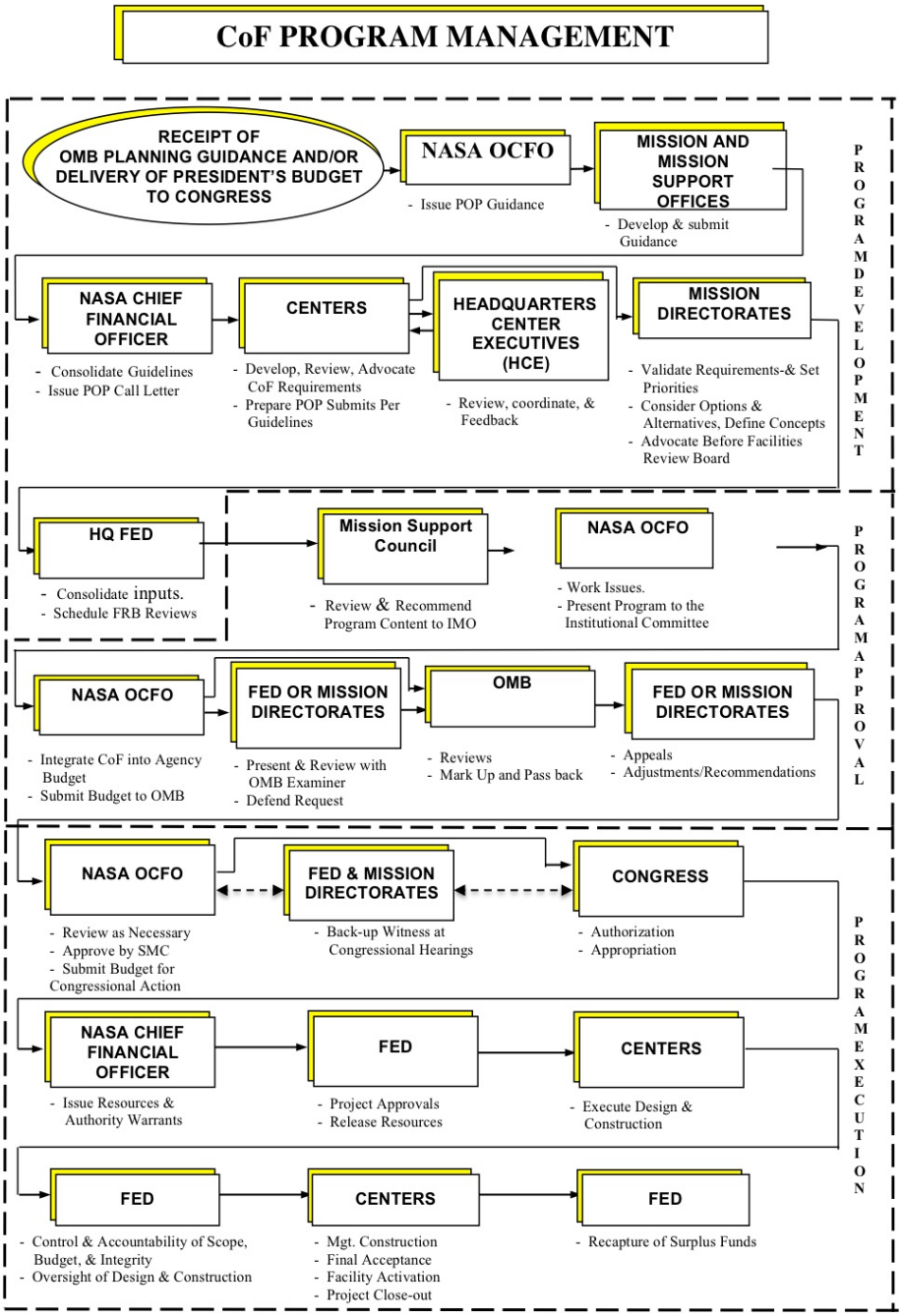

Figure 1-2 CoF Program Management

1.4.15 Program Oversight. As the CoF program proceeds through the authorization and appropriation process, NASA Headquarters (OCFO, FED, Mission Directorates, and Mission Support Offices) inform the Centers concerning the status of proposed facility projects.

1.4.16 Process for Handling Dissenting Opinions. Programs and projects shall follow the Dissenting Opinion Process per NPD 1000.0, NASA Governance and Strategic Management Handbook.

1.4.17 Program Execution. Execution is the process of obligating and managing contracts to accomplish project objectives. To "obligate" funds on a project means to award a contract (including ESPC and UESC) or purchase order. The FED goal is to obligate all CoF projects approved for

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design and construction by the end of the fiscal year. Early obligation of CoF projects is encouraged, and late obligation could place a project at risk of losing project funding (see Appendix A, Definitions, " at-risk project"[3]). The following paragraphs describe facility program execution, and Figure 1-2 depicts this process.

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[3] Funding allocation may be lost when a project is at risk. The resources allocated to an at-risk project can then be made available to satisfy shortages in Congressional appropriations or fund projects at locations where resources can be obligated in a timely manner.

1.4.18 Financial Resources for Facility Projects. The annual appropriations acts contain the principal funding authorities for CoF projects. This funding supports preliminary engineering, design, and construction of those projects. Identifying, planning, and developing the requirement into a proposed project and its activation after construction are paid for using non-CoF funds (see Figure 1-3a, Facilities Project Activities and Funding for Design-Bid-Build and Figure 1-3b, Facilities Project Activities and Funding for Design-Build). In some instances, another Federal agency, State or local government, or other party acquires funding for facility work at a Center through Agency agreements, the private sector as specified in contracts, or a nonappropriated fund activity such as a NASA Exchange. Regardless of the source of funds, approval authority shall comply with NPD 7330.1, Approval Authorities for Facility Projects.

Note 1: Non-CoF-funded studies evaluate current systems, facilities, and capabilities. These studies are done 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 reason for the study. CoF-funded studies are for site investigations to verify as-builts and/or existing utilities, as well as site conditions; e.g., soil borings. These studies are done once a project scope and preliminary Facility Project Cost Estimate have been developed. These studies are typically done as predesign.

Note 2: CoF-funded activation includes installed IT/communication infrastructure up to signal outlets; required demountable partitions and installed systems furniture; and any installed building support specialty equipment such as required emergency warning systems, installed security systems, and installed specialized material or file handling/storage equipment necessary for the facility to function for its intended use. Non-CoF-funded activation includes any other items necessary for the occupancy of the facility.

Note 3: Mixing funds between CoF, Center-directed, power purchase agreements (PPA), ESPC, and UESC is not authorized; however, there may be selected instances where it would be acceptable to combine efforts within a new construction or major renovation project; e.g., using a PPA to add photovoltaic panels to augment the power to the new facility. HQ FED reserves the right to approve or reject any such expenditure when coupled to a CoF project. The CoF project will, in all instances, be a stand-alone project providing a complete and usable end product.

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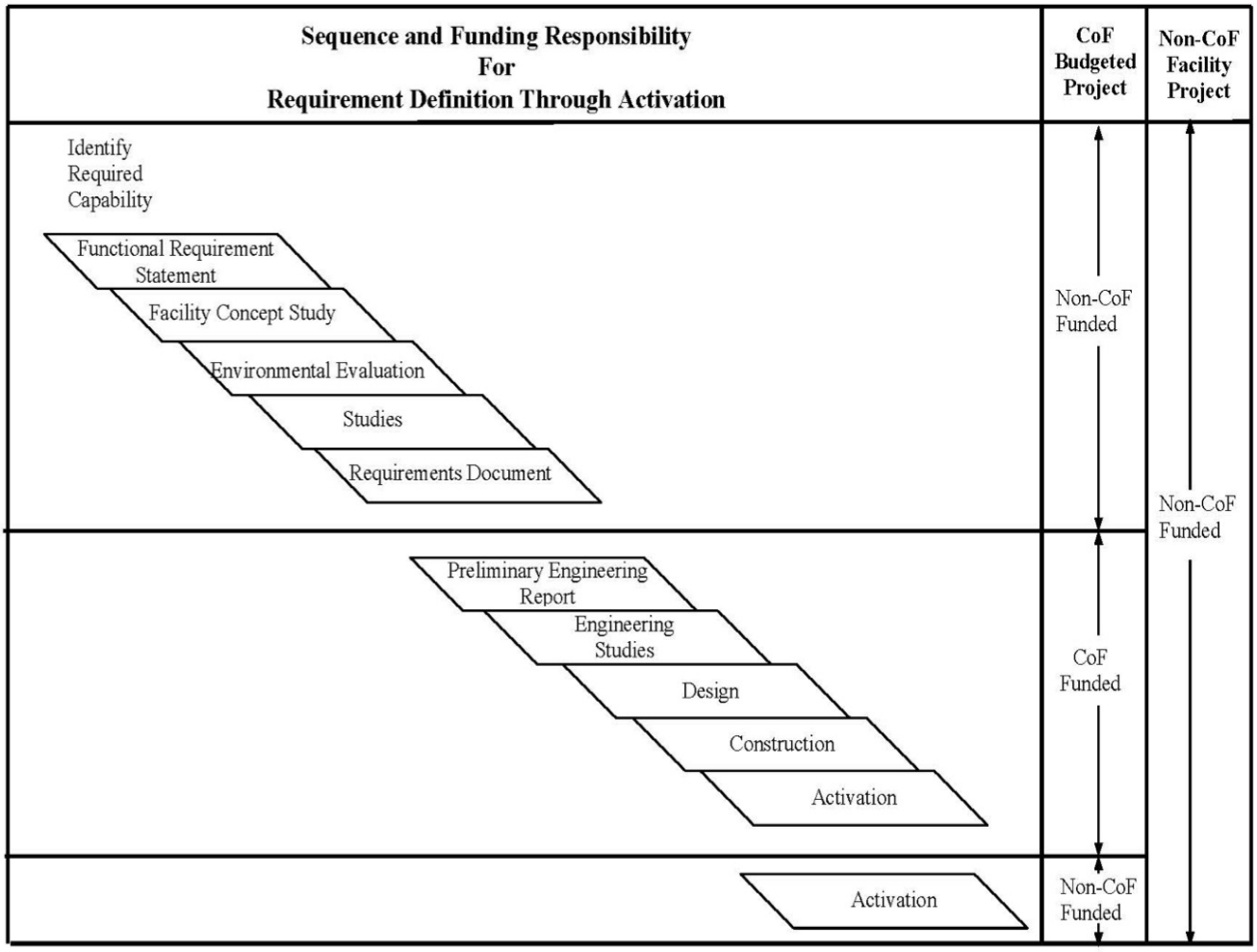

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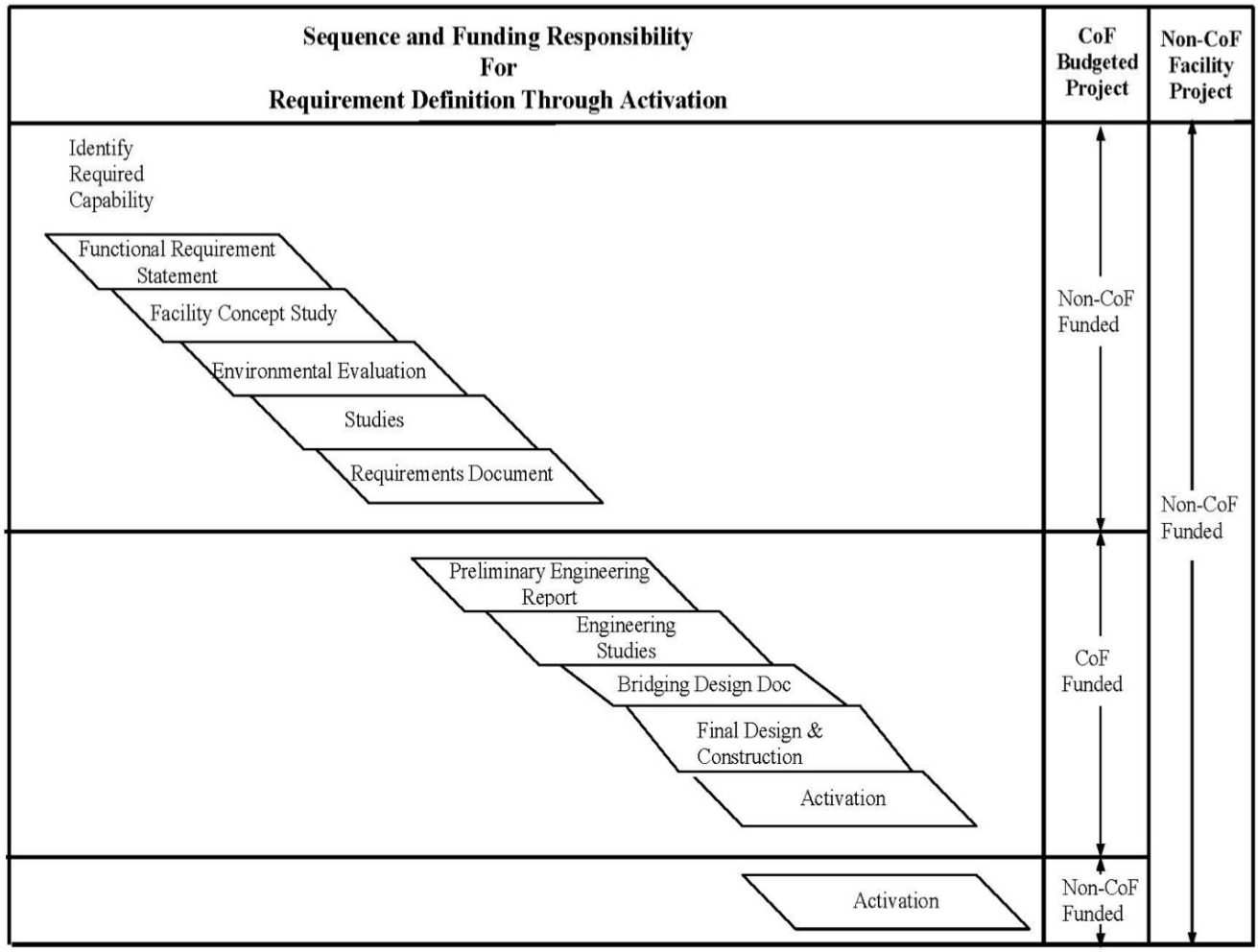

1.4.19 Facility Project Fiscal Management

1.4.19.1 CoF Thresholds. See section 1.1 for current CoF fund types and associated thresholds. The annual appropriation legislation is the only accepted source for adjustments to CoF thresholds.

1.4.19.2 Project Approval. The authorities and responsibilities identified in NPD 7330.1, Approval Authorities for Facility Projects, apply to all facilities projects, regardless of fund source. At a minimum, project concurrence and approval shall include the Center representative with delegated responsibility for construction, validation of requirements by support program or organization and the funding organization. Each facility project with a Facility Project Cost Estimate of $100,000 or more will have an approved NASA Form 1509, Facility Project-Brief Project Document, and NASA Form 1510, Facility Project Cost Estimate, prior to obligating funds on that project. The FPM prepares these. Approval requirements vary according to the types of funds expended as follows:

a. Center-Approved and -Funded Projects. Center-approved and -funded projects have a Facility Project Cost Estimate of $1 million or less. Centers approve and fund these projects; however, FED reviews NASA Forms 1509 for projects with a Facility Project Cost Estimate of $100,000 or more to ensure compliance with NASA policy, to prevent the appearance of fragmentation, and to ensure a complete record in the NASA Real Property Management System (RPMS). Center CoF Program Managers shall submit approved 1509s in excess of $100,000 to FED for review prior to obligating

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funds.

b. Facility Planning and Design Funds (FP&D). Based on the results of the prioritization process, FED authorizes projects for design and provides funds to accomplish facility planning and design of CoF projects. Center CoF Program Managers shall request funds and approval via the Space Act Agreement Maker (SAAM) and attach a NASA Form 1509 in the SAAM. FED replies with authority to design using the NHQ DIV799PD, Facility Planning and Design - Planning and Design form transmitted either through SAAM or by e-mail.

c. MRC Projects and Discrete Projects. Centers request the authority to advertise for construction and approval for construction by submitting a signed version of NASA Form 1509 and the CoF Routine Transaction Form to the FED via SAAM. After FED reviews the project documentation and the proposed project complies with current budget authority, it approves the project and the expenditure of discrete or minor funds by concurring in the SAAM. For CoF projects, FED includes stipulations for expenditures on NASA Form DIV80002, the Minor Facility Projects Summary Brief Project Document, at the time of issue.

d. Externally Funded Facilities Projects. Funding approval and authority comes from the party providing funds; however, NASA facility project approval requirements shall comply with NPD 7330.1, Approval Authorities for Facility Projects. Centers will request approval by submitting NASA Form 1509 and NASA Form 1510 to the Director, FED for review and approval.

e. Energy Savings Performance Contracts (ESPC) and Utility Energy Services Contracts (UESC). For projects where the estimated investment value in any individual facility is less than $1 million, follow section 1.4.16.2.a Center-Approved and Funded Projects. For all other projects, Centers request facility project approval by submitting NASA Forms 1509 and 1510 to FED via the SAAM E-Router; FED reviews and approves the facility project by approving the E-Router.

f. Enhanced Use Leases (EUL). For EUL agreements that include a facility project, follow section 1.4.16.2.d Externally-Funded Facilities Projects and NASA Desk Guide for Enhanced Use Leasing of Real Property.

g. EUL Net Revenue At or Above $100,000. Centers request approval to implement a facility project using EUL net revenue with an estimated cost of greater than or equal to $100,000 by submitting NASA Forms 1509 and 1510 along with the EUL Routine Transaction Form to FED via the SAAM E-Router. FED reviews and approves the facility project and the expenditure of EUL net revenue by approving the E-Router including a NHQ DIV799EUL Enhanced Use Lease Project Approval Form generated at HQ.

h. EUL Net Revenue Below $100,000. Centers request approval to implement a facility project using EUL net revenue with an estimated cost of less than $100,000 by submitting a EUL Routine Transaction Form to FED via e-mail. FED reviews and approves the facility project and the expenditure of EUL net revenue by approving that form and with a NHQ DIV799EUL Enhanced Use Lease Project Approval Form generated at HQ.

1.4.19.3 Requesting Construction Funds. Center CoF Program Managers shall request construction funds using the SAAM with the CoF Routine Transaction Form and NASA Form 1509 attached for each project.

1.4.19.4 Receipt of Funds. After project approval is complete and upon receipt of the work breakdown structures (WBSs) from Centers for approved design and construction projects, FED transmits funding to the Centers electronically through NASA's financial system. Center Contract

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Officers shall award CoF contracts only upon receiving approval authority and funds.

1.4.19.5 Authority to Advertise. FED grants authority to advertise for design and /or construction when it approves (via SAAM) NASA Form 1509. However, FED may grant advanced authority to advertise if necessary and appropriate.

1.4.19.6 Procurement. When professional services such as a design by an A-E firm or a construction contractor are identified, the contract acquisition shall comply with the FAR and NASA FAR supplement. FPMs will collaborate with Contracting Officers to comply diligently with the goals set forth in section 1.4.17, Program Execution.

1.4.19.7 Program Reporting Requirements. Center CoF Program Managers shall maintain records for each CoF project and submit Quarterly Reports, Functional Performance Metrics, and Sustainability Progress Reports to Headquarters.

1.4.19.8 Quarterly Report. Unless the Headquarters program manager has access to current project status via a Center electronic project management system, the Center CoF Program Manager provides the Headquarters program manager with quarterly project updates that include the following at a minimum:

a. Program-related requirements such as capability, schedule, and cost.

b. Design milestones for 30 percent and 90 percent including estimated and actual start dates, review dates, and completion dates.

c. Construction milestones including estimated and actual start dates, work packages, phases, commissioning, activation, beneficial occupancy, and closeout.

d. Funds management for design and construction including the budget amount requested during the budget formulation phase, the Current Cost Estimate (CCE), funds received, funds committed, and funds obligated.

e. Outstanding issues such as significant change orders, safety concerns, or cost overruns and the plans to mitigate these actions.

1.4.19.9 Functional Performance Metrics. The Center CoF Program Managers shall provide functional performance metrics to the FED in response to the FED's annual call for functional performance metrics. These metrics include the CoF Self-Assessment Metrics and the Quality Survey (included as a tab within the CoF Self-Assessment Metrics file). The date for the submission to the FED is included in the call letter but typically would be January 31 after the fiscal year (FY) being assessed.

1.4.19.10 Sustainability Progress Reports. NASA Center Program Managers shall submit an annual report of their progress toward implementing sustainability goals. FED requests and transmits reporting requirements annually, but the following represent typical minimum requirements:

a. Total number of new design projects initiated during the fiscal year.

b. Total number of new designs eligible for LEED registration.

c. Number of new design projects registered for LEED certification and at what level, i.e., Certified, Silver, Gold, or Platinum.

d. Number of completed construction projects eligible for LEED certification and number of

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completed construction projects achieving LEED certification and at what level, i.e., Certified, Silver, Gold, or Platinum.

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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 potential inclusion in the CoF process. 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 operations and maintenance requirements such as excessive trouble calls on a system or facility.

2.2 Facility Project Planning

2.2.1 Acquisition Planning and Execution. The FAR and the NASA FAR Supplement control all of the acquisition phases for all facility project work. The FPM and Center facility planning office shall coordinate all acquisition planning and execution with the Center acquisition office to ensure compliance with these regulations.

2.2.2 Center Master Plan. The FPM shall ensure assigned CoF projects are in accord with the Center Master Plan. See NPD 8810.2, Center Master Planning and NPR 8810.1, Center Master Planning for Real Property for clarification on Master Planning policy and implementation.

2.2.3 Facility Project Manager (FPM). Centers assign an FPM for each CoF project. With support from the project team (see section 2.2.4), the FPM shall organize, manage, and direct facility project work to meet the requirements of this NPR.

2.2.3.1 FPMs should have experience with facility project management commensurate with the size and complexity of the project to be undertaken. As a minimum, FPMs should have completed the Construction of Facilities Management course. In addition, a NASA course in Project Management would be beneficial.

2.2.3.2 For larger and more complex projects, management should consider requiring FPMs to have the level of training provided by the NASA Project Management and Systems Engineering Competency Framework and the Federal Acquisition Certification for Program and Project Managers. Programs and projects with a life-cycle cost of $250 million or greater shall be managed by program and project managers who have been certified in compliance with the Office of Management and Budget (OMB)'s promulgated Federal acquisition program/project management certification requirements. For projects using a design-build approach, specific training in design-build acquisition and requirements is highly recommended.

2.2.4 Facility Project Team. The project team includes all project stakeholders such as representatives from the using organization, safety, health, engineering, fire protection, security, historic preservation, environmental, acquisition, operations and maintenance, and technicians.

2.2.5 Front End Planning (FEP).

The FPM ensures that all project stakeholders take part in FEP: the process of gathering and

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developing sufficient information to define a facility project. Once the FPM and the planning team have identified the initial project goals and objectives, the FEP process starts and continues through the approval of the design statement of work (SOW) and the start of final design. The FEP phase establishes the project approach, requirements, and concept that provide the basis for project budget and approval.

2.2.5.1 In cooperation with the Contracting Officer (CO), the FPM decides whether to conduct the procurement as a Design-Bid-Build or as a Design-Build.

a. Design-Bid-Build. In this approach, the design is provided by an A-E company and then the approved design is put out for a construction bid with the winning contractor building the approved design (see Figure 1-3a).

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 1-3b). Different elements of the contract may be subcontracted out, but there is a single responsible organization. Front End Planning for design-build is not different from design-bid-build.

2.2.5.2 The FPM shall initially use the PDRI as the primary tool for FEP as a checklist to determine the project areas needing clarification and further study.

2.2.6 Facility Project Requirements. The following are required for all facilities projects regardless of fund source:

2.2.6.1 Functional Requirements Document[4]

a. The FPM shall complete a Functional Requirements Document that contains more detail than is found on the NASA Form 1509 and forms the basis for developing documents for budget formulation and/or project approval. The detailed requirements in this document need to be accurate and complete for use in further development of the project. The Functional Requirements Document includes the following elements:

(1) A clear and concise statement of purpose for the project.

(2) A description of the project, including existing conditions, problems, potential or preliminary solutions, operational need dates, studies, user requests, and reports or Operations and Maintenance (O&M) data. (The FPM either attaches supporting documentation as appendixes or at least notes how and where to obtain it.)

(3) Identification of all safety, health, environmental, and security requirements.

(4) Justification for the project.

(5) An SOW, if the project development and design work is to be done by contract.

(6) The funds source(s) and points of contact for those funds.

b. After the FPM writes the Functional Requirements Document, the project stakeholders (as described in section 2.2.4) shall review it.

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[4] The Functional Requirements Document is insufficient in detail to use as the requirements document necessary for a design-build acquisition. For design-build requirements, see sections 1.2.l and 3.6.2.

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2.2.6.2 Facility Project Management Plan

a. For CoF projects, the FPM shall prepare a Facility Project Management Plan that establishes a schedule for implementing a facility project and assigns roles, responsibilities, and authorities to develop and complete the project. The plan provides a detailed outline of the steps in the facility implementation process with well-defined milestones to measure progress. The Facility Project Management Plan includes the following elements:

(1) Identification of the FPM, the project team members, and other individuals or organizations responsible for project implementation.

(2) Functional Requirements Document (see section 2.2.6.1).

(3) A description of the planned work, including capacity, scope, location, sustainability elements, special features, and CCE.

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

(5) 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.

(6) Configuration/change control procedures and responsibilities.

(7) A description of design review milestones, documentation, fiscal control procedures, and reporting frequency.

b. Prior to the start of final design work, the FPM shall present the management plan for approval to the Center official exercising project technical approval authority.

c. For discrete projects, the FPM shall submit the management plan to the NASA Headquarters FED for review and approval. Management plan approval on discrete projects is required before start of final design (after acceptance of the 30-percent design for Design-Bid-Build (see section 3.6.1.1, 30-Percent Design) or acceptance of the requirements document for Design-Build (see section 3.6.2).

2.2.6.3 Environmental Compliance. The FPM and the Center Environmental Manager shall ensure an environmental evaluation in accordance with NPR 8580.1, NASA National Environmental Policy Act Management Requirements, and Exec. Order 12114. 14 C.F.R. Part 1216, Environmental Quality, contains NASA's environmental regulations, including NASA's environmental policy and requirements for managing wetlands and flood plains and for considering the impacts of a proposed action on the environment, including for example, on historic and cultural resources, prior to undertaking the proposed action. These regulations include a list of categorical exclusions; that is, types of actions that, based on NASA's experience, do not significantly impact the environment under normal circumstances and that NASA established through public notice and comment in the Federal Register. To demonstrate under the National Environmental Policy Act (NEPA) that the potential impacts of a proposed construction activity have been considered, the administrative record will include an environmental checklist and accompanying Record of Environmental Consideration (14 C.F.R. § 1216.305(e)) determining whether further review is required.

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Note: NEPA uses the terms "major" and "minor" to refer to the impact on the environment; the terms are not related to construction descriptions, i.e., a minor program project may have a major impact to the environment. The environmental checklist mentioned above helps to identify any unique or extraordinary circumstances, such as damage to a historic site or public controversy on environmental grounds that could rule out use of an established categorical exclusion. The checklist also helps to identify other permits, communications, or findings, if any, that need to be obtained, since NEPA also requires the Agency to consider in determining impact the degree to which there is a risk of violating any other applicable Federal, state, or local law, regulation, or Executive Order.

2.2.6.4 Historic Preservation

a. For work on existing facilities with potentially historic significance, the FPM and the Center Historic Preservation Officer shall ensure the work complies with 36 C.F.R. Part 800, Protection of Historic Properties, of the National Historic Preservation Act (NHPA) prior to rewarding a Design-Bid-Build, Design-Build, Demolition, or Deconstruction contract.

b. The FPM and Center Historic Preservation Officer (HPO) shall ensure any mitigation or design requirements for compliance with 36 C.F.R. Part 800, Protection of Historic Properties are included in a Design-Build request for proposal (RFP) prior to issuance.

2.2.6.5 Energy. The following documents are applicable:

a. 10 C.F.R. Part 433, Energy Efficiency Standards for the Design and Construction of New Federal Commercial and Multi-Family High-Rise Residential Buildings, establishes performance standards for energy conservation that are mandatory for the design of Federal buildings.

b. 10 C.F.R. Part 435, Energy Efficiency Standards for New Federal Low-Rise Residential Buildings, establishes mandatory energy efficiency standards for the design of Federal buildings.

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

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

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

f. NPR 8570.1, NASA Energy Management Program.

2.2.6.6 Occupational Safety and Health

a. The FPM and the Center Occupational Safety and Health organization(s) shall identify safety and occupational health requirements in compliance with NPR 8715.3, NASA General Safety Program Requirements and NPR 8715.1, NASA Occupational Safety and Health Programs.

b. The FPM shall prepare a Preliminary Hazard Analysis and the Preliminary Hazard List and initiate the Facility Safety Management Plan (FSMP) containing the Hazard Analysis Tracking Index (HATI) in accordance with NPR 8715.3, NASA General Safety Program Requirements.

2.2.6.7 Security. NASA is required by Exec. Order 12977 to comply with the Interagency Security

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Council (ISC) Design Criteria for planning and designing new construction and major renovation. Refer to the Department of Homeland Security for security criteria documents for specific requirements (see The Risk Management Process for Federal Facilities: An Interagency Security Committee Standard - August 2013).

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

b. The application of the Physical Security Criteria for Federal Facilities is predicated on a Facility Security Level designation using the ISC's Standard, "Facility Security Level Determinations for Federal Facilities."

c. In addition to the ISC Design Criteria and in compliance with NPD 1600.2, NASA Security Policy, FPMs with cooperation from the Center security officer assigned to the project shall ensure NASA facility projects comply with the requirements contained within NPR 1600.1, NASA Security Program Procedural Requirements (section 7.7); NPR 1620.2, Facility Security Assessments; and NPR 1620.3, Physical Security Requirements for NASA Facilities and Property.

2.2.6.8 Risk Management. If applicable to any portion of a CoF project, the FPM shall ensure compliance with the risk management process as outlined in NPR 8000.4, Risk Management Procedural Requirements. The referenced NPR describes applicability. A project with projected cost growth could be considered an "at-risk project" if the projected growth exceeds $500,000 for a discrete project or 25 percent of its budget authority for a minor project.

2.2.6.9 Operations and Maintenance (O&M)

a. The FPM coordinates all facility project designs and planning with the Center O&M organization. The FPM shall ensure all facility project designs comply with accepted maintenance policies described below:

(1) Reliability Centered Maintenance Guide for Facilities and Collateral Equipment.

(2) Reliability Centered Building and Equipment Acceptance (RCB&EA) Guide.

(3) NPR 8831.2, Facilities Maintenance and Operations Management.

(4) Computerized Maintenance Management System (CMMS) requirements.

b. The FPM shall make sure that O&M manuals on the installed systems and equipment are provided and training of O&M personnel (including certification training for complex technical systems) is accomplished. For real property systems and equipment, these costs are included in the CoF budget. For noncollateral equipment and systems, these costs are included in the activation budget (Non-CoF). It is recommended that the O&M manuals be provided in electronic formats for ease of use.

2.2.6.10 Sustainability. The FPM and project team members shall incorporate the five guiding principles, LEED Silver certification as outlined in section 1.3, and the following:

a. Commissioning. Commissioning as defined in ASHRAE Guideline 0 shall be required on all new construction and major renovation projects and also on the installed items and associated systems of all other projects (for more commissioning guidance, see http://www.wbdg.org/project/buildingcomm.php). Include the five guiding principles and the requirements outlined in the USGBC LEED Silver certification in the commissioning plan as a

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minimum.

b. Exemptions. For projects incapable of meeting the sustainability requirements described in the above paragraph, the FPM and the project team shall incorporate sustainable design practices to the maximum extent practical using the LEED checklist and provide justification in an exemption request. Neither the use of life-cycle cost nor compliance with the five guiding principles can be included in the exemption request.

c. Construction Waste. During the planning stage, local recycling and salvage operations that could process site-related waste are identified. Where markets or onsite recycling opportunities exist, the designer shall incorporate into the construction contract documents to have the contractor recycle or salvage at least 50 percent of construction, demolition, and land-clearing waste, excluding soil.

d. Other Construction Standards. The FPM shall ensure compliance with the following standards or guidance:

(1) Indoor Air Quality (IAQ) During Construction. Sheet Metal and Air Conditioning Contractors' National Association IAQ Guidelines for Occupied Buildings Under Construction 2nd Edition, 2008. After construction and prior to occupancy, conduct a minimum 72-hour flush with maximum outdoor air, consistent with achieving relative humidity no greater than 60 percent. After occupancy, continue the flush as necessary to minimize exposure to contaminants from new building materials.

(2) Ventilation and Thermal Comfort. ASHRAE Standard 55-2013, Thermal Environmental Conditions for Human Occupancy, including continuous humidity control within established ranges per climate zone and ASHRAE Standard 62.1-2013, Ventilation for Acceptable Indoor Air Quality.

(3) Moisture Control. Implement a moisture control strategy for controlling moisture flows and condensation to prevent building damage and mold contamination.

(4) Daylighting. Maintain a minimum daylight factor of 2 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.

(5) Low-Emitting Materials. Use materials and products with low pollutant emissions, e.g., low or no volatile organic compounds. This requirement includes adhesives, sealants, paints, carpet systems, and furnishings.

(6) Biobased Content. Use products meeting or exceeding the United States Department of Agriculture's biobased content recommendations. For other products, use biobased products made from rapidly renewable resources and certified sustainable wood products.

(7) Ozone-Depleting Compounds. Eliminate the use of ozone-depleting compounds during and after construction where alternative environmentally preferable products are available, consistent with both the Montreal Protocol and Title VI of the Clean Air Act Amendments of 1990 or equivalent overall air quality benefits that take into account life-cycle impacts.

(8) Recycled Content. For EPA-designated products, use products meeting or exceeding 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 preconsumer content constitutes at least 10 percent (based on cost) of the total value of the materials in the project.

e. Laboratories. The Labs21 program is cosponsored by the U.S. Environmental Protection Agency

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(EPA) and the U.S. Department of Energy (DOE). For major renovation and new construction of laboratories, the FPM shall incorporate and reference the recommendations of the Labs21 program, including the Labs21 Laboratory Energy Efficiency Profiler and the Labs21 Environmental Performance Criteria.

2.2.6.11 Cost Estimate. The FPM shall prepare or ensure that assigned CoF projects have a Facility Project Cost Estimate that includes every element described in the project Functional Requirements Document with enough accuracy to have a reasonable expectation of project success. For CoF projects, NASA Form 1510, Facility Project Cost Estimate summarizes this estimate with sufficient detail for review. When applicable to the specific project, cost estimates for the following major elements are required:

a. Land acquisition.

b. Site preparation, utilities, sidewalks, parking lots, and access roads.

c. Construction materials and labor.

d. Material and equipment tests performed at the construction site or at an offsite location.

e. Construction management services (including supervision, inspection, and engineering services (SIES) and network diagrams).

f. Commissioning services during design and construction.

g. Environmental compliance and protection.

h. Collateral equipment.

i. Subcontractor and general contractor cost, overhead, and profit.

j. General conditions, insurance bonds, and taxes.

k. LEED certification.

l. Recordation of as-built conditions.

2.2.6.12 Budget and Approval Documents

a. For all discrete and MRC projects (see section 1.4.18.2), the Center CoF Program or Project Manager shall submit NASA Forms 1509 and 1510 to FED.

b. For discrete projects, the Center CoF Program Manager shall provide FED a budget narrative and an LCCA in compliance with OMB Circular A-94 using ECONPACK.

c. The Center CoF Program Manager shall also provide NASA Forms 1509 and 1510 for demolition projects estimated to cost in excess of $1 million to FED.

2.2.6.13 Earned Value Management

a. Earned Value Management (EVM) is a tool that offers the potential for early visibility into the likelihood of cost/schedule problems. The FPM shall consider using EVM for any project with a Facility Project Cost Estimate of $20 million or more or where there is significant development or technical risk. Information on EVM can be found in section 7.11 of the NASA Schedule Management Handbook (SP-2010.3403).

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b. A resource-loaded [5] schedule is an acceptable alternative to EVM when issuing a firm-fixed-price contract. If this option is selected, the construction contractor shall be required to submit a resource-loaded schedule for review and approval by the CO prior to beginning work.

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[5] A resource-loaded schedule includes the estimated percentage of the total cost and time to complete each element of the construction contract. It meets the requirements of EVM. A construction contractor submits this schedule to the CO for approval prior to starting the work.

2.2.7 Codes and Standards

2.2.7.1 The FPM shall ensure designs meet or exceed locally adopted, nationally recognized building codes and standards.

2.2.7.2 If a local jurisdiction has adopted a code that is not nationally recognized, the FPM shall ensure the design meets or exceeds the latest version of the International Building Code from the International Code Council.

2.2.7.3 Regardless of locally adopted building codes, the FPM shall ensure the design meets or exceeds the latest version of the National Fire Protection Association requirements for electrical systems, life safety, and fire protection, detection, and suppression.

2.2.7.4 The FPM shall ensure that all CoF design drawings comply with the United States National CAD Standard.

2.2.7.5 For all CoF project specifications, designers shall 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 a specification suitable for open and competitive procurement.

2.2.7.6 For projects where BIM is to be used, the FPM shall reference the latest version of the National BIM Standard and incorporate the NASA BIM Scope of Services and Requirements in the projects to the extent applicable.

2.2.8 Activation Budget Formulation

2.2.8.1 The FPM shall include budget formulation planning for activation during the planning phase of the project. The purpose is to identify costs associated with activation and ensure funds are available at the time activation starts. The budget planning identifies all costs necessary to outfit the facility for its intended operation and the source(s) of funding (see Chapter 5, Activation for details). NASA Form 1509 includes both the CoF funded and non-CoF funded estimated activation costs for the project.

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Chapter 3. Design

3.1 Design Coordination

3.1.1 The FPM shall keep the project team apprised of changes or proposed changes in project requirements.

3.2 Architectural-Engineering (A-E) Services

3.2.1 Whenever A-E services are required, the FPM and Center Procurement Office shall acquire those services in accordance with the FAR Part 36 and the NASA FAR Supplement.

3.3 Public Release

3.3.1 The FPM and project team members shall ensure that public disclosure of CoF project information (including subprojects and/or work packages) occur only after release by the appropriate committees of Congress. Design documents prior to their planned construction fiscal year 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 Sensitive But Unclassified (SBU) shall be handled by the FPM and project team members in accordance with NPR 2810.1, Security of Information Technology.

3.4 Management of Design

3.4.1 NASA policy is to award CoF projects early in the fiscal year in which they are planned. The FPM shall plan and manage CoF program projects to support reaching the goal of obligating all design funds by the end of the fiscal year. This includes the preparation and submittal of NASA Form 1739, Alternative Future Use Questionnaire, which allows the proper accounting treatment of the design funding.

3.4.2 For all CoF projects, the FPM shall include in the A-E SOW a statement that the A-E firm is responsible for designing the project within the estimated cost of construction. For all CoF projects, the A-E contract should include at least 5 percent of the cost of construction as bid alternates, bid additions, or bid options. The A-E contract should require notification to the CO or Contracting Officer's Representative (COR) when the estimated construction costs are not adequate to cover the requirements included in the SOW.

3.5 Preliminary Engineering Report

3.5.1 The FPM shall ensure a Preliminary Engineering Report (PER) is performed on any assigned CoF project having significant technical or financial risks associated with it; e.g., employing leading-edge technology or is highly technical or complex.

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3.5.2 If a PER is performed for a project, the PDRI score shall be determined by the FPM and the project team soon after its conclusion (see section 2.2.5, Front End Planning).

3.5.3 The FPM shall ensure every PER includes a Requirement Statement and Justification; a Descriptive Analysis; Engineering, Budget, and Other Estimates; a Design and Construction Schedule; and Appendices.

a. **Section I: Requirement Statement and Justification.** Describe and justify the project requirements, problems, and milestones. Reference Center directives to support the requirements and required completion date.

b. **Section II: Descriptive Analysis**. Identify and explain the problems and solutions with sufficient detail to adequately make rational decisions. Include schematics and one-line diagrams showing the functions and operations to be performed within the facility. Develop and provide for each alternative a life-cycle cost analysis that meets the requirements of section 2.2.6.12, Budget and Approval Documents. For each alternative, include discussions on the pros, cons, risks, and analyses for meeting the project requirements including safety, fire protection, energy conservation, environmental, operations and maintenance considerations, and sustainability. Where applicable, include for each alternative information on architectural, site development, structural, mechanical, and electrical considerations; real estate actions and any affected utilities. Address in this section real estate requirements (including acquisitions and easements); results of Section III - Engineering, Budget, and Other Estimates; and a summary of information in the dedicated appendix for Real Estate Interests (see section 3.5.3.e(2)). If there are no real estate requirements, clearly state that in this section.

c. **Section III: Engineering, Budget, and Other Estimates**. This section presents the total cost estimate for the proposed facility project approached and the selected alternatives. This includes the Facility Project Cost Estimate and the Operations and Maintenance Cost Estimate.

(1) **Facility Project Cost Estimate**. This is the cost estimate as prepared on NASA Form 1510, Facility Project Cost Estimate. The cost estimating process includes Engineering Estimates (EE), Budget Estimates, Approved Facility Project Cost Estimates, and other cost estimates.

(a) The EE. The EE represents the CoF costs developed from the draft project documents (drawings and specifications) prepared for the PER. It includes the costs for materials, labor, real estate actions, and services, including contractor overhead and profit. It includes adequate design contingencies. The EE includes all labor and material costs for all items including collateral equipment that would normally be furnished by a contractor and installed as permanent in the facility (see Appendix D, Facility and Other Related Costs, for a listing of items and types to include). When applicable, the EE includes the cost to install Government Furnished Property (GFP). The EE does not include escalation, construction contingencies, or SIES. The basis or source used is indicated on the estimate. Estimates identify funding requirements by fiscal year(s) and amount(s). The EE includes unit costs (e.g., units of measure and quantities for each significant item) instead of lump sum estimates whenever feasible.

(b) The Budget Estimate. This estimate includes the EE of the selected alternative, escalation, construction contingencies, commissioning services, and SIES. This estimate follows the same guidelines for unit costs outlined in the prior paragraph. The total budget estimate becomes the budget amount (BA) after it has been submitted to OMB and is the BA for this project on all future reports to HQ (see section 1.4.20, Program Reporting Requirements).

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(c) Approved Facility Project Cost Estimate. This estimate represents the total rounded estimated cost of the project, including contingencies, SIES, and all options. For the PER, this is a draft estimate that goes onto the NASA Form 1509.

(d) Other Cost Estimate. Project requirement costs not covered in the prior three sections should be included within the PER but annotated separately. For example, non-real property equipment, non-system furniture, and telecommunications equipment downstream of signal outlets required to meet the project goals and objectives fit under this heading.

(2) **Operations and Maintenance Cost Estimate.** An O&M cost estimate covering the expected life of the facility is included for each feasible alternative in the PER. This cost estimate includes estimated energy and maintenance costs for installed systems over the expected life of the facility.

d. **Section IV: Design and Construction Schedule**. Provide a project schedule using a commercially available project planning software product and identify the software in the PER. If a predetermined need date has been established for the facility, the FPM shall ensure it is shown in the schedule. The schedule addresses the requirements for other A E services, long lead items, special approvals, and other special requirements. If more than one construction contract is contemplated, an estimate of the time required for each major contract and the phasing of the contracts is provided. The schedule includes the estimated number of months required for each of the following:

(1) Preparing the final design documents.

(2) Construction acquisition.

(3) Construction.

(4) Facility activation.

e. **Section V: Appendices to the Report**

(1) Drawings. As required for clearly illustrating the project, drawings for the PER include a location plan, site plan, single-line floor plans, and elevations. The drawings are to be in 8-1/2 by 11-inch format. Foldouts are acceptable if the vertical dimension is kept to 11 inches. On the drawings, pay particular attention to illustrating effective land use. Indicate any proposed land-acquisition requirements, including easements, on the site plan. Show required safety and security clearance distances, when applicable, on the site plan.

(2) Real Estate Interest. For those projects requiring additional real estate (on- or offsite) or easements, include an appendix in the PER and address the following items:

(a) A tabulation segregated by type of ownership (i.e., private, state, or public domain) of only the acreage proposed for acquisition plus easements for access and utilities. The tabulation includes the assessed value of land, assessed value of improvements, current appraised value, and the number of owners involved.

(b) The extent of any street or road closings and the extent of any road or utility relocations, including the estimated cost for such closings and/or relocations, separate from the land values indicated above.

(c) The extent and estimated costs of required additional rights such as mineral rights, timber rights, and easement rights whether outstanding in parties other than the present owners or not, and a statement as to whether title should be taken in fee simple absolute or subject to such rights.

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(d) A lease-purchase analysis, as required by OMB Circular No. A-94 Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs, when a decision has been made to lease or purchase (construct) general-purpose real property.

(e) Compliance with Exec. Order 12372, Intergovernmental Review of Federal Programs or the basis of exception. Completing an Environmental Impact Statement, Finding of No Significant Impact, or Environmental Assessment satisfies this requirement.

(3) Ancillary Investigations. If there are any supplementary investigations or engineering studies used to enhance, develop, or eliminate alternatives, such as soil conditions, environmental studies, marketing strategies, or feasibility studies, either attach them to or summarize them in the appendixes.

3.6 Design Milestones.

3.6.1 Design-Bid-Build. For Design-Bid-Build projects, the minimum design milestones are 30 percent and 90 percent. The FPM, in addition to ensuring the design is coordinated with the project stakeholders during design meetings, shall distribute 30 percent and 90-percent design documents to the project stakeholders for review. These design stages include the following minimum elements:

3.6.1.1 30-Percent Design Documents. The 30-percent design is a critical design milestone. In addition to the documentation required in section 2.2.6, Facility Project Requirements, the designer shall include the following documentation:

a. For new construction or an addition to an existing building, site plans in accordance with the Center Master Plan. Site plans include site utility locations, grading, pavement, and hardscape and landscape features.

b. Floor plans, building elevations, structural systems, mechanical systems, electrical systems, a construction phasing plan, a preliminary commissioning plan (see http://www.wbdg.org/project/buildingcomm.php), and a draft activation plan.

c. Design analysis supporting the basis for the design with calculations. The analysis contains important assumptions, standards, codes, and other constraints used to determine final selections. The package includes section numbers and titles for all specifications planned.

d. Outline specifications, including outline specification section numbers and titles for all specifications planned.

e. A preliminary Facility Project Cost Estimate, in accordance with section 3.5.3, Section III: Engineering, Budget, and Other Estimates.

3.6.1.2 The FPM and the project team shall evaluate and score the project using the PDRI soon after receiving the 30-percent design documents.

a. If at that time the PDRI score is over 200 out of 1,000 possible points, the project team identifies the problem areas and evaluates the risks to project success.

b. If the risks are low (below 200), the project may proceed to final design.

c. If the risks are high (above 400), the FPM further defines the project before proceeding with final

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design.

d. For CoF projects receiving a PDRI score of 300 or more out of 1,000 possible points, the FPM shall prepare a written memorandum outlining the items of low definition and the reasoning behind the decision to proceed. The FPM and the Center CoF Program Manager sign and date this document and keep it on file with the project documents through project closeout.

3.6.1.3 90-Percent Design Documents. The design documents submitted for review are a completely detailed set of technical design contract documents in final form. They include the following:

a. A complete set of drawings and specifications with sufficient detail for a prudent contractor to complete the work.

b. A final Facility Project Cost Estimate in accordance with section 3.5.3, Section III: Engineering, Budget, and Other Estimates.

c. A construction schedule with key milestones for long-lead items, phases clearly delineated, and activation.

3.6.2 Design-Build. The primary document used during acquisition of a design-build contractor is the requirements document, including a detailed set of requirements and restrictions. In contrast to the requirements document that is developed for a design-bid-build project, the 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. A 30-percent design, as described in section 3.6.1.1 and 3.6.1.2 (PDRI evaluation), is required for review after the design-build contractor is under contract. At the conclusion of the design-build contract, a complete set of as-built drawings or Building Information Model (BIM) shall be required by the FPM.

3.7 BIM Requirement

3.7.1 FPM shall ensure the BIM is required for discrete level projects (greater than or equal to $10 million), new construction, and major renovation projects. A major renovation project is one where the Facility Project Cost Estimate of the renovation is 50 percent or greater of the actual replacement cost of the facility or the portion of the facility under renovation.

3.7.2 Where projects are using BIM, the FPM should use the NASA BIM scope of service document in the project designer's scope of work.

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

3.7.2.2 For design-build delivery, refer to the NASA BIM guideline document Building Information Modeling Scope of Services and Requirements for Construction Contractor in a Design-Bid-Build Process.

3.8 Design Reviews

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3.8.1 The project stakeholders (see section 2.2.4) shall review both the 30 percent and 90 percent design stages for constructability, environmental compliance, sustainability, safety, security, health, and code compliance. The primary purpose of a design review is to ensure compliance with the design or design-build contract.

3.9 Mission-Critical Systems

3.9.1 For mission-critical technical facilities (for definition, see NPR 7120.5, NASA Space Flight Program and Project Management Requirements) specifically developed or significantly modified for space flight systems and associated ground systems, the FPM (as directed by NPR 7120.7 and NPR 7120.8) shall comply with NPR 7120.5 and with this document. Where compliance to both policies would duplicate an effort (e.g., a project management plan), only one effort incorporating all required elements from both policies is necessary. For complex or mission-critical systems, the FPM ensures a Failure Mode and Effects Analysis (FMEA) is accomplished in accordance with NASA STD 8719.7, Facility System Safety Guidebook.

3.10 Facility Activation Plan

3.10.1 For new construction and major renovation projects, the FPM shall develop a facility activation plan during the design phase. This plan outlines the process steps and resources necessary for project implementation. The activation plan addresses the following items for the specific project:

a. Noncollateral equipment purchase and installation. For noncollateral equipment no longer needed within an existing facility, refer to NPR 4200.1, NASA Equipment Management Procedural Requirements.

b. Subsystem tests (list each, list test limits, and the PT&I technology to be used).

c. Integrated systems test plan and test.

d. Integrated systems safety and occupational health review.

e. Operational Readiness Review according to, but not limited to, NPR 8715.3, NASA General Safety Program Requirements.

f. Estimated yearly budget for O&M for installed systems.

g. Prefinal inspections.

h. Facility and systems as-builts.

i. Final facilities construction contract closeout.

j. Telecommunications equipment installation.

k. Personnel move in.

l. Thermal Comfort Survey of Building Occupants (USGBC LEED IEQ Credit 7.2).

m. Conducting a Post-Occupancy Evaluation.

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3.10.2 Prior to completion of the final design work, the office exercising project approval authority shall review and approve the activation plan.

3.11 Activation Budget

3.11.1 The FPM shall complete the activation budget started in the planning process (see section 2.2.8, Activation Budget Formulation) and submit it during the normal budget process. The activation budget includes estimated costs associated with all tasks necessary to verify that the facility meets the project requirements, the systems operate within the design parameters, and the facility and operating organization are ready to use and maintain the facility.

3.11.2 The budget includes all costs necessary to outfit the facility for personnel move-in and its intended operation. CoF and non-CoF funds cover these costs. Project Engineering Estimates (CoF funds) for new construction and total renovation projects are to include an amount for the following items:

a. Installed IT/communications infrastructure up to signal outlets.

b. Required demountable partitions and installed systems furniture.

c. Installed building support specialty equipment such as required emergency warning systems, conduit and cable to support installed security systems [6], and installed material or file handling/storage equipment in support areas of designated use.

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[6] Installation of cipher locks, when determined to be required for access into secure areas are acceptable CoF expense items. CCTV cameras, for example, are not included in this exception, but it is okay to provide conduit and cable to the site where the camera(s) are mounted.

3.11.3 All other items considered necessary to support occupancy are to be covered by non-CoF funds and are to be reported by the FPD as "Other Related Costs" on NASA Form 1509.

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Chapter 4. Construction

4.1 Acquisition of Construction

4.1.1

The designated CO is the only person with authority to obligate the Federal Government in acquiring and executing contracts. The construction phase includes preparation of the acquisition package, advertisement, negotiation, contract award, construction management, construction inspection, change control management, commissioning, and activation startup. This includes the preparation and submittal of NASA Form 1739, Alternative Future Use Questionnaire, which allows the proper accounting treatment of the construction funding.

4.1.2 The FPM or designee represents the CO as the COR within the limitations granted and responsibilities assigned by the CO. The project team continues to provide support during this phase, especially during the change control process.

4.2 Preparation of the Acquisition Package

4.2.1 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 (see section 1.4.19.3., Requesting Construction Funds). For design-build procurements, the minimum acquisition package includes a Government Cost Estimate, a requirements document, and a contractor selection and evaluation plan.

4.2.2 The CO with cooperation and coordination from the COR and project team members shall ensure facility project acquisitions comply with the FAR and the NASA FAR Supplement.

4.3 Authority to Advertise

4.3.1 For CoF projects, the acquisition process for construction begins only after the authority to advertise has been issued from FED. For design-build acquisitions, funds and/or authority to advertise prior to receipt of funds may be requested when the Center is ready to begin acquisition. For design-bid-build acquisitions, funds and/or authority to advertise prior to receipt of funds may be requested when the final design is 90 percent complete. The following documents shall be submitted by the Center CoF Program Manager, reviewed, and approved using the SAAM system:

a. A locally approved and signed NASA Form 1509 and 1510 for each project.

b. For discrete projects, the approved Facility Project Management Plan (see section 2.2.6.2., Facility Project Management Plan) is submitted by the FPM or COR for FED.

4.4 Receipt of Bids or Negotiation

4.4.1 The CO is responsible for bidding and negotiating construction contracts, but the COR

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provides technical support and advice at the CO's request.

4.4.2 The COR shall prepare and submit the NASA Form 1579, Flash Bid Report or equivalent documentation for minor and discrete projects to FED immediately following the bid evaluation and the CO's acceptance of the bids as responsive.

4.5 Contract Award

4.5.1 Contract award is the CO's responsibility. The COR may be called upon to provide assistance prior to and during the award process.

4.6 Building Information Modeling

4.6.1 During construction, the FPM/COR shall periodically verify the construction contractor is updating the BIM to reflect as-built conditions.

4.6.2 At contract closeout, the final as-built BIM shall be turned over to the FPM who will provide this to the O&M organization at the Center.

4.7 Construction Management

4.7.1 During the administration of the construction contract, the COR shall perform partnering for all facilities projects, as defined in NFS Subpart 1836.70, Partnering, 48 C.F.R. Chapter 18.

4.7.2 The COR shall apply change controls during the preconstruction conference (or immediately after the notice to proceed is issued) to ensure all involved with the contract understand who is responsible for directing changes and how the changes are administered.

4.7.3 Either the CO or the COR shall brief all project stakeholders on contract administration and change control procedures.

4.7.4 The COR shall ensure the following are accomplished during the project:

a. Manage the Architectural Engineer's construction services contract.

b. Ensure the facility is constructed in accordance with the contract documents.

c. Prepare and process status reports and inspection logs.

d. Review contractor safety and health plans with representatives from the Center safety and occupational health organizations.

e. Review and approve contractor submittals, including as-builts.

f. Process contractor requests for progress payments and requests for information.

g. Review and approve change requests.

h. Maintain the project CCE, highlighting approved and potential changes in the project cost and schedule.

i. Ensure the preparation and delivery of O&M instructions, Reliability Centered Maintenance

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(RCM), PT&I, and CMMS information and as-built drawings.

j. Use the Reliability Centered Building and Equipment Acceptance Guide (RCBEA) during the final inspection and acceptance of installed systems.

k. Prepare or oversee the preparation of real property vouchers and transfer documents.

l. Complete final project closeout.

m. Where required, ensure the facility is achieving the defined LEED certification construction credits.

4.8 Real Property Capitalization

4.8.1 Within 30 days after project completion [7], the FPM and the COR assist the Center Real Property Accountable Officer (RPAO) in capitalizing and classifying the real property. The FPM, with guidance from the RPAO, shall fill out NASA Form 1046, Transfer and/or Notification of Acceptance of Accountability of Real Property.

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[7] Project completion means that the contractor has performed all the necessary work assigned and the final voucher is approved for payment. For cases where partial beneficial occupancy is allowed, a NASA Form 1046 is required for the portion accepted.

4.9 Project Closeout

4.9.1 For new construction and major renovation projects, the FPM shall facilitate project closeout by ensuring the completion of the following activities:

a. Facility systems training.

b. O&M instructions, PT&I and CMMS information, and manuals.

c. Final inspections.

d. Punch list (closeout).

e. Warranty transfer(s).

f. Contractor performance records.

g. Data systems design and installation.

h. Systems furniture design, purchase, and installation.

i. Transfer to customer and O&M organization.

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Chapter 5. Activation

5.1 Activation

5.1.1 Facility activation involves the completion of facility projects including facility outfitting, subsystem and integrated system tests, final inspection and acceptance, final cost closeout, and release to the customer and O&M organizations.

5.2 Facility Outfitting

5.2.1 Outfitting (see Appendix A, "outfitting" and Appendix D, Facility and Other Related Costs) includes the following items:

a. Noncollateral equipment installation.

b. Data systems installation.

c. Audio-visual systems installation.

d. Electronic security system installation.

e. Systems furniture installation.

f. Telephone installation.

g. Furniture and equipment move-in.

h. Personnel move-in.

i. Maintenance services startup.

5.3 Beneficial Occupancy Prior to Completion

5.3.1 With CO and Authority Having Jurisdiction approval, beneficial occupancy of the facility or a portion of the facility may be allowed prior to final acceptance. The CO shall provide the contractor with a list of outstanding work for those areas the Government intends to use. Taking beneficial occupancy does not absolve the contractor from completing the contractual agreement.

5.4 Completion and Acceptance of Installed Systems

5.4.1 The COR shall ensure inspections and tests are performed for equipment and installed systems to validate compliance with O&M requirements identified in the Facility Project Management Plan (see section 2.2.6.2) and the Reliability Centered Building and Equipment Acceptance Guide.

5.5 O&M Manuals and Training

5.5.1 During the activation phase, the FPM shall ensure that the O&M staff is trained on and

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provided with O&M manuals and the final BIM, if required, for installed systems and equipment.

5.5.2 For real property, funding for this effort is to be included in the CoF budget.

5.5.3 For noncollateral equipment and systems, funding is from activation budget source(s).

5.6 Commissioning

5.6.1 The FPM or COR shall ensure Total Building Commissioning, as defined in the most current version of the United States Green Building Council's (USGBC) LEED Green Building Design and Construction Reference Guide, as enhanced commissioning is performed on all new construction and major renovation projects, and on installed items and associated systems on all other facility projects. For additional commissioning requirements, refer to the most current version of the USGBC reference guides for Existing Buildings: Operations & Maintenance and Commercial Interiors (see http://www.usgbc.org/leed/rating-systems for more information).

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Chapter 6. Disposal/Deconstruction

6.1 Demolition Plan

6.1.1 The FPM shall develop a management plan that is compliant with NPR 8580.1 and NPR 8800.15 for disposal/demolition projects and any other projects requiring disposal and/or deconstruction.

6.1.2 Authority to Dispose/Demolish. The FPM shall submit a letter to the Director, Integrated Asset Management Division, signed by the Center Director or designee, requesting authority to proceed with the disposal/demolition. This authority is separate from the request to include the facility in the demolition program as part of the PPBE process. FED reviews and approves the request with an NHQ DIV799DF Demolition of Facilities Project Approval Form generated at HQ.

6.1.3 Determination to Demolish. The FPM shall evaluate disposal alternatives such as transfer to another agency or adaptive reuse (McKinney Act screening) (for more information, see NPR 8800.15, Real Estate Management Program, Chapter 8).

6.1.4 Requesting Inclusion in the Demolition Program

a. The FPM shall request funding for demolition of the facility as part of the PPBE process 24 to 26 months prior to the start of demolition.

b. The FPM shall identify the earliest demolition date and any schedule constraints and reference the Annual PPBE Guidance for requirements.

6.1.5 Compliance with NHPA. For projects where existing buildings will be modified or disposed of, the FPM shall contact the Historic Preservation Officer (HPO) for their determination of historic eligibility.

6.1.5.1 If eligible, the FPM, in cooperation and coordination with the HPO, shall develop an adaptive reuse feasibility report. The HPO will identify mitigating measures such as a Historic American Building Survey (HABS) or a Historic American Engineering Record (HAER) based on existing mitigation measures outlined in NASA's Programmatic Agreement on Historical Preservation or in accordance with section 106 of the National Historic Preservation Act (NHPA).

6.1.6 Environmental Baseline Survey. Prior to demolition, an Environmental Baseline Survey shall be required and will be managed by the Center Environmental Officer or designee. Its purpose is to identify hazardous substances (e.g., asbestos and lead) for removal as part of the demolition and prior to demolition (chemical containers).

6.1.7 Compliance with NEPA. The initial record of environmental planning and an environmental checklist shall be completed by the FPM and coordinated through the Center Environmental Management Office 24 months before the start of demolition under the National Environmental Policy Act (NEPA). Additional actions may be required based upon the environmental impacts identified on the checklist.

6.1.8 Personal Property Reuse Plan. 12 to 24 months before the start of demolition; equipment, property and artifacts for reuse by the Government or disposal by other means shall be identified by the FPM, in cooperation with the HPO, property disposal officers, programs, and other customers

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who are assigned personal property within the facility.

6.1.9 Salvage Material Inventory/Diversion Plan. Identifying salvage materials and including them to offset the cost of a demolition contract is encouraged on all demolition projects. During design and 6 to 12 months before the start of demolition, the FPM shall identify the types and amount of materials that could either have salvage value as recycled material or be reused. One of the primary goals of the FPM is to minimize demolition waste going to a landfill.

6.1.10 Clearing the Building of Noncollateral Equipment and Debris. 6 to 12 months before the start of demolition, the FPM shall work with the property disposal officer to ensure that any personal property is properly disposed of separate from facility demolition.

6.1.11 Evaluating Infrastructure Impact. The FPM shall ensure that impacts to utilities, roads, other facilities, and security are investigated and evaluated 12 to 24 months prior to the start of demolition. Demolition of a facility may remove either the supply of or the demand for essential services, requiring modifications to associated systems.

6.1.12 Sustainment Plan. The FPM, as part of decommissioning, shall determine the protection and maintenance requirements for safety, property, security, and environmental impacts between facility deactivation and demolition.

6.1.13 Safety Baseline Survey. The FPM shall ensure a safety baseline survey is performed as part of decommissioning. The survey identifies 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.

6.1.14 Pollution Prevention and Abatement Plan. The FPM shall ensure a pollution prevention and abatement plan is completed as part of decommissioning to determine required remediation. The plan identifies potential environmental risks associated with the work, such as:

a. Hazardous waste disposal.

b. Run off/erosion.

c. Underground storage tank systems.

d. Wetlands.

e. Floodplains.

6.1.15 Communication Plan. 6 to 12 months prior to the start of demolition and during design, the FPM shall determine if a plan is needed to communicate information about the demolition and impacts to the Center and surrounding community.

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6.2 Demolition Planning Checklist

6.2.1 The FPM shall utilize the Demolition Planning Checklist in creating the demolition plan. (Refer to Appendix E.)

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Appendix A. Definitions

Activation. The portion of the total facility acquisition process that normally follows construction. It includes the installation of ground support equipment, the integration and checkout of combined facility and equipment systems, the installation of noncollateral equipment, and the demonstration and acceptance of an operable facility.

Adaptive Reuse Feasibility Report (ARFR). A concise report that evaluates the property against projected new construction needs of the Center over the next 3 years. The report compares the square footage, location, and layout of the facilities to determine if any of the proposed needs can be met through refurbishment and adaption of the 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. For example, if a new administrative building is being proposed, the ARFR could demonstrate that those needs cannot be met or are too costly. A reasonable good faith effort should be demonstrated in the ARFR.

Addition, Expansion, Extension. A physical increase to a real property facility that adds to the overall dimension of the facility.

Administrator. The top executive of NASA.

Agency. Any executive department, commission, authority, administration, board, or other independent establishment in the executive branch of the Federal Government, including any corporation wholly or partly owned by the United States that is an instrumentality of the United States. The term as used herein does not include the municipal government of the District of Columbia.

Apportionment. The act of distributing according to a plan or setting apart for a special purpose. OMB is responsible for apportioning NASA's appropriated funds.

Appropriation. Statutory authority that allows Federal agencies to incur obligations and make payments out of the U.S. Treasury for specific purposes. An appropriation usually follows enactment of authorizing legislation. The following is a list of typical appropriation terms:

a. **Annual Appropriation.** An appropriation that is available for incurring obligations only during one fiscal year specified in the annual Appropriation Act.

b. **Continuing Appropriation**. An authority to incur obligations until funds are exhausted or to achieve a specific objective.

c. **Current Appropriation**. An appropriation that is available for obligation during the current fiscal year.

d. **Lump Sum Appropriation**. An appropriation in a specified amount made for a complete program without prescribing limitation of outlays within the stated purpose and amount.

e. **Multiple-Year Appropriation**. An appropriation that is available for incurring obligations for a definite period in excess of one fiscal year (e.g., CoF).

f. **No-Year Appropriation**. An appropriation that is available for incurring obligations for an

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indefinite period.

g. **One-Year Appropriation**. An appropriation available for obligations only during one specified year.

At-Risk Project. A project for which one of the following applies:

a. Final design has not started by the end of May preceding the fiscal year in which the project is proposed for Congressional authorization or not completed by February of the fiscal year in which the project was authorized and appropriated.

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

c. Construction award has not been made or is not scheduled to occur by the end of the fiscal year in which the project was authorized and appropriated.

d. The projected growth exceeds $500,000 for a discrete project or 25 percent of its budget authority for a minor project.

Authority Having Jurisdiction. 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 building.

Authority to Advertise. The authority received from FED to move forward with a design or construction procurement.

Authorization. A legislative act authorizing money to be spent for Government programs that specify a maximum spending level without provision for actual funds.

Beneficial Occupancy. Limited acceptance and approval by the Authority Having Jurisdiction for occupancy prior to a facility's construction completion and acceptance.

Beneficial Occupancy Date. The date a contractor releases and NASA assumes occupancy of a facility or portion of a facility.

Bid Opening Date. The date when all sealed bids must have been received by the Government and when all bids are opened and recorded for an Invitation for Bid.

Brief Project Document. See Facility Project-Brief Project Document.

Budget. A formal estimate of future revenues, obligations to be incurred, and outlays to be made during a defined period and, when determined to be appropriate, based on accrued expenditures and costs to be incurred.

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

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 Process. The process encompassing all phases of funding formulation through execution.

Budget Year. The fiscal year of execution, covering the period from October 1 through September

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30 (see "Fiscal Year").

Building Information Modeling (BIM). A parametric, computable representation of a facility's project design and construction details integrated into a single model. This model can be used for design, analysis, estimating, detailing, fabrication, construction, operation, and/or maintenance of the facility project and/or any portion or element of the facility project.

Category A. Used for minor projects to indicate that the requirement for the project was included in a Congressional budget submission. For substitution projects, see "Modification."

Category C. Used for projects requesting funds that had not been part of the President's Budget.

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

a. Ames Research Center (ARC).

b. Dryden Flight Research Center (DFRC).

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

d. Goddard Space Flight Center (GSFC).

e. Jet Propulsion Laboratory, 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 Director.

The top executive at a NASA Center.

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. It 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 program and institutional activities and NASA's strategic and business planning.

Certificate of Occupancy.

A certificate issued after construction completion by the Center's Authority Having Jurisdiction to certify that the facility is ready for occupancy.

Change in Scope. A change in objectives, work plans, or schedules that results in a material difference from a prior approval from a higher authority.

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

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

Collateral Equipment. Building support equipment and large, substantially affixed equipment/property (also see "Noncollateral Equipment"). It is normally acquired and installed as a part of a facility project and includes the following:

a. Building support equipment that normally is required to make a facility useful and operable. It is built-in to the facility, and its removal would impair the usefulness, safety, or environment within the facility; e.g., elevators, transformers, compressors, heaters, ventilators, and air-conditioners. It also includes systems and subsystems such as electrical, plumbing, pneumatic, fire protection, fire suppression, control systems, and monitoring systems.

b. Large, substantially affixed equipment or property of any type other than building support equipment that is built-in such that the installation costs including building envelope modifications, special foundations, and utility service exceed $300,000.

Commissioning. 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.

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

Completion Date. The date on which the Government accepts all contract deliverables.

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, Goldstone, CA; Canberra, Australia; Madrid, Spain; (JPL).

b. Ground Network at KSC (GSFC).

c. Independent Verification and Validation Facility (IV&V) (GSFC).

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

e. NASA Management Office (NMO)/JPL (HQ/Science Mission Directorate).

f. Palmdale (DFRC).

g. Plum Brook Station (PBS) (GRC).

h. Santa Susana Field Laboratory (MSFC).

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

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

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

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.

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The data in the system describes equipment, parts, jobs, crafts, costs, step-by-step instructions, and other information involved in the maintenance effort. This information may be stored, viewed, analyzed, reproduced, and updated with just a few keystrokes. The maintenance-related functions typically include the following:

a. Facility/equipment inventory.

b. Facility/equipment history.

c. Work input control.

d. Job estimating.

e. Work scheduling and tracking.

f. Preventive and predictive maintenance.

g. Facility inspection and assessment.

h. Material management.

i. Utilities management.

Constructability. A review of the design documents from a practicality, cost effectiveness, and efficiency perspective. The review includes verifying the integration and coordination of the drawings with the various professional disciplines and the clarity of the design. It also includes a review for maintainability and operability.

Construction. The erection or modification of real property required to support a new capability including additions, sidewalks, parking lots, driveways, and upgrades. This includes alterations to existing facilities that change the original purpose of the facility; e.g., remodeling a warehouse, or portion thereof, into office space.

Construction Completion. Final inspection has been completed and the facility is accepted in the following manner:

a. Construction was in accordance with the plans and specifications.

b. All construction deficiencies noted on the "punch list" were corrected.

c. The contractor or construction agency acknowledged the listed deficiencies and ensured 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. A NASA corporate program that funds planning for future facility needs, design of facilities projects, revitalization projects (repair, rehabilitation, and modification of existing facilities), construction of new facilities, and acquisition of collateral equipment.

Contingency (Construction). An allowance included in a construction cost estimate to cover uncertainties during the construction phase of the project; for example, changes in site conditions or construction interferences.

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Contingency (Design). An allowance included in the engineering estimate to allow for added unanticipated costs due to design uncertainties and incomplete or changing user requirements.

Contract. Either an agreement or an order for the acquisition of supplies or services signed by a CO.

Contract Award Date. The date the CO signs the contract.

Contracting Officer (CO). Any person who has the authority to acquire, administer, or terminate contracts. The term includes specifically authorized representatives of the CO acting within the limits of their authority as delegated by the CO.

Contracting Officer's Representative (COR). An authorized representative with technical understanding of the project and acting under the authority delegated by the CO.

Contractor Safety and Health Plan.

A comprehensive written document, specific to the scope of work and applicable to all subcontractors, explaining 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.

Current Cost Estimate. An estimate that is the latest and best professional cost estimate for a given project at any given time during planning, design, or construction. It is the estimated cost for labor, materials, and services to complete a planned facility project. It includes an estimate for land acquisition, site work, construction, and the purchase and installation of collateral equipment. It must include a reasonable estimate for contingencies. If a construction agent is to manage the project for NASA, this estimate includes the agent's contract cost.

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

Data Call. A FED request to identify institutional CoF project requirements as part of the Capital Facility Investment Program.

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.

Demolition. The tearing down of a facility to clear a site by total destruction or the removal of parts of a building to alter it. Demolition projects (see section 1.1.1.3) are focused on reducing the Center's real property footprint.

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 (typically at the 30-percent, 60-percent, and 90-percent design milestones).

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

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a contract.

Discrete Facility Project. A CoF project with an estimated cost of $10 million or more.

Dissenting Opinion. A substantive disagreement with a decision or action that is based on a sound rationale (not on unyielding opposition) that an individual judges is not in the best interest of NASA and is of sufficient importance that it warrants a specific review and decision by higher level management, and the individual specifically requests that the dissent be recorded and resolved by the Dissenting Opinion process.

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

Electronic Security Systems. That part of 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. Restoration 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. HQ FED defines "emergency" as so urgent that it cannot wait to go through the normal budget cycle or process. For all emergency repairs, the replacement of components or materials will be of the size or characteristic currently required to meet demands or needs.

Energy Savings Performance Contracts. 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.

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 systems manual, verifying operator training, and performing a post-occupancy operations review.

Enhanced Use Lease (EUL). A real estate agreement that grants to others, by lease, the use of underutilized NASA real property including land, buildings, and other structures. The NASA Center and HQ retain the proceeds derived from such a lease for use as authorized by Public Law 108-7 section 418, as amended. For more information, see NPR 8800.15, Real Estate Management Program and The Enhanced Use Leasing Desk Guide.

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 National Environmental Policy Act (NEPA) 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.

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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.

Equipment/Property. Equipment within NASA classified as either "personal property (other terms: noncollateral or accountable)" or "real property installed equipment (collateral)." Personal property is equipment whose maintenance, repair, and replacement are the responsibility of the NASA program owning it. All personal property equipment has attached property tags in the form of NASA bar codes. Real property installed equipment is equipment that is capitalized on the Real Property Inventory by the Center Real Property Accountability Officer.

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

Facilities Maintenance. The recurring day-to-day work required to preserve facilities (buildings, structures, grounds, utility systems, and collateral equipment) in such condition that they can be used for their designated purpose over an intended service life. It includes the cost of labor, materials, and parts.

Facility. Land, buildings, structures, and other real property improvements including utility systems and collateral equipment. The term does not include operating materials, supplies, special tooling, special test equipment, or noncapitalized equipment (see the Financial Management Manual for criteria for capitalized 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 permit, and rights of way.

Facility Activation. The process of preparing or outfitting a facility for use when a Construction of Facilities project is substantially complete. This includes, but is not limited to, such activities as installation of noncollateral equipment, connection of noncollateral equipment to its interfaces, checkout of systems, and validation activities in support of operational readiness testing.

Facility Need Date. The date when a facility is required for a specific purpose, such as to receive program hardware for test and checkout. First operational use of the facility completes this milestone.

Facility Outfitting. See "Outfitting."

Facility Project. The consolidation of facility work items including related collateral equipment required to provide a complete and usable facility.

Facility Project-Brief Project Document (NASA Form 1509). A multipurpose document that must be used for all facility projects estimated to cost $100,000 or more, regardless of location or source of funding.

Facility Project Cost Estimate (NASA Form 1510). The form on which the approved facility project cost estimate (AFPCE) is further detailed beyond the summary in NASA Form 1509.

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Facility Project Manager (FPM). The individual responsible for organizing, managing, and directing the activities to accomplish facility work within schedule and cost. Different individuals may fill this role at different phases of a project.

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).

Federal Agency. A specific organization established by an executive, legislative, or judicial branch of the U.S. Government.

Fiscal Year. The 12-month period from October 1 through September 30 as established each year by the U.S. Government.

Five-Year Plan. A list by fiscal year of projects that meet the functional requirements needed to achieve a Center's assigned mission.

Flash Bid Report (NASA Form 1579). A form that summarizes the results of a project bidding process.

Fragmentation. The planning, development, or execution of two or more interdependent projects to circumvent the appropriate budget approval process.

Full Disclosure Concept. The concept that project documentation outlines all reasonably identifiable elements of cost necessary to achieve a fully operable facility for all stages of planning, approval, and management of a facility project. The estimated cost of the facility project must include every associated element of real property including non-collateral equipment. It must also identify all other equipment required to the extent practicable (see Appendix D, Facility and Other Related Costs, for a listing of items and types to include).

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

Fund. A sum of money authorized by law and set aside for use for specified purposes.

Funding. The issuance of funds to incur commitments, obligations, and disbursements.

Government-Furnished Property. Property owned by the Government and provided to a contractor for use in the performance of a contract.

Ground Support Equipment. Nonflight 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. This may include equipment required to support another item of ground support equipment as defined in the previous sentence.

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, if any, pursuant to NHPA, ARPA, NAGPRA, and other legal authorities, as identified in NPR 8510.10.

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,

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and installed collateral equipment.

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

Investment Value. The implementation price for ESPC and UESC projects to survey, study, design, construct, and commission to acceptance. This includes indirect costs such as overhead and profit but does not include government payments to the contractor during the performance period term for debt repayment and services such as maintenance, measurement, and verification.

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. An instrument conveying an interest in land, buildings, or other structures and facilities for a specified term in consideration of payment of a rental fee. A lease is revocable as specified by the terms of the instrument.

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.

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

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.

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. See "Facilities Maintenance."

Major Facility Work. See "Discrete Facility Project."

Major Renovation. A repair project on an existing facility that exceeds 50 percent of the replacement value for the space in question.

McKinney Act. The McKinney-Vento Homeless Assistance Act (42 U.S.C. §11411), commonly called the Homeless Assistance Act, or McKinney Act, requires Federal agencies to identify and make available excess Federal real property, such as buildings and land, for use by States, local governments, and nonprofit agencies to assist the homeless.

Negotiation. The method of making purchases and contracts without using sealed bidding procedures.

New Capability. A facility project that supports new programmatic or institutional requirements. This includes projects for the rehabilitation/modernization and repair of existing facilities when the facility supports new programmatic or institutional requirements.

New Construction. A facility project where new real property is built. See definition of

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"Construction."

Nonappropriated Funds. Funds not associated with an appropriation such as funds received through international cooperation, gifts, donations, and NASA exchanges.

Noncollateral Equipment. Equipment other than collateral equipment that, when acquired and used in a facility or a test apparatus, can be severed and removed after erection or installation without substantial loss of value or damage to the premises where installed.

Notice to Proceed. The date a CO directs a contractor to start 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.

Operations and Maintenance (O&M) Manuals. Organized procedural information specifying methods of operating and maintaining building systems, collateral equipment, and support equipment. O&M personnel use the manuals in the performance of day to day tasks. Preferably, the manuals are in an electronic format.

Outfitting. The process of equipping a facility for its intended purpose during activation.

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.

Partnering. A Government contractor relationship to foster the achievement of mutually beneficial goals (see NFS, 48 C.F.R., Chapter 18, Part 1836 Subpart 1836.70).

Past-Year. The fiscal year immediately prior to the current fiscal year.

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

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 & 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 allows for planning and scheduling preventive maintenance or repairs prior to failure.

Procurement. The purchase, rent, lease, or other acquisition of supplies, services, or facilities. It includes all functions that pertain to the acquisition of supplies and services including description, but not determination of requirements, selection, and solicitation of sources; preparation and award of contract; and all phases of contract administration.

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Program Offices. Headquarters organizational elements, such as the following:

a. Human Exploration & Operations Mission Directorate.

b. Aeronautics Research Mission Directorate.

c. Science Mission Directorate.

Progress Payment. A partial expenditure of funds made to a contractor as work progresses.

Project. A specific investment that has defined goals, objectives, requirements, life-cycle costs, a beginning, and an end. A project yields new or revised products or services that directly address NASA's strategic needs.

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.

Project Team. The team responsible for organizing, managing, and directing facility project work. It includes all project stakeholders, such as representatives from the using organization, safety, engineering, fire protection, security, environmental, acquisition, operations and maintenance, and technicians.

Purchase Request/Purchase Order. 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.

Real Property. Land, buildings, structures, utility systems, improvements, and appurtenances permanently annexed to land. The term real property also includes installed collateral equipment.

Recapitalization. The process by which NASA renews its real property assets over the entire service life of its facility inventory in order 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.

Related Costs. Estimated cost elements of project work that are not included in the facility project cost estimate (see Appendix D for more detailed information)

Reliability Centered Building and Equipment Acceptance Guide. A technical reference, the Reliability Centered Building and Equipment Acceptance Guide (RCBEA) is for design engineers, project and program managers, construction managers and inspectors, quality control personnel, and NASA quality assurance staff to use prior to and during the equipment startup/checkout phase of new construction, repair, or rehabilitation projects. It focuses on the use of Predictive Testing and Inspection (PT&I) technologies by the contractor to detect latent manufacturing and installation defects as a normal part of the contractor's quality control program.

Reliability Centered Maintenance (RCM). A process used to determine the most effective

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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 Reliability Centered Maintenance Guide for Facilities and Collateral Equipment and "Predictive Testing & Inspection").

Renewal Rate (Yearly). The Current Replacement Value (CRV) in dollars divided by the revitalization investment expressed in dollars per year.

Renovate/Repair/Replace. Work required to restore a facility or component to its originally intended condition, capacity, efficiency, or capability.

Resources. Actual assets of a governmental unit, such as funds, human resources, and materials.

Resources Authority Warrant. A document granting authority to initiate, commit, obligate, and outlay funds for approved projects and activities.

Revitalization. Substantial renewal and upgrade work on the physical plant to meet current and future needs, thereby extending its useful life; e.g., a facility project that extends the useful service life beyond the original design life.

Salvage. Property that has some value in excess of its basic material content but is in such condition that it has no reasonable prospect of use for any purpose as a unit, and its repair or rehabilitation for use as a unit is clearly impracticable.

Site Activation Need Date.

The date equipment/Ground Support Equipment is required to support installation and validation. Uncrating, inspecting, and handling time must be allowed for in establishing this date.

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

Spare. An item peculiar to a system or end item held in reserve or for backup.

Specifications. A completely, precisely, and verifiably prescribed requirement, design, behavior, or characteristic of a system or system component.

Specifications Kept Intact (SpecsIntact). The NASA standard construction specification system.

Statutory Limitation. See "Limitation."

Substantial Completion. The status of a facility project that has been inspected and discrepancies recorded on a "punch list."

Supervision, Inspection, and Engineering Services (SIES). A funding allowance used to provide the necessary controls and management during construction and deliverables such as as built drawings and O&M manuals.

Sustainability. An overarching concept incorporating appropriate sustainable design practices, maintainable design elements, building commissioning processes, safety, health and security features into facility planning, design, construction, activation, operation and maintenance, and decommissioning to enhance and balance facility life-cycle cost, environmental impact, and occupant health, safety, security, and productivity. Done properly, sustainability will optimize the

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facility acquisition process to ensure the "best fit" of the built environment to the natural environment. It requires a practical and balanced approach to responsible stewardship of natural, human, and financial resources.

Sustainment. A parametric estimated cost to keep facilities in an acceptable condition. This is the lowest recommended funding level for facility maintenance.

Total Building Commissioning. As defined by the Government Accountability Office (GAO), the process for achieving, validating, and documenting that the performance of the total building and its systems meet the design intent and requirements of the owner.

Utility Energy Services Contract (UESC). A partnership between a Federal agency and a serving or franchised utility company. 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.

Validation. Verification that the equipment/system meets the operational needs of the O&M user. It is part of the turnover process from the design agency to the O&M agency.

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

Work Breakdown Structure. 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.

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Appendix B. Acronyms

A-E	Architect-Engineer
AFPCE	Approved Facility Project Cost Estimate
AHJ	Authority Having Jurisdiction
ARC	Ames Research Center
ARFR	Adaptive Reuse Feasibility Report
ASHRAE	American Society of Heating, Refrigeration, and Air-Conditioning Engineers
ASTM	American Society for Testing Materials
BCA	Building Commissioning Association
BIM	Building Information Modeling
BMP	Best Management Practices
BTU	British Thermal Units
BY	Budget Year
CA	Commissioning Authority
CCB	Change Control Board
CCE	Current Cost Estimate
CFO	Chief Financial Officer
C.F.R.	Code of Federal Regulations
CII	Construction Industry Institute
CMMS	Computerized Maintenance Management System
CMP	Center Master Plan
CO	Contracting Officer
CoF	Construction of Facilities
COSS	Center Operations Support Services
COR	Contracting Officer's Representative
CPG	Comprehensive Procurement Guidelines
CPM	Critical Path Method
CSI	Construction Specification Institute
DBT	Design-Basis Threat
DFRC	Dryden Flight Research Center
DoD	Department of Defense
DOE	Department of Energy
DSN	Deep Space Network
EA	Environmental Assessment
EE	Engineering Estimate
EEO	Equal Employment Opportunity

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EIS	Environmental Impact Statement
EMCS	Energy Management Control Systems
Exec. Order	Executive Order
EPA	Environmental Protection Agency
ESPC	Energy Savings Performance Contract
EUL	Enhanced Use Lease
EVM	Earned Value Management
FAR	Federal Acquisition Regulation
FEMP	Federal Energy Management Program
FED	Facilities Engineering Division
FHPSB	Federal High Performance and Sustainable Buildings
FMEA	Failure Modes and Effects Analysis
FMM	Financial Management Manual
FMS	Facilities Management System
FONSI	Finding of No Significant Impact
FP&D	Facility Planning and Design
FPM	Facility Project Manager
FPN	Facility Project Number
FPT	Functional Performance Tests
FRB	Facilities Review Board
FSC	Federal Supply Catalog
FY	Fiscal Year
GAO	Government Accountability Office
GBA	Green Building Advisor
GFP	Government-Furnished Property
GPE	Government-wide Point of Entry
GRC	Glenn Research Center
GSA	General Services Administration
GSE	Ground Support Equipment
GSFC	Goddard Space Flight Center
HABS	Historic American Building Survey
HAER	Historic American Engineering Record
HPO	Historic Preservation Officer
HSF	Human Space Flight
HVAC	Heating, Ventilation, and Air-Conditioning
IAQ	Indoor Air Quality
IEQ	Indoor Environmental Quality
IESNA	Illuminating Engineering Society of North America

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IFB	Invitation for Bid
IPO	Institutional Program Offices
ISC	Interagency Security Committee
IST	Integrated Systems Test
JPL	Jet Propulsion Laboratory, a Federally Funded Research and Development Center
JSC	Johnson Space Center
KSC	Kennedy Space Center
LaRC	Langley Research Center
LEED	Leadership in Energy and Environmental Design
LLIS	Lessons Learned Information System
LS	Lump Sum
MAF	Michoud Assembly Facility
MS	Mission Support
MSFC	Marshall Space Flight Center
N/A	Not Applicable
NASA	National Aeronautics and Space Administration
NEHRP	National Earthquake Hazard Reduction Program
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NFS	NASA Far Supplement
NHPA	National Historic Preservation Act
NIBS	National Institute of Building Services
NIST	National Institute of Standards and Technology
NODIS	NASA Online Directives Information System
NPD	NASA Policy Directive
NPR	NASA Procedural Requirements
NRC	National Research Council
NSBF	National Scientific Balloon Facility
NSPE	National Society of Professional Engineers
NSS	NASA Safety Standard
NTP	Notice to Proceed
O&M	Operations and Maintenance
OMB	Office of Management and Budget
OPR	Owner's Project Requirements
OSHA	Occupational Safety and Health Administration
PBS	Plum Brook Station
PCSD	President's Council on Sustainable Development

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PD	Program Direct
PDRI	Project Definition Rating Index
PER	Preliminary Engineering Report
PES	Preliminary Environmental Survey
PPBES	Planning, Programming, Budgeting and Execution System
PR	Procurement Request
PT&I	Predictive Testing & Inspection
QA	Quality Assurance
R&D	Research and Development
RCBEA	Reliability Centered Building and Equipment Acceptance
RCM	Reliability Centered Maintenance
RCRA	Resource Conservation and Recovery Act
REV	Review
RFP	Request for Proposal
RFQ	Request for Quote
ROD	Record of Decision
RPAO	Real Property Accountable Officer
SAAM	Space Act Agreement Maker
SBIC	Sustainable Buildings Industry Council
SF	Standard Form or Subcontractor-Furnished
SHPO	State Historic Preservation Officer
SIES	Supervision, Inspection, and Engineering Services
SOW	Statement of Work
SPECSINTACT	Specifications-Kept-Intact
SPOC	Single Point-of-Contact
SS	Special Studies
SSA	Source Selection Authority
SSC	Stennis Space Center
SUB	Subcontractor
TAB	Testing, Adjusting, and Balance
TM	Technical Manual
UCS	Utilities Control System
UESC	Utility Energy Services Contract
UFGS	Unified Facilities Guide Specifications
UPN	Unique Project Number
USGBC	U.S. Green Building Council
VE	Value Engineering
WBDG	Whole Building Design Guide

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WBS	Work Breakdown Structure
WFF	Wallops Flight Facility
WSTF	White Sands Test Facility
YR	Year

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Appendix C. Compliance Matrix

Doc Sec	Requirement	Compliance			Waiver		Reference/ Comment
		Yes	No	Partial	Yes	No	
1.2.1	Center Facility Project Managers (FPMs) shall comply with NASA-required best practices regardless of the funding source (e.g., NASA Program, CECR Account, or external funds). Required best practices include the following: a. Implementing front-end planning as 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. Investigating the site and providing sufficient preliminary design to develop a full project scope, assess risks, identify construction complexities, and provide a realistic Facility Project Cost Estimate prior to inclusion in the NASA budget submission to the Office of Management and Budget (OMB). c. Using life-cycle cost vs. first cost to determine the best economic solution (e.g. new construction vs. renovation or adaptive reuse, mechanical and electrical systems, equipment, materials, and methods) (see NASA Business Case Guide for Facilities Projects). Ensure that any large capital energy investment in an existing building employs the most energy efficient and life-cycle cost-effective designs, systems, equipment, and controls. d. Designing for maintainability to optimize operation and maintenance costs and effort (see CII Best Practices). e. Commissioning installed equipment, systems, building envelope, and other building elements to ensure quality, operability, reliability, and systems integration. f. Using environmentally friendly processes,						

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	materials, and equipment. g. Maximizing reuse, recycling, and salvage and minimizing disposal when a project includes demolition (see CII Best Practices). h. Applying constructability concepts and principles during each phase of the facility project process to ensure the project execution remains practical (see CII Best Practices). i. 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 NASA Partnering Desk Reference for more specific guidance. j. Practicing effective configuration and change order control to minimize project cost and schedule growth. k. Implementing the safety initiative "Making Zero Incidents a Reality" to encourage proactive safe behavior during the construction phase (see CII Best Practices). l. Using Design-Build Institute of America's Design-Build Manual of Practice when a design-build approach is planned.						
1.3.1	For all CoF level projects, Center FPMs shall comply with the five guiding principles described for Federal High Performance and Sustainable Buildings (FHPSB) in Exec. Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance and Exec. Order 13423, Strengthening Federal Environmental, Energy, and Transportation Management.						
1.3.2	For New Construction and Major Renovation, in addition to complying with the five guiding principles referenced in section 1.3.1, CoF FPMs shall ensure all projects are designed to meet a minimum level of Leadership in Energy and Environmental Design (LEED) Silver certification using United States Green Building Council (USGBC) criteria.						

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1.3.3	If the FPM does not think compliance with the minimum LEED requirements is reasonable for a particular project, the FPM shall submit a letter requesting a waiver from the minimum LEED requirements explaining why compliance is imprudent along with a completed initial LEED checklist to the NASA Headquarters Office of Strategic Infrastructure.						
1.4.3	The FPM shall establish the project scope in cooperation with Center management and other project stakeholders.						
1.4.4	FPMs shall ensure all CoF projects are complete and usable within the proposed scope of the project.						
1.4.5	NASA has no authority to formulate or execute CoF projects using incremental programming and shall not do so without special legislation.						
1.4.6	On the NASA Form 1509, the FPM shall include a statement that explains the scope of the particular phase, how many phases are planned, and the associated estimated total cost of all phases.						
1.4.7	Center CoF Program Managers 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).						
1.4.8	The CoF program manager shall prepare the following documentation for each CoF project: a. A NASA Form 1509, Facility Project-Brief Project Document. b. A NASA Form 1510, Facility Project Cost Estimate. c. A Life-Cycle Cost Analysis (LCCA). LCCAs for discrete CoF projects are submitted during the data call, along with the draft budget narrative (see NASA Business Case Guide for Facilities Projects). LCCAs for all other CoF projects should be kept in the project folder and made available on request by FED. d. A Risk Assessment. Risk assessment format and content will comply with the template provided in FED's annual data call						

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	FED's annual data call.						
1.4.11	Until released by the appropriate committees of Congress, no project stakeholder (e.g. FPM, Architectural-Engineering (A-E) firm, NASA employee) shall publicly disclose CoF project information (including subprojects and/or work packages).						
1.4.16	Programs and projects shall follow the Dissenting Opinion Process per NPD 1000.0, NASA Governance and Strategic Management Handbook.						
1.4.18	Regardless of the source of funds, approval authority shall comply with NPD 7330.1, Approval Authorities for Facility Projects.						
1.4.19.2	At a minimum, project concurrence and approval shall include the Center representative with delegated responsibility for construction, validation or requirements by support program or organization, and the funding organization.						
1.4.19.2.a	Center CoF Program Managers shall submit approved 1509s in excess of $100,000 to FED for review prior to obligating funds.						
1.4.19.2.b	Center CoF Program Managers shall request funds and approval via the Space Act Agreement Maker (SAAM) and attach a NASA Form 1509 in the SAAM.						
1.4.19.2.d	Funding approval and authority comes from the party providing funds; however, NASA facility project approval requirements shall comply with NPD 7330.1, Approval Authorities for Facility Projects.						
1.4.19.3	Center CoF Program Managers shall request construction funds using the SAAM with the CoF Routine Transaction Form and NASA Form 1509 attached for each project.						
1.4.19.4	Center Contract Officers shall award CoF contracts only upon receiving approval authority and funds.						
1.4.19.6	When professional services such as a design by an A-E firm or a construction contractor are identified, the contract acquisition shall comply with the FAR and NASA FAR supplement.						

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1.4.20	Program Reporting Requirements. Center CoF Program Managers shall maintain records for each CoF project and submit Quarterly Reports, Functional Performance Metrics, and Sustainability Progress Reports to Headquarters.						
1.4.20.2	The Center CoF Program Managers shall provide functional performance metrics to the FED in response to the FED's annual call for functional performance metrics.						
1.4.20.3	NASA Center Program Managers shall submit an annual report of their progress toward implementing sustainability goals.						
2.1	The Center CoF Program Manager shall develop a systematic process for developing projects for potential inclusion in the CoF process.						
2.2.1	The FPM and Center facility planning office shall coordinate all acquisition planning and execution with the Center acquisition office to ensure compliance with these regulations.						
2.2.2	The FPM shall ensure assigned CoF projects are in accord with the Center Master Plan.						
2.2.3	With support from the project team (see section 2.2.4), the FPM shall organize, manage, and direct facility project work to meet the requirements of this NPR.						
2.2.3.2	Programs and projects with a life-cycle cost of $250 million or greater shall be managed by program and project managers who have been certified in compliance with Office of Management and Budget (OMB)'s promulgated Federal acquisition program/project management certification requirements.						
2.2.5.2	The FPM shall initially use the (PDRI) as the primary tool for FEP as a checklist to determine the project areas needing clarification and further study.						
2.2.6.1.a	The FPM shall complete a Functional Requirements Document that contains more detail than is found on the NASA Form 1509 and forms the basis for developing documents for budget formulation and/or project approval.						

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2.2.6.1.b	After the FPM writes the Functional Requirements Document, the project stakeholders (as described in section 2.2.4) shall review it.						
2.2.6.2.a	For CoF projects, the FPM shall prepare a Facility Project Management Plan that establishes a schedule for implementing a facility project and assigns roles, responsibilities, and authorities to develop and complete the project.						
2.2.6.2b	Prior to the start of final design work the FPM shall present the management plan for approval to the Center official exercising project technical approval authority.						
2.2.6.2c	For discrete projects, the FPM shall submit the management plan to NASA Headquarters FED for review and approval.						
2.2.6.3	Environmental Compliance. The FPM and the Center Environmental Manager shall ensure an environmental evaluation in accordance with NPR 8580.1, NASA National Environmental Policy Act Management Requirements, and Exec. Order 12114.						
2.2.6.4.a	For work on existing facilities with potentially historic significance, the FPM and the Center Historic Preservation Officer shall ensure the work complies with 36 C.F.R. Part 800, Protection of Historic Properties, of the National Historic Preservation Act (NHPA) prior to rewarding a Design-Bid-Build, Design-Build, Demolition, or Deconstruction contract.						
2.2.6.4.b	The FPM and Center Historic Preservation Officer (HPO) shall ensure any mitigation or design requirements for compliance with 36 C.F.R. Part 800, Protection of Historic Properties are included in a Design-Build request for proposal (RFP) prior to issuance.						
2.2.6.6.a	The FPM and the Center Occupational Safety and Health organization(s) shall identify safety and occupational health requirements in compliance with NPR 8715.3, NASA General Safety Program Requirements and NPR 8715.1, NASA Occupational Safety and Health Programs.						

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2.2.6.6.b	The FPM shall prepare a Preliminary Hazard Analysis and the Preliminary Hazard List and initiate the Facility Safety Management Plan (FSMP) containing the Hazard Analysis Tracking Index (HATI) in accordance with NPR 8715.3, NASA General Safety Program Requirements.						
2.2.6.7.c	In addition to the ISC Design Criteria and in compliance with NPD 1600.2, NASA Security Policy, FPMs with cooperation from the Center security officer assigned to the project shall ensure NASA facility projects comply with the requirements contained within NPR 1600.1, NASA Security Program Procedural Requirements (section 7.7); NPR 1620.2, Facility Security Assessments; and NPR 1620.3, Physical Security Requirements for NASA Facilities and Property.						
2.2.6.8	If applicable to any portion of a CoF project, the FPM shall ensure compliance with the risk management process as outlined in NPR 8000.4, Risk Management Procedural Requirements.						
2.2.6.9.a	The FPM shall ensure all facility project designs comply with accepted maintenance policies described below: (1) Reliability Centered Maintenance Guide for Facilities and Collateral Equipment. (2) Reliability Centered Building and Equipment Acceptance (RCB&EA) Guide. (3) NPR 8831.2, Facilities Maintenance and Operations Management. (4) Computerized Maintenance Management System (CMMS) requirements.						
2.2.6.9.b	The FPM shall make sure that O&M manuals on the installed systems and equipment are provided and training of operations and maintenance personnel (including certification training for complex technical systems) is accomplished.						
2.2.6.10	The FPM and project team members shall incorporate the five guiding principles, LEED Silver certification as outlined in section 1.3.						

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2.2.6.10.a	Commissioning as defined in ASHRAE Guideline 0 shall be required on all new construction and major renovation projects and also on the installed items and associated systems of all other projects (for more commissioning guidance, see http://www.wbdg.org/project/buildingcomm.php).						
2.2.6.10.b	For projects incapable of meeting the sustainability requirements described in the above paragraph, the FPM and the project team shall incorporate sustainable design practices to the maximum extent practical using the LEED checklist and provide justification in an exemption request.						
2.2.6.10.c	Where markets or onsite recycling opportunities exist, the designer shall incorporate into the construction contract documents to have the contractor recycle or salvage at least 50 percent of construction, demolition, and land-clearing waste, excluding soil.						
2.2.6.10.d	Other Construction Standards. The FPM shall ensure compliance with the following standards or guidance: (1) Indoor Air Quality (IAQ) During Construction. Sheet Metal and Air Conditioning Contractors' National Association IAQ Guidelines for Occupied Buildings Under Construction 2nd Edition, 2008. After construction and prior to occupancy, conduct a minimum 72-hour flush out with maximum outdoor air, consistent with achieving relative humidity no greater than 60 percent. After occupancy, continue the flush out as necessary to minimize exposure to contaminants from new building materials. (2) Ventilation and Thermal Comfort. ASHRAE Standard 55-2013, Thermal Environmental Conditions for Human Occupancy, including continuous humidity control within established ranges per climate zone and ASHRAE Standard 62.1-2013, Ventilation for Acceptable Indoor Air Quality. (3) Moisture Control. Implement a moisture control strategy for controlling moisture flows and condensation to prevent building damage and mold contamination. (4) Daylighting. Maintain a minimum daylight						

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	(4) Daylighting. Maintain a minimum daylight factor of 2 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. (5) Low-Emitting Materials. Use materials and products with low pollutant emissions, e.g., low or no volatile organic compounds. This requirement includes adhesives, sealants, paints, carpet systems, and furnishings. (6) Biobased Content. Use products meeting or exceeding the United States Department of Agriculture's biobased content recommendations. For other products, use biobased products made from rapidly renewable resources and certified sustainable wood products. (7) Ozone-Depleting Compounds. Eliminate the use of ozone-depleting compounds during and after construction where alternative environmentally preferable products are available, consistent with both the Montreal Protocol and Title VI of the Clean Air Act Amendments of 1990 or equivalent overall air quality benefits that take into account life-cycle impacts. (8) Recycled Content. For EPA-designated products, use products meeting or exceeding 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 preconsumer content constitutes at least 10 percent (based on cost) of the total value of the materials in the project.						
2.2.6.10.e	For major renovation and new construction of laboratories, the FPM shall incorporate and reference the recommendations of the Labs21 program, including the Labs21 Laboratory Energy Efficiency Profiler and the Labs21 Environmental Performance Criteria.						
2.2.6.11	The FPM shall prepare or ensure that assigned CoF projects have a Facility Project Cost Estimate that includes every element described in the project Functional Requirements Document with enough accuracy to have a reasonable expectation of project						

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	accurately to have a reasonable expectation of project success.						
2.2.6.12.a	For all Discrete and MRC projects (see section 1.4.18.2), the Center CoF Program or Project Manager shall submit NASA Forms 1509 and 1510 to FED.						
2.2.6.12.b	For Discrete projects, the Center CoF Program Manager shall provide FED a budget narrative and an LCCA in compliance with OMB Circular A-94 using ECONPACK.						
2.2.6.12.c	The Center CoF Program Manager shall also provide NASA Forms 1509 and 1510 for Demolition projects estimated to cost in excess of $1 million to FED.						
2.2.6.13.a	The FPM shall consider using EVM for any project with a Facility Project Cost Estimate of $20 million or more or where there is significant development or technical risk.						
2.2.6.13.b	A resource-loaded* schedule is an acceptable alternative to EVM when issuing a firm-fixed-price contract. If this option is selected, the construction contractor shall be required to submit a resource-loaded schedule for review and approval by the CO prior to beginning work.						
2.2.7.1	The FPM shall ensure designs meet or exceed locally adopted, nationally recognized building codes and standards.						
2.2.7.2	If a local jurisdiction has adopted a code that is not nationally recognized, the FPM shall ensure the design meets or exceeds the latest version of the International Building Code from the International Code Council.						
2.2.7.3	Regardless of locally adopted building codes, the FPM shall ensure the design meets or exceeds the latest version of the National Fire Protection Association requirements for electrical systems, life safety, and fire protection, detection, and suppression.						
2.2.7.4	The FPM shall ensure that all CoF design drawings comply with the United States National CAD Standard.						

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2.2.7.5	For all CoF project specifications, designers shall use SpecsIntact; i.e., the Unified Facilities Guide Specifications (UFGS) found in the Whole Building Design Guide.						
2.2.7.6	For projects where BIM is to be used, the FPM shall reference the latest version of the National BIM Standard and incorporate the NASA BIM Scope of Services and Requirements in the projects to the extent applicable.						
2.2.8.1	The FPM shall include budget formulation planning for activation during the planning phase of the project.						
3.1.1	The FPM shall keep the project team apprised of changes or proposed changes in project requirements.						
3.2.1	Whenever A-E services are required, the FPM and Center Procurement Office shall acquire those services in accordance with the FAR Part 36 and the NASA FAR Supplement.						
3.3.1	The FPM and project team members shall ensure that public disclosure of CoF project information (including subprojects and/or work packages) occur only after release by the appropriate committees of Congress.						
3.3.2	Any information deemed Sensitive But Unclassified (SBU) shall be handled by the FPM and project team members in accordance with NPR 2810.1, Security of Information Technology.						
3.4.1	The FPM shall plan and manage CoF program projects to support reaching the goal of obligating all design funds by the end of the fiscal year.						
3.4.2	For all CoF projects, the FPM shall include in the A-E SOW a statement that the A-E firm is responsible for designing the project within the estimated cost of construction.						
3.5.1	The FPM shall ensure a Preliminary Engineering Report (PER) is performed on any assigned CoF project having significant technical or financial risks associated with it; e.g., employing leading-edge technology or is highly technical or complex.						

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3.5.2	If a PER is performed for a project, the PDRI score shall be determined by the FPM and the project team soon after its conclusion (see section 2.2.5, Front End Planning).						
3.5.3	The FPM shall ensure every PER includes a Requirement Statement and Justification; a Descriptive Analysis; Engineering, Budget, and Other Estimates; a Design and Construction Schedule; and Appendices.						
3.5.3.d	If a predetermined need date has been established for the facility, the FPM shall ensure it is shown in the schedule.						
3.6.1	The FPM, in addition to ensuring the design is coordinated with the project stakeholders during design meetings, shall distribute 30 percent and 90 percent design documents to the project stakeholders for review.						
3.6.1.1	The 30-percent design is a critical design milestone. In addition to the documentation required in section 2.2.6, Facility Project Requirements, the designer shall include the following documentation: a. For new construction or an addition to an existing building, site plans in accordance with the Center Master Plan. Site plans include site utility locations, grading, pavement, and hardscape and landscape features. b. Floor plans, building elevations, structural systems, mechanical systems, electrical systems, a construction phasing plan, a preliminary commissioning plan (see http://www.wbdg.org/project/buildingcomm.php), and a draft activation plan. c. Design analysis supporting the basis for the design with calculations. The analysis contains important assumptions, standards, codes, and other constraints used to determine final selections. The package includes section numbers and titles for all specifications planned. d. Outline specifications, including outline specification section numbers and titles for all specifications planned.						

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	e. A preliminary Facility Project Cost Estimate in accordance with section 3.5.3, Section III: Engineering, Budget, and Other Estimates.						
3.6.1.2	The FPM and the project team shall evaluate and score the project using the PDRI soon after receiving the 30-percent design documents.						
3.6.1.2.d	For CoF projects receiving a PDRI score of 300 or more out of 1,000 possible points, the FPM shall prepare a written memorandum outlining the items of low definition and the reasoning behind the decision to proceed.						
3.6.2	At the conclusion of the design-build contract, a complete set of as-built drawings or BIM shall be required by the FPM.						
3.7.1	FPM shall ensure Building Information Modeling (BIM) is required for discrete level projects (greater than or equal to $10 million), new construction, and major renovation projects.						
3.8.1	The project stakeholders (see section 2.2.4) shall review both the 30 percent and 90 percent design stages for constructability, environmental compliance, sustainability, safety, security, health, and code compliance.						
3.9.1	For mission-critical technical facilities (for definition, see NPR 7120.5, NASA Space Flight Program and Project Management Requirements) specifically developed or significantly modified for space flight systems and associated ground systems, the FPM (as directed by NPR 7120.7 and NPR 7120.8) shall comply with NPR 7120.5 and with this document.						
3.10.1	For new construction and major renovation projects, the FPM shall develop a facility activation plan during the design phase.						
3.10.2	Prior to completion of the final design work, the office exercising project approval authority shall review and approve the activation plan.						
3.11.1	The FPM shall complete the activation budget started in the planning process (see section 2.2.8, Activation Budget Formulation) and submit it during the normal budget process.						

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4.2.1	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 (see section 1.4.18.3., Requesting Construction Funds).						
4.2.2	The CO with cooperation and coordination from the COR and project team members shall ensure facility project acquisitions comply with the FAR and the NASA FAR Supplement.						
4.3.1	The following documents shall be submitted by the Center CoF Program Manager, reviewed, and approved using the SAAM system: a. A locally approved and signed NASA Form 1509 and 1510 for each project. b. For discrete projects, the approved Facility Project Management Plan (see section 2.2.6.2., Facility Project Management Plan) is submitted by the FPM or COR for FED.						
4.4.2	The COR shall prepare and submit the NASA Form 1579, Flash Bid Report or equivalent documentation for minor and discrete projects to FED immediately following the bid evaluation and the CO's acceptance of the bids as responsive.						
4.6.1	During construction, the FPM/COR shall periodically verify the construction contractor is updating the BIM to reflect as-built conditions.						
4.6.2	At contract closeout, the final as-built BIM shall be turned over to the FPM who will provide this to the Operations and Maintenance organization at the Center.						
4.7.1	During the administration of the construction contract, the COR shall perform partnering for all facilities projects, as defined in NFS Subpart 1836.70, Partnering, 48 C.F.R. Chapter 18.						
4.7.2	The COR shall apply change controls during the preconstruction conference (or immediately after the notice to proceed is issued) to ensure all involved with the contract understand who is responsible for directing changes and how they are						

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	responsible for directing changes and how they are administered.						
4.7.3	Either the CO or the COR shall brief all project stakeholders on contract administration and change control procedures.						
4.7.4	The COR shall ensure the following are accomplished during the project: a. Manage the Architectural Engineer's construction services contract. b. Ensure the facility is constructed in accordance with the contract documents. c. Prepare and process status reports and inspection logs. d. Review contractor safety and health plans with representatives from the Center safety and occupational health organizations. e. Review and approve contractor submittals, including as-builts. f. Process contractor requests for progress payments and requests for information. g. Review and approve change requests. h. Maintain the project CCE, highlighting approved and potential changes in the project cost and schedule. i. Ensure the preparation and delivery of O&M instructions, Reliability Centered Maintenance (RCM), PT&I, CMMS information, and as-built drawings. j. Use the Reliability Centered Building and Equipment Acceptance Guide (RCBEA) during the final inspection and acceptance of installed systems. k. Prepare or oversee the preparation of real property vouchers and transfer documents. l. Complete final project closeout. m. Where required, ensure the facility is achieving						

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	iii. Where required, ensure the facility is achieving the defined LEED certification construction credits.						
4.8.1	Within 30 days after project completion*, the FPM and the COR assist the Center Real Property Accountable Officer (RPAO) in capitalizing and classifying the real property. The FPM, with guidance from the RPAO, shall fill out NASA Form 1046, Transfer and/or Notification of Acceptance of Accountability of Real Property.						
4.9.1	For new construction and major renovation projects, the FPM shall facilitate project closeout by ensuring the completion of the following activities: a. Facility systems training. b. O&M instructions, PT&I and CMMS information, and manuals. c. Final inspections. d. Punch list (closeout). e. Warranty transfer(s). f. Contractor performance records. g. Data systems design and installation. h. Systems furniture design, purchase, and installation. i. Transfer to customer and O&M organization.						
5.3.1	The CO shall provide the contractor with a list of outstanding work for those areas the Government intends to use.						
5.4.1	The COR shall ensure inspections and tests are performed for equipment and installed systems to validate compliance with O&M requirements identified in the Facility Project Management Plan (see section 2.2.6.2) and the Reliability Centered Building and Equipment Acceptance Guide.						
5.5.1	During the activation phase, the FPM shall ensure that the O&M staff is trained on and provided with O&M manuals and the final BIM, if required, for installed systems and equipment.						

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5.6.1	The FPM or COR shall ensure Total Building Commissioning, as defined in the most current version of the United States Green Building Council's (USGBC) LEED Green Building Design and Construction Reference Guide, as enhanced commissioning is performed on all new construction and major renovation projects, and on installed items and associated systems on all other facility projects.						
6.1.1	The FPM shall develop a management plan that is compliant with NPR 8580.1 and NPR 8800.15 for disposal/demolition projects and any other projects requiring disposal and/or deconstruction.						
6.1.2	The FPM shall submit a letter to the Director, Integrated Asset Management Division, signed by the Center Director or designee, requesting authority to proceed with the disposal/demolition. This authority is separate from the request to include the facility in the demolition program as part of the PPBE process. FED reviews and approves the request with an NHQ DIV799DF Demolition of Facilities Project Approval Form generated at HQ.						
6.1.3	The FPM shall evaluate disposal alternatives such as transfer to another agency or adaptive reuse (McKinney Act screening) (for more information, see NPR 8800.15, Real Estate Management Program, Chapter 8).						
6.1.4.a	The FPM shall request funding for demolition of the facility as part of the PPBE process 24 to 26 months prior to the start of demolition.						
6.1.4.b	The FPM shall identify the earliest demolition date and any schedule constraints and reference the Annual PPBE Guidance for requirements.						
6.1.5	For projects where existing buildings will be modified or disposed of, the FPM shall contact the Historic Preservation Officer (HPO) for their determination of historic eligibility.						
6.1.5.1	If eligible, the FPM, in cooperation and coordination with the HPO, shall develop an adaptive reuse feasibility report.						
6.1.6	Prior to demolition, an Environmental Baseline Survey shall be required and will be managed by the Center Environmental Officer or designee.						

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6.1.7	The initial record of environmental planning and an environmental checklist shall be completed by the FPM and coordinated through the Center Environmental Management Office 24 months before the start of demolition under the National Environmental Policy Act (NEPA).						
6.1.8	12 to 24 months before the start of demolition equipment, property and artifacts for reuse by the Government or disposal by other means shall be identified by the FPM, in cooperation with the HPO, property disposal officers, programs, and other customers who are assigned personal property within the facility.						
6.1.9	During design and 6 to 12 months before the start of demolition, the FPM shall identify the types and amount of materials that could either have salvage value as recycled material or be reused.						
6.1.10	6 to 12 months before the start of demolition, the FPM shall work with the property disposal officer to ensure that any personal property is properly disposed of separate from facility demolition.						
6.1.11	The FPM shall ensure that impacts to utilities, roads, other facilities, and security are investigated and evaluated 12 to 24 months prior to the start of demolition.						
6.1.12	The FPM, as part of decommissioning, shall determine the protection and maintenance requirements for safety, property, security, and environmental impacts between facility deactivation and demolition.						
6.1.13	The FPM shall ensure a safety baseline survey is performed as part of decommissioning. The survey identifies potential safety hazards and concerns such as: a. Facility safety. b. Fire protection. c. Confined space entry. d. Nuclear safety. e. Radiation protection.						

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	f. Explosives. g. Pressurized systems.						
6.1.14	The FPM shall ensure a pollution prevention and abatement plan is completed as part of decommissioning to determine required remediation.						
6.1.15	6 to 12 months prior to the start of demolition and during design, the FPM shall determine if a plan is needed to communicate information about the demolition and impacts to the Center and surrounding community.						
6.2.1	The FPM shall utilize the Demolition Planning Checklist in creating the demolition plan. Refer to Appendix E.						

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Appendix D. Facility and Other Related Costs

D.1 Typical Facility Cost. The Current Cost Estimate (CCE) included on Forms 1510 and 1509 for a typical facility project includes the current local cost of the following:

a. Land acquisition.

b. Site preparation, utilities, sidewalks, parking lots, and access roads.

c. Construction materials and labor.

d. Material and equipment tests performed at the construction site or at an offsite location.

e. Construction management services (including SIES and network diagrams).

f. Commissioning services during design and construction.

g. Environmental compliance and protection.

h. Collateral equipment.

i. Subcontractor and general contractor cost, overhead, and profit.

j. General conditions, insurance bonds, and taxes.

k. LEED Certification.

l. Recordation of as-built conditions.

m. Outfitting items such as the following:

(1) IT/communications infrastructure up to signal outlets; however, not computer servers or racks.

(2) Demountable partitions and installed systems furniture.

(3) Building support specialty equipment such as emergency warning systems, security systems (e.g., public address warning systems and cipher locks for classified areas), and specialized material or file handling/storage equipment in support areas or designated use.

n. In general, items that are permanently affixed, such as conduits, raceways, cable trays, ductwork, wall penetrations, terminal rooms, and junction and terminal boxes.

D.2 Related Costs. The following is a partial list of items that are normally funded from accounts other than CoF. The Director, Facilities Engineering Division, can approve exceptions.

a. Planning/studies documentation such as the following:

(1) Environmental Assessments (EA) and Environmental Impact Statements (EIS).

(2) Permit actions (e.g., environmental, storm water, dredging) unless directly related to the construction contracting effort.

(3) Pre-PER studies (i.e., concept studies and/or requirements document).

b. Design-related activities other than SIES such as the following:

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(1) Independent design analysis.

(2) External review.

(3) Health and safety analysis.

(4) Engineering support.

(5) Reliability and quality assurance support.

(6) Software quality assurance support.

(7) Program scheduling.

(8) Documentation and control.

c. Outfitting items such as the following:

(1) Research, checkout, and assembly hardware/equipment.

(2) Test support and ground support equipment.

(3) Cleaning equipment.

(4) Furniture.

(5) Telephones, modems, switching equipment, and associated wiring.

(6) Communications equipment (voice/data) and associated wiring.

(7) Electronic security systems hardware that does not qualify as collateral equipment (e.g., cipher locks and intrusion detection systems are considered collateral equipment for classified areas within a facility).

(8) Paging and area warning systems hardware.

(9) Process/support equipment.

(10) Replacing carpet and installation (initial carpet or carpet tile installation when used as the primary floor covering can be included in the CCE).

(11) Window and door treatments; e.g., blinds, glare controls, and drapes, except where blinds are an integral part of the window or door unit and, thus, the initial purchase can be included in the CCE.

(12) Lockers, unless built in.

(13) Clocks.

(14) Video equipment.

(15) Computer hardware.

(16) Automatic data processing equipment, including cables, fiber optics, and network connections.

d. Services such as the following:

(1) Building/vehicle maintenance.

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(2) Janitorial services.

(3) Storage costs for noncollateral equipment.

(4) Security personnel.

(5) Spare parts.

(6) Warranties, except when associated with equipment or structural members that are an integral part of the facility.

(7) Operator certification and training programs.

(8) Operational Readiness Reviews.

(9) Integrated systems testing, health, and safety reviews.

e. Other expenses such as the following:

(1) Relocation/move-in expenses.

(2) Acquisition process.

(3) Personal and other health and safety protection.

(4) Temporary housing.

(5) Utility consumption.

(6) Facility calibration.

(7) Facility dedication.

(8) Personnel travel.

(9) Training, except for collateral equipment.

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Appendix E. Demolition Planning Checklist

Item	Description	Reference Requirement	Notes	Lead Time Before Demolition (Months)
Authority to dispose/ demolish	Submit a letter, signed by the Center Director or designee, requesting authority to proceed with the demolition.	NPR 8800.15B Chapter 8	This authority is separate from the request to include the facility in the demolition program as part of the PPBE process.	
Determination to demolish		NPR 8800.15B Chapter 8	Evaluate disposal alternatives such as transfer to another agency or adaptive reuse (McKinney Act screening)	
Request inclusion in the demolition program	Request funding for demolition of the facility as part of the PPBE process.	Annual PPBE Guidance	Identify earliest demolition date and any schedule constraints.	24 - 36
Compliance with NHPA	Determine historic eligibility, look at adaptive reuse, determine mitigating measures such as HABS/HAER	NPR 8580.1	If eligible, SHPO consult may be required.	
Environmental baseline survey	Identify hazardous substances to be removed as part of demolition (asbestos, lead) and prior to demolition (chemical containers)	NPR 8800.15B Chapter 8		

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Compliance with NEPA	Complete Record of Environmental Planning and Environmental Checklist (additional actions may be required)	NPR 8580.1		24
Personal property reuse plan	Identify equipment, property and artifacts for reuse by the Government or disposal by other means		Bring in HPO's, property disposal officers, programs, and special interest groups early in the process	12 - 24
Salvage material inventory/ diversion plan	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 8800.15B Chapter 8	During design	6 - 12
Clear the building of non-collateral equipment and debris	Ensure that any personal property is properly disposed of separate from facility demolition		Work with the property disposal officer	6 - 12
Evaluate infrastructure impact	Look at impact to: utilities, roads, other facilities, security		Demolition of a facility may remove either supply or demand of essential services, requiring modifications to associated systems.	12 - 24
Sustainment plan	Determine protection and maintenance requirements (safety, property, security, environmental) between facility deactivation and demolition		Complete as part of decommissioning	

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Safety baseline survey	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 8800.15B Chapter 8	Complete as part of decommissioning	
Pollution prevention and abatement plan	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 8800.15B Chapter 8	Complete as part of decommissioning	
Communication plan	Determine if a plan is needed to communicate to the Center and surrounding community information about the demolition and impacts.		During design	6 - 12

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Appendix F. Reference Documents

The following references apply to facilities projects:

a. Incentives for agencies, as amended (Utility Energy Services Contracts (UESC)), 42 U.S.C. § 8256.

b. Exec. Order No. 12196, Occupational Safety and Health Programs for Federal Employees, as amended.

c. Exec. Order No. 12699, Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction.

d. Exec. Order No. 12941, Seismic Safety of Existing Federally Owned or Leased Buildings.

e. Exec. Order No. 13327, Federal Real Property Asset Management.

f. Federal Energy Management and Planning Programs, 10 C.F.R. pt. 436.

g. Occupational Safety and Health Standards, 29 C.F.R. pt. 1910.

h. Safety and Health Regulations for Construction, 29 C.F.R. pt. 1926.

i. Basic Program Elements for Federal Employee Occupational Safety and Health Programs and Related Matters, 29 C.F.R. pt. 1960.

j. OMB Circular A-131, Value Engineering (05/21/1993).

k. NPD 1800.2, NASA Occupational Health Program.

l. NPD 1820.1, NASA Environmental Health Program.

m. NPD 8010.2, Use of the SI (Metric) System of Measurement in NASA Programs.

n. NPD 8500.1, NASA Environmental Management.

o. NPD 8700.1, NASA Policy for Safety and Mission Success.

p. NPD 8710.5, NASA Safety Policy for Pressure Vessels and Pressurized Systems.

q. NPD 8800.14, Policy for Real Property Management.

r. NPD 8810.2, Master Planning for Real Property.

s. NPD 9050.6, NASA Exchange and Morale Support Activities.

t. NPR 1441.1, NASA Records Retention Schedules.

u. NPR 1800.1, NASA Occupational Health Program Procedures.

v. NPR 8530.1, Affirmative Procurement Program and Plan for Environmentally Preferable Products.

w. NPR 8553.1, NASA Environmental Management System (EMS).

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x. NPR 8810.1, Master Planning Procedural Requirements.

y. NASA-STD 8719.7, Facility System Safety Guidebook.

z. NASA-STD 8719.9, Standard for Lifting Devices and Equipment.

aa. NASA-STD 8719.12, Safety Standard for Explosives, Propellants, and Pyrotechnics.

bb. NASA-STD 8719.17, NASA Requirements for Ground-Based Pressure Vessels and Pressurized Systems.

cc. Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding.

dd. Facility Design Guide, Facilities Engineering Division, NASA Headquarters.

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