BUILDING COMMISSIONING GUIDELINES

INTEGRATED FACILITIES MANAGEMENT
INFORMATION SERVICES

IFMIS

February 2006

Dormitory Authority of the State of New York

515 Broadway, Albany, New York 12207-2964

TABLE OF CONTENTS

Tab 1 – Summary ……1-2

Tab 2 – Commissioning Process 3

Selecting the Commissioning Authority (CxA) 4

Phases of Work 5-7

Responsibilities 8-20

Tab 3 – Commissioning Guidelines 21

Commissioning Section 638.8 22-39

Tab 4 – Tables 40

Table 1 Commissioning Process & Delivery Approach 41

Table 2 Commissioning Activity Check List.....42

Tab 5 –Appendix..... 43

Appendix 1 Construction Phase Application Forms.....44

Appendix 2 Specification Structure 45

Appendix 3 New York State Executive Order 111…… 46-50

Tab 6 – Reference 51

Definitions 52-56

Reference Standards 57

Revisions.....58

SUMMARY

The purpose of these guidelines is to develop a consistent method to facilitate Commissioning on Dormitory Authority projects.

Governor George E. Pataki signed Executive Order No. 111 for "Green and Clean" State Buildings and Vehicles on June 10, 2001 (See Appendix 3). This is the most aggressive and comprehensive directive ever issued to address energy use and environmental issues through government procurement standards and design practices. New York State has long been a leader in creating a coordinated, long-term energy policy.

Commissioning is required on New York State buildings by *New York State Executive Order No.111, which* references the following areas:

- Green Building Tax Credit (6NYCRR Part 638)

  Commissioning [Section 638.8]

  Indoor Air Quality Testing [Section 638.7(d)(1)]

  Indoor Air Quality Management Plan During Construction [Section 638.7(d)(2)]

  Operations and Maintenance Management Plan [Section 638.7(d)(3)]

- *New York State Tax Law, Section 19*

- U.S. Green Building Council's LEED™ Green Building Rating System

Building Commissioning is a process for achieving, verifying and documenting that the performance of a building and its various systems meet the *design intent* and the owners and occupants operational needs. The process ideally extends throughout all phases of the project, from concept to occupancy; and throughout the life of the building, which includes operations and maintenance.

Commissioning is a quality control process which identifies, that:

- The owners project requirements and expectations are achieved
- *Design Intent* and *Basis of Design* is developed and followed
- Specified components and systems have been properly installed
- *Pre-functional & Functional Performance Testing* has been completed and documented for proper operation through all specified modes of operation and conditions
- Training of operations and maintenance personnel has been performed
- *Operations and maintenance manuals* are documented and completed

The *Commissioning Authority* is the entity selected to develop and ensure that the commissioning process is properly carried out. The *Commissioning Authority* leads the commissioning process and makes final recommendations to the owner(s) regarding the performance of the commissioned building systems. In order to do so, the *Commissioning Authority* must be an active participant throughout all phases of the project from initial concept, through design, construction and occupancy

The *Commissioning Authority* can be an individual, an organization, or a team with individuals from more than one organization (See 638.8c3 and 638.8d). For the purpose of these guidelines, the C*ommissioning Authority* should be an independent third-party participant. The *Commissioning Authority* should have no economic or political ties to either the design professional(s) or the contractor(s)

The forms required to complete the commissioning requirements for buildings complying with Executive Order No. 111 shall be those created by Portland Energy Conservation, Incorporated (PECI). These forms are available at *http://www.peci.org/library/mcpgs.htm*

Please refer to the following links for information regarding the documents referenced in these guidelines:

http://www.nyserda.org/programs/State_Government/exorder111guidelines.pdf NYSERDA's web page for Executive Order No. 111 and additional information and links to these resources.

http://www.usgbc.org/ to download a copy of the latest version of the U.S. Green Building Council's LEED® rating systems and guidelines.

http://www.dec.state.ny.us/website/ppu/grnbldg/gbprop.pdf to download a copy of the New York State Green Building Tax Credit and the latest version of the New York State Green Building Tax Credit Guidelines.

The following section on the "Commission Process" outlines the phases of work and what is required under each phase. The section on "Commissioning Responsibilities" outlines who is responsible for the task and deliverance under the commissioning process.

COMMISSIONING PROCESS

This section includes the following:

Selecting the Commissioning Authority (CxA)

Phases of Work

Commissioning Responsibilities

Note: The detailed scope of work can be found in Tab 3 Commissioning Guidelines 638.8

SELECTING THE COMMISSIONING AUTHORITY

Note: This process of selecting a Commissioning Authority is for specific projects only, not for use in selecting term consultants.

The *Commissioning Authority* leads the commissioning team and is responsible for planning, organizing, and facilitating the completion of the commissioning process on behalf of the owner. In addition to having good technical knowledge of the systems being commissioned, the *Commissioning Authority* must also have a complete understanding of the commissioning process and possess the organizational, documentation, communications, and team-building skills that are necessary to lead and coordinate an effective C*ommissioning Team* and to ensure that the intent of the building owner is achieved. For longevity and maintainability of the systems and the overall building, the *Commissioning Authority* must have a strong background in the operation and maintenance of facilities.

When selecting a *Commissioning Authority*, whether it is from a list of term consultants or from a Request for Qualification process, it is critical to select a firm or entity that best suited for the project at hand.

Independent Third Party

The *Commissioning Authority* can be an individual, an organization, or a team with individuals from more than one organization, see *Green Building Tax Credit (638.8c3 and 638.8d*). For the purpose of these guidelines, an independent commissioning authority, under contract with DASNY/Owner is the preferred contractual arrangement because a third party professional brings objectivity and practical experience to the project to ensure that the owner will receive the building performance expected.

The *Design phase* lays the foundation for all the other phases of work to follow and defines the scope of the overall project. During this phase the owner's project requirements are identified and documented and developed into a program and or scope of work for the finished product.
Also during this phase of work energy requirements are established, as well as construction budgets are established.

It is important to involve the independent *Commissioning Authority* as early in the project as possible, preferably during the start-up of the project early in the *Design Phase*. This allows the *Commissioning Authority* the opportunity to review the owners project requirements and the *design intent* for the project. Also, the *Commissioning Authority* can assist in scheduling commissioning activities, and developing specification language into bid documents for other contractors.

It is critical in the overall project delivery process that the lines of communication are established early and that the team members understand the expectations of the owner, the project, and that discussions and decisions are made to achieve those goals.

PHASE OF WORK:

The intent of this document is to outline commissioning as a planned systematic process that involves a team approach to delivering projects. The process begins at implementation early in the *Design Phase*; where the owners project requirements set the basis for development of the *Design Intent, Basis of Design* and the *Commissioning Plan*. During the construction phase, the commissioning activities increase with the testing and functional verification of the building systems. The construction phase culminates with the delivery of the final *Commissioning Report* and the operation and maintenance documentation for occupancy. Requirement for Post-Occupancy review must be incorporated for the purpose of off- season deferred testing and warranty items.

The Dormitory Authority will coordinate commissioning services in a two-part delivery process: *Design Phase* Commissioning *and Construction Phase* Commissioning. The *Construction Phase* incorporates both *Commissioning activities and Acceptance activities.* Each phase is described below. Certain projects based on scope, building type, complexity of building systems, and technical requirements may require the need for post-occupancy Commissioning.

I. Design Phase:

The commissioning process begins in the design phase. This process should begin as close to project inception as possible. The design phase of the commissioning process includes the preparation of schematic design documents through the completion of contract documents and specifications.

Objectives of the commissioning process during the design phase are to:

- Develop a budget for *Commissioning* services.
- Document the *owners project requirements*.
- Develop the schematic design report and drawings for review by the Commissioning Team.
- Select the *Commissioning Authority*.
- Identify the *Commissioning Team* and discuss roles and responsibilities.
- Document the *Design Intent, Basis of Design* and *Sequence of Operations.*
- Identify systems requiring *Commissioning.*
- Participate in design review and meetings.
- Develop the *Commissioning Specifications*.
- Develop the *Commissioning Plan*.

Continued

- Coordinate other mechanical, electrical, fire safety, and life-safety service requirements with HVAC layout, equipment, and systems.
- Prepare *Contract Documents* that clearly describe and fulfill the *Design Intent, Basis of Design* and *Sequence of Operations* and *Commissioning Plan.*
- Incorporate Commissioning as part of the project schedule.
- Document Design Phase activities.

II. Construction Phase:

During the construction phase of the commissioning process, the system(s) are installed, started, and put into operation. The construction phase commissioning is delivered in two activities, commissioning activities and acceptance activities.

The objectives of the commissioning process during the construction phase are to:

Commissioning activities:

- Establish *Commissioning Team* Progress meetings.
- Review submittals and shop drawings as related to Commissioning.
- Revise details of the *Commissioning Plan*.
- Develop *Pre-functional tests; including* installation and start-up check lists and procedures.
- Develop *Functional performance testing* procedures and checklists.
- Verify and document construction and installation of building systems and equipment
- Verify and document *Pre-functional testing* including; start-up and check out
- Verify and document controls testing and calibration prior to *TAB.*
- Verify and document *testing, adjusting, and balancing (TAB)*
- Submit *Certificate of readiness* prior to *Functional Performance Testing.*
- Perform *Functional Performance Testing*.
- Conducts periodic site inspections.
- Develop Master deficiency and resolution log

During construction of the HVAC system, the owner's O&M personnel should observe and monitor construction of these systems. They will develop a better understanding of the system's intended operation and performance and become familiar with the physical installation, particularly the location of equipment and devices, which may be hidden when construction is complete.

Continued

Acceptance Activities:

During the acceptance activities of the construction phase, verification of functional performance tests, and other acceptance procedures will take place.

Objectives of the commissioning process during the acceptance activities is to:

- Submit *TAB* and all verification reports for review and approval
- Address all deficiencies noted during *Pre-Functional & Functional Performance Testing.*
- Prepare and document *O&M Manuals.*
- Prepare and document *Systems & Energy Management Manuals.*
- Conduct *O&M* training of owner's staff.
- Complete the as-built record drawings.
- Submit *Statement of Certification of Work.*
- Complete final *Commissioning Report.*
- Perform off-season deferred testing and post-occupancy review.

Post Occupancy Review

The *Commissioning Authority* shall return to the site within the 12-month warranty period in accordance with *NYS EO 111 Green Building Tax Credit P 638.8 3c14-15,* to address the following issues:

- Review current building operations with facility staff and address outstanding issues related to the owners project requirements.
- Interview facility staff and identify problems or concerns with operating the building
- Provide suggestions for improvements and record changes in the *Systems & Energy Manuals*
- Identify problems covered under warranty or under the original construction contract
- Assist facility staff in developing reports, documents and requests for services to remedy outstanding problems
- Provide Report of the Post Occupancy Review

LEED Rated Projects:

The United States Green Building Council's LEED rating system requires *Fundamental Building Commissioning* as a prerequisite under the Energy and Atmosphere category. Also available is an additional one (1) point under credit 3, *Additional Commissioning*. (See USGB LEED rating system for details).

PROJECT MANAGEMENT (PM) (DASNY)

COMMISSIONING RESPONSIBILITIES

Note: The following represents key elements of Commissioning activities. The type of equipment and systems to be commissioned, the scope of work and the requirements of the facility will determine the task and scope of work for each participant.

Note: The DASNY IFMIS Group and the Commissioning Authority shall assist the DASNY PM in coordinating the following activities as required.

I. Design Phase:

Project Manager shall coordinate the following activities:

- ☐ Develop scope of work and budget for *Commissioning* to include:
  - Design Professional
  - Commissioning Term Consultant
  - Construction Manager
  - DASNY IFMIS Group
- ☐ Work with DASNY IFMIS Group in Selecting Commissioning Authority from pre-qualified list of term consultants and provide a copy of the proposal to IFMIS group for review.
- ☐ Add *IFMIS* unit and *Commissioning Authority* to project distribution list.
- ☐ Participate as a member of the *Commissioning Team* and discuss roles and responsibilities.
- ☐ Distribute and review the *Owners Project Requirements* and/or Project Scope of Work.
- ☐ Distribute and review the schematic design report and drawings.
- ☐ Schedule and attend a minimum of three (4) design review meetings concurrent with each submission, (30, 60, 90 Percent & Bid set) addressing Commissioning issues.

Project Manager shall review and verify that the following have been performed:

- ☐ *Design Intent* and *Basis of Design*.
- ☐ *Sequence of Operations.*
- ☐ Documentation of systems requiring *Commissioning.*
- ☐ *Commissioning Specifications.*
- ☐ *Commissioning Plan*.

II. Construction Phase:

Note: Projects where the services of a CM are not required, the DASNY PM shall coordinate the following activities with the General Contractor and Sub-contractors.

- ☐ Schedule and attend Construction kick-off meeting - Add *Commissioning Authority* and IFMIS Group.
- ☐ Schedule and attend *Commissioning Team* progress meetings.
- ☐ Review and approve *Commissioning agent(s)* qualifications.

Project Manager shall distribute and review the following:

- ☐ *Pre-functional tests, including* start-up & checkout procedures and checklists.
- ☐ Submittals and shop drawings for equipment & systems requiring *Commissioning.*
- ☐ Final *Sequence of Operations.*
- ☐ Final *Commissioning Plan*.
- ☐ *Testing, Adjusting & Balancing (TAB) Plan.*
- ☐ *Functional performance tests* procedures and checklists.

Commissioning Activities:

Project Manager shall distribute and review the following documentation:

- ☐ Installation of systems and components are complete.
- ☐ The HVAC pipe testing and flushing procedures.
- ☐ All duct testing and cleaning procedures.
- ☐ *Pre-functional testing* including start-up and checkout were performed and completed.
- ☐ The testing of the controls system. Before *Tab*
- ☐ *Testing, Adjusting & Balancing (TAB)* report.
- ☐ *Certificate of Readiness* from Cx Agent (contractor), prior to FPT.
- ☐ *Functional Performance Testing* procedures (FPT).
- ☐ Log of deficiencies and resolutions.

Acceptance Activities:

Project Manager shall review and verify that the following have been processed:

- ☐ *Operation and Maintenance (O&M) Manuals*.
- ☐ *Systems & Energy Management Manuals.*
- ☐ Training syllabus.
- ☐ Training plan of the owner's O&M personnel.
- ☐ *Commissioning Report*.
- ☐ *Certification of Work.*
- ☐ Coordinate off-season deferred testing.
- ☐ Coordinate *Post Occupancy Review.*

Note: The preparation and documentation of the Operation and Maintenance manuals shall be accordance with the New York State Green Building Tax Credit Part 638.8k and ASHRAE Guidelines 4-1993 or the latest revisions of each document.

DESIGN PROFESSIONALS (DP)

COMISSIONING RESPONSIBILITIES

Note: The following represents key elements of Commissioning activities. The type of equipment and systems to be commissioned, the scope of work and the requirements of the facility will determine the task and scope of work for each participant.

I. Design Phase:

Design Professionals shall complete the following:

- ☐ Document the owners project requirements.
- ☐ Develop a schematic design report and drawings.
- ☐ Assist in identifying systems requiring *Commissioning.*
- ☐ Develop *Design Intent* and *Basis of Design*.
- ☐ Develop *Sequence of Operations.*
- ☐ Develop *Commissioning Specifications.*
- ☐ Review the *Commissioning Plan*.
- ☐ Address review comments & attend design review meeting at each submission phase, (30, 60, 90 Percent & Bid Set) addressing *Commissioning* issues.
- ☐ Participate as a member of the *Commissioning Team.*

II. Construction Phase:

- ☐ Participate in *Commissioning Team* progress meeting.
- ☐ Provide the final *Sequence of Operations.*
- ☐ Review and approve submittals and shop drawings for equipment & systems requiring *Commissioning.*
- ☐ Review *pre-functional testing* including start-up and checkout procedures and checklists.
- ☐ Review the final *Commissioning plan*.
- ☐ Review and approve the *Testing, Adjusting & Balancing (TAB) Plan*.
- ☐ Review *functional performance testing* procedures and checklists.

Continued

Commissioning Activities:

The Design Professionals shall review the documentation for the following:

- ☐ *Pre-functional testing* including, start-up and checkout were performed
- ☐ HVAC pipe testing and flushing procedures were performed.
- ☐ All duct testing and cleaning procedures were performed.
- ☐ Testing of the controls system before *TAB.*
- ☐ *Testing, Adjusting & Balancing (TAB).*
- ☐ *Certificate of Readiness* from Cx Agent (contractor), prior to FPT.
- ☐ *Functional Performance Testing.*
- ☐ Log of deficiencies and resolutions.

Acceptance Activities:
Note: For projects with no Construction Manager, coordinate the following:

The Design Professionals shall review & approve the following:

- ☐ *Operation and Maintenance (O&M) Manuals.*
- ☐ Systems & Energy Management Manuals.
- ☐ *O&M* training syllabus.
- ☐ The final *Commissioning Report.*
- ☐ Documentation of off-season deferred testing.
- ☐ Documentation of *Post Occupancy Review.*

Note: During the Construction Phase, the design professional and/or their designee shall witness all or parts of any of the tasks as required by their contract and/or scope of work

Note: The preparation and documentation of the Operation and Maintenance manuals shall be accordance with the New York State Green Building Tax Credit Part 638.8k and ASHRAE Guidelines 4-1993 or the latest revisions of each document.

COMMISSIONING AUTHORITY (CxA)

COMMISSIONING RESPONSIBILITIES

Note: The following represents key elements of Commissioning activities. The type of equipment and systems to be commissioned, the scope of work and the requirements of the facility will determine the task and scope of work for each participant.

Note: Commissioning authority approval is solely for the purpose of ensuring that the items below are in accordance with the commissioning requirements and must not constitute approval for any other purpose.

I. Design Phase:

The Commissioning Authority shall:

- ☐ Lead the *Commissioning Team* and discuss roles and responsibilities.
- ☐ Review Owner's project requirements.
- ☐ Review Schematic design report and drawings.
- ☐ Identify and document systems requiring *Commissioning.*
- ☐ Review and approve *Design Intent* and *Basis of Design*.
- ☐ Review and approve *Sequence of Operations.*
- ☐ Assist with developing and approve *Commissioning Specifications.*
- ☐ Develop the *Commissioning Plan.*
- ☐ Review documents and attend design review meeting at each submission, (30, 60, 90 Percent & Bid Set) addressing Commissioning issues.
- ☐ Document design phase activities

II. Construction Phase:

The Commissioning Authority shall:

- ☐ Conduct *Commissioning Team* progress meeting.
- ☐ Review and approve *Commissioning agent(s)* qualifications.
- ☐ Review submittals and shop drawings for equipment & systems requiring Commissioning.
- ☐ Develop *pre-functional testing* including start-up and checkout procedures and checklists.
- ☐ Review and approve final *Sequence of Operations.*
- ☐ Provide the final *Commissioning Plan.*
- ☐ Review and approve the *Testing, Adjusting & Balancing (TAB) Plan.*
- ☐ Develop *functional performance testing* procedures and checklists.
- ☐ Conduct periodic site inspections.

Continued

Commissioning Activities:

The Commissioning Authority shall:

- ☐ Verify and document installation of systems, equipment and components.
- ☐ Verify, document and approve *pre-functional testing* including, start-up and checkout were completed and performed
- ☐ Witness all HVAC pipe testing and flushing procedures.
- ☐ Witness all duct testing and cleaning procedures.
- ☐ Witness and approve testing of the controls system before *TAB.*
- ☐ Retrieve *Certificate of Readiness* from the Cx Agent (Contractor) prior to FPT
- ☐ *Testing, Adjusting & Balancing (TAB).*
- ☐ Verify, document and approve *functional performance testing (FPT).*
- ☐ Maintain a master log of deficiencies and resolutions.

Acceptance Activities:

The *Commissioning Authority* shall:

- ☐ Retrieve, review and approve the *Operation and Maintenance (O&M) Manuals*.
- ☐ Develop *Systems & Energy Management Manuals.*
- ☐ Prepare the O&M training syllabus.
- ☐ Oversee and approve the training of the owner's O&M personnel.
- ☐ Develop final Commissioning Report.
- ☐ Provide *Statement of Certification of Work.*
- ☐ Retrieve all as-built record documents for systems requiring commissioning.
- ☐ Verify, document and conduct off-season deferred testing.
- ☐ Verify, document and conduct *Post Occupancy Review.*

Note: The Commissioning Authority is responsible for the documentation of all equipment and systems during the Commissioning process. The Commissioning Authority is also responsible for retrieving and reviewing reports and documentation prepared by other trades that are also required by the Commissioning process. This documentation shall be archived as part of the final Commissioning documentation delivered to DASNY

Note: The preparation and documentation of the Operation and Maintenance manuals shall be accordance with the New York State Green Building Tax Credit Part 638.8k and ASHRAE Guidelines 4-1993 or the latest revisions of each document.

CONSTRUCTION MANAGER (CM)

COMMISSIONING RESPONSIBILITIES

Note: Projects were the services of a CM are not required; then the Prime General Contractor shall perform the activities of the Construction Manager as it relates to the commissioning process only

Note: The following represents key elements of Commissioning activities. The type of equipment and systems to be commissioned, the scope of work and the requirements of the facility will determine the task and scope of work for each participant.

I. Design Phase:

Throughout the design phase the Construction Manager shall continuously review the following:

- ☐ Owners project requirements.
- ☐ The schematic design report and drawings.
- ☐ The *Design Intent and Basis of Design.*
- ☐ *Sequence of Operations.*
- ☐ *Commissioning Specifications.*
- ☐ Systems requiring *Commissioning.*
- ☐ The *Commission Plan.*

- ☐ Develop Project schedule to include the *Commissioning Process.*
- ☐ Attend design review meeting at each submission, (30, 60, 90 Percent & Bid Set) addressing Commissioning issues.
- ☐ Participate as a member of the *Commissioning Team.*

Note: Some of the items listed below in the Construction Phase will be furnished from the Contractor and/or Sub-contractors to the Construction Manager. The Construction Manager will be asked to coordinate and process this information and deliver it to the Commissioning team in an efficient and timely manner

II. Construction Phase:

Note: The Construction Manager shall coordinate all Commissioning activities during the Construction phase as required including but not limited to the following:

- ☐ Attend construction kick-off meeting.
- ☐ Develop and monitor the commissioning schedule in project timeline.
- ☐ Schedule and participate in *Commissioning Team* progress meeting.

Continued

- ☐ Coordinate the execution of the Commissioning Process.
- ☐ Review and Approve the *Cx Agents* (contractors) qualifications.
- ☐ Process submittals and shop drawings for equipment & systems requiring Commissioning.
- ☐ Review & coordinate *pre-functional testing,* including start-up and checkout procedures and checklists.
- ☐ Review final *Sequence of Operations.*
- ☐ Review the final *Commissioning plan*.
- ☐ Review & coordinate the *Testing, Adjusting & Balancing (TAB) Plan*.
- ☐ Review & coordinate *Functional performance testing* procedures and checklists.

Commissioning Activities:

The Construction Manager shall document & provide to the *Commissioning Team* as being completed and operational the following*:*

- ☐ The installation of systems, equipment and components.
- ☐ *Pre-functional testing,* including start-up and checkout procedures.
- ☐ HVAC pipe testing and flushing procedures.
- ☐ Duct testing and cleaning procedures.
- ☐ Testing of the controls system before *TAB.*
- ☐ *Testing, Adjusting & Balancing (TAB).*
- ☐ Provide the *Certificate of Readiness* prior to FPT.
- ☐ *Functional Performance Tests*.
- ☐ Review the deficiency log and coordinate all deficiencies and resolutions for any system performance deficiencies.

Acceptance Activities:

The Construction Manager shall retrieve the following:

- ☐ *Operation and Maintenance (O&M) Manuals*
- ☐ *Systems & Energy Management Manuals.*
- ☐ Assist in preparing the O&M training syllabus.
- ☐ Schedule & coordinate the training of the Owner's O&M personnel.
- ☐ Final *Commissioning Report*.
- ☐ Documentation for off-season deferred testing & schedule.
- ☐ Documentation for *Post Occupancy Review*
- ☐ Provide final electronic copy of submittals and as-built record documents to DASNY.

Note: The preparation and documentation of the Operation and Maintenance manuals shall be accordance with the New York State Green Building Tax Credit Part 638.8k and ASHRAE Guidelines 4-1993 or the latest revisions of each document.

COMMISSIONING AGENT (CA) (Contractor)

COMMISSIONING RESPONSIBILITIES

Note: For the purposes of these guidelines the Contractor(s) will be responsible for the role, tasks and responsibilities of the Commissioning Agent. This pertains to projects, where there is a Construction Manager. (See Note Below)

Note: Projects where the services of a CM are not required; then the General Contractor shall perform the activities of the Construction Manager. The Subcontractor(s) shall act as the commissioning agent as it relates to the commissioning process only as outlined in this document.

Note: The following represent key elements of the Commissioning activities. The type of equipment and systems to be commissioned, the scope of work and the requirements of the facility will determine the task and scope of work for each participant.

I. Design Phase:

Note: It is assumed the Commissioning Agent (Contractor) will join the project at the Construction Phase. Should the Commissioning Agent (Contractor) be involved sooner in the process, then roles and responsibilities listed in the Design Phase for all other Commissioning Team members will be modified accordingly.

II. Construction Phase:

- ☐ Submit for approval *Commissioning Agent* (sub-contractors) qualifications.
- ☐ Participate as a member of the *Commissioning Team.*
- ☐ Attend *Commissioning Team* progress meeting.
- ☐ Review the schedule/timeline for Commissioning.
- ☐ Provide for approval submittals and shop drawings for equipment & systems requiring *Commissioning.*
- ☐ Assist with developing and/or review *pre-functional testing* including, start-up and checkout procedures and checklists.
- ☐ Review final *Sequence of Operations.*
- ☐ Review *Commissioning Specifications and drawings.*
- ☐ Review final *Commissioning Plan*.
- ☐ Provide for approval the *Testing, Adjusting & Balancing (TAB) Plan*.
- ☐ Assist with developing and/or *functional performance testing* procedures and checklists.

Continued

Commissioning Activities:

The *Commissioning agent* shall document to the *Commissioning Team* as being completed and operational the following*:*

- ☐ Installation of all systems, equipment and components.
- ☐ P*re-functional testing* including start-up and checkout.
- ☐ HVAC pipe testing and flushing.
- ☐ Duct testing and cleaning.
- ☐ Testing of the controls system before *TAB.*
- ☐ *Testing, Adjusting & Balancing (TAB).*
- ☐ Provide *Certificate of Readiness* prior to FPT.
- ☐ F*unctional performance testing.*
- ☐ Review deficiency logs & correct all system performance deficiencies.

Note: As a result of the installation, testing and verification process during Commissioning, the Commissioning Agent shall document and provide the following reports for review and approval: start-up and checkout reports, installation verification reports, testing and balancing reports, pre-functional and functional performance testing reports.

Acceptance Activities:

The Commissioning Agent shall:

- ☐ Provide *Operation and Maintenance (O&M) Manuals*.
- ☐ Assist in preparing the O&M training syllabus.
- ☐ Provide training of the owner's O&M personnel.
- ☐ Provide final electronic copy of submittals and as-built record drawings to DASNY.
- ☐ Conduct and document off-season deferred testing.
- ☐ Address items generated from *Post Occupancy Review.*

Note: The Commissioning Agent is required to review all of the above documents in an effort to understand the commissioning scope of work and what is required for the commissioning process. The Commissioning Agent shall document the above as required by the commissioning process for review and approval.

Note: The preparation and documentation of the Operation and Maintenance manuals shall be accordance with the New York State Green Building Tax Credit Part 638.8k and ASHRAE Guidelines 4-1993 or the latest revisions of each document.

IFMIS Group (DASNY)
Integrated Facilities Management Information Services

COMMISSIONING RESPONSIBILITIES

The IFMIS unit will provide technical support to facilitate and coordinate the Commissioning Process. It is the intent of the group to provide the necessary support and expertise to document the Commissioning Process and assist DASNY in delivering the required documentation and information for proper Operation and Maintenance of facilities.

I. Design Phase:

- ☐ Assist Project Manager Budget for *Commissioning.*
- ☐ Assist Project Manager in selection of *Commissioning Authority.*
- ☐ Review *Commissioning Authority* proposal for services.
- ☐ Review and archive *Owners project requirements*
- ☐ Review schematic design report and drawings.
- ☐ Identify the *Commissioning Team and* discuss roles, responsibilities and reporting.
- ☐ Set up *Commissioning* project database.
- ☐ Attend design review meeting at each submission phase, (30, 60, 90 Percent and Bid Set) addressing *Commissioning* issues
- ☐ Coordinate and review Comments related to Commissioning
- ☐ Review and archive *Design Intent* and *Basis of Design.*
- ☐ Review *Sequence of Operations.*
- ☐ Coordinate and review documentation of systems requiring *Commissioning.*
- ☐ Review *Commissioning Specifications.*
- ☐ Review *Commissioning Plan.*

II. Construction Phase:

- ☐ Attend Construction kick-off meeting - Outline *Commissioning*-reporting requirements.
- ☐ Attend *Commissioning Team* progress meeting.
- ☐ Review *Commissioning Agent(s)* qualifications.
- ☐ Review the schedule/timeline for Commissioning.
- ☐ Review & archive final *Commissioning Specifications and drawings*
- ☐ Review and archive final *Sequence of Operations.*
- ☐ Review and archive final *Commissioning Plan.*
- ☐ Review *Pre-functional testing including* Start-up and checkout procedures and checklists.
- ☐ Review *Testing, Adjusting & Balancing (TAB) Plan.*
- ☐ Review *Functional performance testing* procedures and checklists.

Continued

Commissioning Activities:

IFMIS Unit will review for completeness documentation of the following

- ☐ Installation of systems, equipment and components.
- ☐ *Pre-functional testing,* including start-up and checkout.
- ☐ HVAC pipe testing and flushing.
- ☐ Duct testing and cleaning.
- ☐ Testing of the controls system before TAB.
- ☐ *Testing, Adjusting & Balancing (TAB)*
- ☐ *Certificate of Readiness* prior to FPT
- ☐ *Functional Performance Testing.*
- ☐ Master log of deficiencies and resolutions.

Note: during the installation, start-up and testing of any equipment and systems, the DASNY IFMIS Group may witness all or parts of any of the testing as required.

Acceptance Activities:

IFMIS group will review and archive for project record documentation the following:

- ☐ *Operation and Maintenance (O&M) Manuals.*
- ☐ *Systems & Energy Management Manuals.*
- ☐ Review the O&M training syllabus.
- ☐ Final Commissioning Report.
- ☐ *Statement of Certification of Work.*
- ☐ Final electronic copy of submittals and as-built record drawings.
- ☐ Review and archive documentation of off-season deferred testing.
- ☐ Review and archive documentation of *Post Occupancy Review.*

QUALITY ASSURANCE GROUP (QA) (DASNY)

COMMISIONING RESPONSIBILITIES

Note: The following represents key elements of Commissioning activities. The type of equipment and systems to be commissioned, the scope of work and the requirements of the facility will determine the task and scope of work for each participant.

I. Design Phase:

Review the following:

- ☐ Review *Design Intent* and *Basis of Design.*
- ☐ *Sequence of Operations.*
- ☐ *Commissioning Specifications.*
- ☐ *Commissioning Plan.*
- ☐ Participate as a member of the *Commissioning Team.*

II. Construction Phase:

- ☐ Attend *Commissioning Team* progress meeting as required.
- ☐ Review Final *Sequence of Operations.*
- ☐ Review *Testing, Adjusting & Balancing (TAB) Plan*.

Commissioning Activities:

The Quality Assurance Group may review documentation for the following as required:

- ☐ *Pre-functional performance testing* including start-up and checkout
- ☐ HVAC pipe testing and flushing.
- ☐ Duct testing and cleaning .
- ☐ Tests for the controls system before TAB.
- ☐ *Testing, Adjusting & Balancing (TAB report).*
- ☐ *Functional Performance Testing.*
- ☐ Log of deficiencies and resolutions.

Acceptance Activities:

The Quality Assurance Group may review documentation for the following as required:

- ☐ *Operation and Maintenance (O&M) Manuals*.
- ☐ *Systems & Energy Management Manuals.*
- ☐ Final Commissioning Report.

Note: During the Construction Phase, the DASNY Quality Assurance Group may witness all or parts of any of the tasks as required by their Quality Assurance process.

COMMISSIONING GUIDELINES

This section includes the following:

Commissioning Section 638.8 – New York State Green Building Tax Credit

Commissioned Process
Responsibilities of Primary Participants in Commissioning
Qualifications of the Commissioning Authority and Commissioning Agent
Design Intent and Basis of Design
Commissioning Plan
Commissioning Specifications
Start-up and Checkout
Functional Performance Testing
Training
Manuals
Commissioning Report

For Reference Purposes, the relevant Commissioning section of 6NYCRR Part 638.8, Green Building Tax Credit, has been reproduced below:

The following has been amended by DASNY to fit tier operational needs.

638.8 COMMISSIONING

(b) Commissioned Process

The owner must implement the commissioning process summarized below

(1) Commissioning Steps

(i) Designate a qualified Commissioning Authority.

(ii) Ensure that the individuals or firms performing the design of the base building or tenant space(s), the commissioning agent and the commissioning authority fulfill their roles and responsibilities in accordance with Section 638.8(c) and (d).

(2) Systems to be Commissioned

(i) All base building Heating, Ventilating, and Air-Conditioning (HVAC) systems, equipment and components that affect energy use must be commissioned.

(ii) All indoor air quality systems that affect the operation of the HVAC ventilation system of the base building must be commissioned.

(iii) The following list of systems, equipment and components must be commissioned:

(a) Chillers, unitary and split-air conditioners, boilers, furnaces, and domestic hot water and service hot water heaters;

(b) Cooling towers, fans, pumps, heat exchangers;

(c) Controls for central plant and for HVAC, including, if present, the energy management system or the portion of the building automation system (BAS) that affects energy use;

(d) Ducts and associated dampers;

(e) Piping and associated valves;

(f) Duct insulation and pipe insulation;

(g) Duct system protection during construction, as related to indoor air quality;

(h) Air quality monitoring systems as they relate to ventilation systems;

(i) Renewable and alternative energy technologies, as appropriate per mechanical plant definition;

(j) Waste heat recovery; and

(k) Thermal storage.

(iv) In addition to the systems, equipment and components listed in paragraph (iii), other systems, equipment and components that are used for heating, cooling, or ventilation and that affect energy use or indoor air quality must also be commissioned.

(c) Responsibilities of Primary Participants in Commissioning

NOTE: FURTHER CLARIFICATION OF THE ROLES AND RESPONSIBILITIES CAN BE FOUND IN SECTION TITLED "COMMISSIONING RESPONSIBILITIES"

CONSTRUCTION MANAGER: THE ROLE OF THE CONSTRUCTION MANAGER (CM) HAS BEEN DESCRIBED IN THE ROLES AND RESPONSIBILITIES, WHICH CAN BE FOUND IN SECTION TITLED "COMMISSIONING RESPONSIBILITIES"

(1) **Designers.** The individuals or the firms that design each system to be commissioned must prepare in writing the following: (1) Design Intent,
(2) Basis of design and
(3) Full sequences of operation for all equipment and systems, all of which must meet the requirements of this subpart and industry standards.

(2) **Commissioning Agent**. The commissioning agent must perform the functional testing of equipment, documented by the commissioning authority, using forms approved by the commissioning authority, all of which must meet the requirements of this subpart and industry standards.

NOTE: FOR THE PURPOSE OF THESE GUIDELINES THE CONTRACTOR WILL BE REPONSIBLE FOR THE ROLE, TASKS AND REPONSIBILITIES OF THE COMMISSIONING AGENT.

(3) **Commissioning Authority**

(i) The commissioning authority must:

(a) Develop a commissioning plan, and

(b) Document performance (i.e., determine and document whether systems, equipment and components are functioning in accordance with the documented Design Intent and in accordance with the construction documents).

(c) For the purposes of this subpart, the commissioning authority (CA) cannot be responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management.

(d) Review and approve the Design Intent, basis of design, and sequence of operation. Commissioning authority approval is solely for the purpose of ensuring that sufficient information is contained therein to perform commissioning and must not constitute approval for any other purpose.

(e) Develop, or assist with developing and approve, or review and approve, the following written work products:

(1) Commissioning specifications designed;
(2) Commissioning plan;
(3) Start-up and check-out checklists and procedures;
(4) Functional performance testing procedures and checklists;
(5) Testing, adjusting, and balancing (TAB) plan;
(6) Operations and maintenance manual;
(7) Systems and energy management manual; and
(8) Commissioning Report.

Commissioning authority approval is solely for the purpose of ensuring that the above are in accordance with the commissioning requirements and must not constitute approval for any other purpose.

(4) Verify and document installation of systems, equipment and components. This activity must ensure the following:

(i) That systems, equipment and components are installed according to construction documents and manufacturer's instructions,

(ii) That other building systems or components are not compromising the efficacy of the systems or features being commissioned, and

(iii) That any required differences between the final installation and the original construction documents are documented.

(5) Verify, document, and approve that the start-up and checkout were completed and performed as required by Section 638.8(h).

(6) Witness all or part of the HVAC piping test and flushing procedure, sufficient to be confident that proper procedures were followed. Document this testing and verify that this documentation is included in operations and maintenance manuals. Notify owner of any deficiencies in results or procedures.

(7) Witness all or part of any duct testing and cleaning procedures, sufficient to be confident that proper procedures were followed. Document this testing and verify that this documentation is included in operations and maintenance manuals. Notify owner of any deficiencies in results or procedures.

(8) Witness sufficient functional testing of the control system and approve it to be used for TAB, before TAB is executed.

(9) Verify, document, and approve that functional performance tests were performed as required by this subpart. See Section 638.8(i) for details.

(10) Maintain a master log for deficiencies and resolutions, and maintain a separate testing record. Provide to the owner written progress reports regarding issues related to the commissioning (e.g., progress being made, issues to resolve, milestones met, test results, recommended actions).

(11) Review the operations and maintenance manual for the completeness of all features components, equipment, subsystems, and systems that are commissioned in accordance with this part.

(12) Oversee and approve the training of the owner's operations and maintenance personnel. See Section 638.8(j) for details.

(13) Verify, document and approve required seasonally- deferred testing and corrections of any deficiencies. Document final testing and verify that this documentation is included in the commissioning report and in operations and maintenance manuals.

(14) Return to the site between six months and one year of building occupancy and review with facility staff the then current building operation and all outstanding issues related to the original commissioning and any seasonally deferred testing. Also interview facility staff and identify problems or concerns they have with operating the building as originally intended. Make suggestions for improvements and for recording these changes in the operations and maintenance manual and in the systems and energy management manual. Compliance with this subparagraph is required before the submission of the eligibility certificate for the second taxable year for which the green building credit is claimed.

(d) Qualifications of the Commissioning Authority and Commissioning Agent

(1) The commissioning authority's primary representative that will be fulfilling the responsibilities of the commissioning authority must have a professional engineer's license earned for mechanical engineering and must have a minimum of 5 years of experience in HVAC engineering.

(2) The commissioning authority must approve the qualifications of the commissioning agent.

(3) The commissioning agent and commissioning authority may be the same organization or person.

NOTE: FOR THE PURPOSE OF THESE GUIDELINES DASNY DOES NOT ALLOW THE COMMISSIONOING AUTHORITY AND THE COMMISSIONING AGENT TO BE THE SAME ORGANIZATION OR PERSON

(4) A qualified member of the architecture or engineering firm or company that performs the design may act as the commissioning authority; however, such an individual must not be responsible for any aspect of the project design, or construction management or supervision for the subject building. In addition, reporting of all conditions and findings must be immediate and direct from the commissioning authority to the owner.

NOTE: FOR THE PURPOSE OF THESE GUIDELINES DASNY DOES NOT ALLOW THE DESIGN PROFESSIONAL AND THE COMMISSIONING AUTHORITY TO BE THE SAME ORGANIZATION OR PERSON. THE OWNER, HOWEVER, MAY EXECUTE A SEPARATE CONTRACT WITH A QUALIFIED MEMBER OF THE DESIGN PROFFESIONAL'S FIRM TO PROVIDE THE SERVICES OF THE COMMISSIONING PROFFESIONAL, AS PROVIDED FOR BY 6NYCRR PART 638, SECTION 638.8(d)(4).

(e) Design Intent and Basis of Design

A Design Intent narrative and a Basis of Design narrative must be developed.

(1) An overall Design Intent narrative is required for the following:

(i) Space temperature and humidity criteria;

(ii) Thermal zoning criteria;

(iii) Level of occupant control over HVAC systems (e.g., direct local control at the space level, control only at a central energy management system level)

(iv) Ventilation requirements and related indoor air quality criteria;

(v) Performance criteria related to energy efficiency;

(vi) Environmental responsiveness of the facility; and

(vii) Commissioning criteria.

(2) The Basis of Design must include at a minimum the following:

(i) Occupancy;

(ii) Space and process requirements;

(iii) Applicable codes, policies, and standards;

(iv) Design assumptions (e.g., heating/cooling load, and climatic);

(v) Performance standards, benchmarks or metrics;

(vi) Interaction between systems affecting intended performance; and

(vii) Control system appropriate for the skill of the operations and maintenance staff.

The Design Intent and basis of design must become part of the operations and maintenance manual and of the systems and energy management manual.

(f) Commissioning Plan

(1) A commissioning plan covering a given system, equipment or component is required before such system, element or component is commissioned.

(2) The commissioning plan must address the following:

(i) An overview of the tasks to be executed during commissioning;

(ii) A list of all features to be commissioned;

(iii) a list of reference documents related to commissioning, including specification references, drawing list, and submittal drawings;

(iv) a list of primary participants in the commissioning process and their responsibilities;

(v) A plan for management, communication and documentation;

(vi) An outline of the scope of the commissioning process, including submittal review, inspection, start-up, testing, training, operations and maintenance manual, systems and energy management manual;

(vii) A brief description of the checklists and tests to be performed, with reference to specific pre-start and start-up checklists;

(viii) A list of the functional performance tests to be performed to verify proper operation of all commissioned systems, including prerequisite activities and reference to specific checklists or worksheets which are necessary;

(ix) Where the commissioning authority is not the commissioning agent, a description of the process to be performed by the commissioning authority to verify that the systems are operating as indicated in the documentation provided by the commissioning agent;

(x) A brief description of the content of the training to be provided to the operations and maintenance personnel;

(xi) The expected written work products, including checklist, worksheets, and testing procedures; and

(xii) An activity schedule.

(g) Commissioning Specifications

(1) Commissioning specifications must be included in the construction documents.

(2) The commissioning specifications must include the following:

(i) Scope and details of the commissioning process;

(ii) Qualifications and skills required by the commissioning agent;

(iii) A detailed description of the responsibilities of all parties included in the commissioning process;

(iv) Systems, equipment and components to be commissioned;

(v) Requirements for pre-functional checklist and start-up;

(vi) The functional performance testing process;

(vii) Specific functional performance test requirements, including testing conditions and acceptance criteria for each piece of equipment being commissioned;

(viii) Provisions for resolving deficiencies;

(ix) Requirements for reporting and documentation for commissioning;

(x) Requirements for training;

(xi) requirements for operations and maintenance manual, and for systems and energy management manual; and

(xii) Schedule.

(h) Start-up and Checkout

Start-up and checkout must comprise the checks and tests to determine that all components, equipment, subsystems, systems, and interfaces between systems operate in accordance with

construction documents. In this context, “operate” includes all modes and sequences of control operation, Interlocks and conditional control responses, and specified responses to abnormal or emergency conditions.

(1) The results of the start-up and check-out must be documented and must be performed according to:

(i) The manufacturer’s written instructions for the systems and equipment being commissioned, and

(ii) The construction documents.

(2) A certificate of readiness must be prepared by the contractor and delivered to the commissioning authority stating that start-up and checkout have been successfully completed and that all equipment, systems, and controls are complete and ready for functional performance testing.

(i) The commissioning authority must verify that initial start-up and check-out were successfully completed.

(ii) The commissioning authority must verify that every point of the control system was checked and that every control point is commanding, reporting and controlling as specified in the construction documents. Verification must include a minimum sample of each type of control point. In addition, the controls that are verified must be within a minimum sample of each type of component, equipment, subsystem and system where the sensor type is installed. If any control point in the minimum sample is not commanding, reporting and controlling as specified in the construction documents, then an additional minimum sample of each type of control found not to be performing must be checked, until all control points in a minimum sample are found to be performing as specified.

(iii)The commissioning authority must verify that all sensors have been calibrated so that the value reported in the control system represents the actual local value. Verification must include re-calibrating a minimum sample of each type of sensor. In addition, the sensors that are re-calibrated must be within a minimum sample of each type of component, equipment, subsystem and system where the sensor type is installed.

If any sensor in the minimum sample is out of calibration, then an additional minimum sample of each type of sensor found to be out of calibration must be re-calibrated, until all sensors in a minimum sample are found to be in calibration.

(iv)The commissioning authority must verify that all actuators have been adjusted to fully close and open dampers and valves, and also must verify by visual observation that the reported values in the control system are correct. Verification must include checking the operation of a minimum sample of each type of actuator, valve, and damper. In addition, the actuator, valve, and damper must be within a minimum sample of each type of component, equipment, subsystem and system where the type of actuator, valve, and damper is installed. If any actuator, valve, or damper in the minimum sample does not operate as required in the construction documents, then an additional minimum sample of each type of actuator, valve, or damper found not to be operating as required must be verified until all actuators, valves, or dampers in a minimum sample are found to be to be operating as required.

(v) The commissioning authority must verify the TAB by re-measuring a minimum sample of values reported for each type of component, equipment, subsystem, or system in the TAB reports. In addition, the values that are re-measured must be within a minimum sample of each type of subsystem and each type of system. If any re-measured value in the minimum sample deviates from the values in the TAB report or from the requirements in the construction documents by more than 10 percent, then an additional minimum sample must be re-measured for each type of component, equipment, subsystem or system for which there is a deviation, until all re-measured values in a minimum sample are within 10 percent of the values in the TAB report or of the requirements in the construction documents.

(vi) The commissioning authority must:

(a) Check that chimneys, chimney connectors and stacks are free of cracks, blockages and leaks;

(b) Ensure that proper combustion air is provided to the HVAC equipment;

(c) Ensure that all appliances are installed in accordance with applicable fire safety and local building codes; and

(d) Witness the testing of air tightness of smoking areas (if any), and document that all air leaks, if any, were sealed.

(i) Functional Performance Testing

(1) Written, repeatable test procedures must be prepared specifically for the project and must be used to functionally test equipment, components, subsystems, systems, and sequences and

modes of operation. Test procedures must be documented to describe the individual test procedure, the expected system response, and acceptance criteria for each procedure.

(2) Testing documentation must identify the actual system response and must provide any pertinent observations or discussion.

(3) After initial check-out has been verified and approved by the commissioning authority, then the following must be tested:

(i) Each sequence in the sequence of operations must be tested. Additionally, other significant modes, sequences and control strategies not mentioned in the written sequences must be tested. The testing must include the following:

(a) Start-up;
(b) Shutdown;
(c) Unoccupied and manual modes;
(d) Modulation up and down the unit's range of capacity, if applicable;
(e) Staging, if applicable;
(f) Power failure/power down;
(g) Alarms;
(h) Backup upon failure; and

(i) Interlocks with other equipment.

(ii) The functional performance of each type of component, equipment, subsystem, and system must be tested using a minimum sample for each type of component, equipment, subsystem and system. If any component, equipment, subsystem or system in the minimum sample is found not to operate as required in the construction documents, then an additional minimum sample of each type found not to be operating as required must be tested until all units in a minimum sample are found to be operating as required.

(iii) Equipment must be tested to demonstrate performance under near-design conditions. To this end, tests on respective HVAC equipment and systems must be executed during both the heating and cooling season. However, overriding of control values to simulate cooling conditions during the heating season, and heating conditions during

the cooling season is allowed where it would not affect the demonstrated performance required in the construction documents for the component, equipment, subsystem, system, or mode or sequence of operation being tested. Where the conditions listed above in this paragraph are not met, seasonally deferred testing must be undertaken.

(iv) The central plant (heating and cooling) must have its efficiency recorded for later reference by operations staff.

(v) Functional performance testing must be done using manual methods, or control system trend logs and read-outs, or stand-alone data loggers, as deemed appropriate by the commissioning authority.

(j) Training

(1) The commissioning authority must assemble written verification that training of operations and maintenance personnel was conducted for all commissioned features and systems.

(2) The training program for operations and maintenance personnel must include instructional and demonstration portions.

(3) The owner must identify for the purpose of training the specific in-house personnel or contracted organization that will be responsible for the operations and maintenance for the building. Training must be performed within six months of the date that either the initial or subsequent statement of commissioning certification, as appropriate as determined by the commissioning authority, has been executed. Qualified personnel must perform training for a sufficient duration of time to ensure that facility staff for the building has all the information they need to properly operate, maintain and replace each feature or system that is commissioned.

(4) In addition, if operations and maintenance personnel change during the period that the tax credit provided for in this part is taken; the replacement personnel must receive the training required by these regulations. Written verification that this training was conducted must be maintained.

(5) The operations and maintenance manual, and the systems and energy management manual must be available for and used for the training.

(6) The instructional portion of the training program must cover at least the following:

(i) General purpose of each building system (i.e., Design Intent) including theory of

operation, capabilities and limitations, and modes of control and sequences of operation in the subject building;

(ii) Use of the operations and maintenance manual and of the systems and energy management manual;

(iii) Review of control drawings and schematics;

(iv) Procedures for start-up, shutdown, seasonal changeover, normal operation, unoccupied operation, and manual operation;

(v) Controls set-up and programming;

(vi) Troubleshooting;

(vii) Alarms;

(viii) Interactions with other systems;

(ix) Operational monitoring and record keeping, including what should be monitored, what useful information can come from monitored data, and why that information is important to analyzing system operation;

(x) Adjustments and optimizing methods for energy conservation;

(xi) Relevant health and safety issues;

(xii) Inspection, service, and maintenance requirements for each system, including any requirements for special skills and knowledge that may best be met by specialized service contractors;

(xiii) Sources for replacement parts/equipment;

(xiv) Tenant interaction issues; and

(xv) Why certain features are environmentally responsive (i.e., save energy, improve indoor air quality (IAQ), reduce toxic materials, reduce waste).

(7) The demonstration portion of the training program must include at least the following:

(i) Operation of each system, or typical examples if there are several similar systems in the building;

(ii) Start-up and shutdown procedures, operation under all specified modes of control and sequences of operation, and the correct procedures under emergency or abnormal conditions; and

(iii) Procedures necessary for effective operational monitoring, as appropriate, but particularly for projects with direct digital control systems incorporating trending and graphing features.

(k) Manuals

(1) Operations and maintenance (O&M) manual

(i) The operations and maintenance data must be complete and must be accessible by the operations and maintenance personnel and the owner.

(ii) The operations and maintenance manual must include for each piece of equipment and each system:

(a) The name, address and telephone number of the manufacturer or vendor and installing contractor;

(b) Submittal data; and

(c) Operations and maintenance instructions with the models and features for the subject site clearly marked.

(iii) The operations and maintenance manual must be edited to include only data for equipment that is actually installed. The data must include the following:

(a) Instructions for installation, maintenance, replacement, start-up;

(b) Special maintenance requirements and sources for replacement parts/equipment;

(c) Parts list;

(d) List of special tools required;

(" Performance data; and

(f) Warranty information.

(iv) The manual must also include an as-built documentation package for controls that includes information related to the following:
(a) normal operation;
(b) shutdown;
(c) unoccupied operation;
(d) seasonal changeover;
(e) manual operation;
(f') controls set-up and programming;
(g) troubleshooting;
(h) alarms;
(i) control drawings and schematics; and
(j) final sequences of operation.

(2) Systems and Energy Management Manual

(i) In addition to the operations and maintenance manual and the commissioning report, a systems and energy management manual must be developed and delivered to the owner.

(ii) The following components must be included in the systems and energy management manual even though some parts may also be found in the operations and maintenance manual:

(a) Narratives for the final Design Intent and basis of design, including brief descriptions of each system;

(b) Final sequences of operations for all equipment;

(c) Procedures for seasonal start-up and shutdown, manual and restart operation;

(d) As-built control drawings;

(e) For all energy-saving features and strategies, rationale description, operating instructions, and caveats about their function and maintenance relative to energy use;

(f) Recommendations and brief method for appropriate accounting of energy use of the whole building.

(g) Recommendations for recalibration frequency of sensors and actuators by type and use;

(h) Plans for continuous commissioning or recommended frequency for re-commissioning by equipment type, with reference to tests conducted during initial commissioning;

(i) Recommendations regarding seasonal operational issues affecting energy use;

(j) List of all user-adjustable set points and reset schedules, with a discussion of the purpose of each and the range of reasonable adjustments with energy implications;

(k) Schedule of how frequently to review the various set points and reset schedules to ensure they still are at current, relevant, and efficient values;

(l) List of time-of-day schedules and a frequency to review them for relevance and efficiency;

(m) Guidelines for establishing and tracking benchmarks for building energy use and primary plant equipment efficiencies;

(n) Guidelines for ensuring that future renovations and equipment upgrades will not result in decreased energy efficiency and will maintain the Design Intent;

(o) List of diagnostic tools, with a description of their use, that will assist facility staff for the building in operating equipment more efficiently; and

(p) A copy of the commissioning report; and

(q) Index of all commissioning documents with notation as to their location.

(l) Commissioning Report

(1) After all commissioning tasks except seasonally deferred testing have been completed, a commissioning report must be delivered to the owner.

(2) The report must include:

(i) an executive summary;

(ii) list of participants and their respective roles;

(iii) a brief building description;

(iv) an overview of the scope of commissioning and testing;

(v) a general description of testing and verification methods; and

(vi) a list of each feature or system commissioned.

(3) For each piece of commissioned equipment, the report must contain the determination of the commissioning authority regarding the adequacy of the equipment, documentation and training.

(4) The commissioning report must address the following areas:

(i) Adequacy of equipment with respect to construction documents and Design Intent;

(ii) Equipment installation;

(iii) Functional performance and efficiency;

(iv) Equipment documentation;

(v) Operations and maintenance review and recommendations; and

(vi) Operator training.

(5) The functional performance and efficiency section for each piece of equipment must identify the verification method used (manual testing, trend logs of the building automation system, data loggers) and must include observations and conclusions from the testing.

(6) The report must also include a list of outstanding commissioning issues and any testing that is scheduled for a later date due to weather conditions (i.e., seasonally deferred testing).

(i) All outstanding deficiencies identified during or as a result of commissioning activities as required by this subpart must have been corrected or must be separately listed and highlighted in the commissioning report.

(ii) Each non-compliance issue must be referenced to where the deficiency is documented (e.g., the specific functional test, inspection, trend log).

(7) Appendixes must contain acquired sequence documentation, logs, meeting minutes, progress reports, deficiency lists, site visit reports, findings, unresolved issues, communications, and other relevant information. Documentation must be provided in a separate labeled binder for the following:

(i) Start-up and checkout in accordance to Section 638.8(h)

(ii) Functional performance testing (along with blank forms for the operators), and

(iii) As available, data obtained from monitoring, and analysis of those data.

(8) If components, equipment, subsystems, systems, controls, or sequences of operations as-built are different than required in the original construction documents, then the commissioning report must list these differences. In addition, the commissioning report must state that the computer models used to calculate energy use to demonstrate compliance with this Part must be revised to reflect the difference listed between the as-built conditions and original modeling assumptions and inputs and the listed deficiencies which have not been corrected. The commissioning report must also state that the revised energy models must be re-run to demonstrate that the energy performance is in compliance with the energy use provisions specified in Section 638.7(c).

(9) Once the seasonally deferred testing has been completed, the Commissioning Authority must issue an addendum to the commissioning report, or must re-issue the commissioning report, using the same criteria and methods as in the initial commissioning report.

NOTE: FOR THE PURPOSE OF THESE GUIDELINES DASNY REQUIRES A SECTION BE INCLUDED IN THE COMMISSIONING REPORT FOR DOCUMENTING THE COMMISSIONING AUTHORITIES REVIEWS OF THE DRAWING AND SPECIFICATION AT EACH OF THE PHASE AS NOTED. THIS SECTION SHALL INCLUDE BOTH DESIGN AND CONSTRUCTION.DOCUMENT REVIEW.

TABLES

This section includes the following:

Table 1
Commissioning Process & Delivery Approach Chart

Table 2
Commissioning Activity Check List

Commissioning Process & Delivery Approach

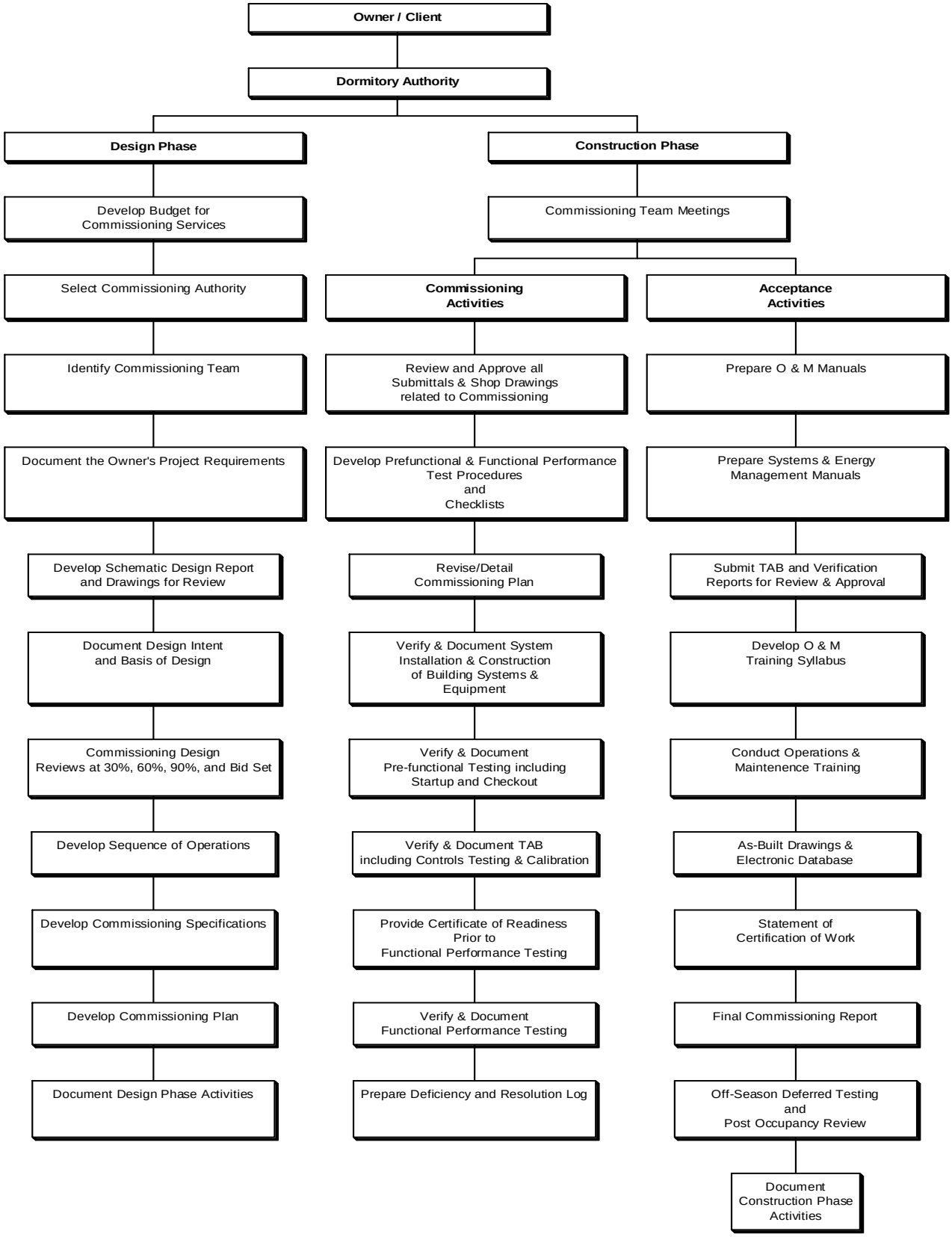


Table 1

		DASNY			DESIGN CONSULTANTS				
Commissioning Process	**Owner Client**	**PM**	**IFMIS**	**QA**	**Architect**	**Engineer**	**Commissioning Authority**	**Construction Manager**	**Commissioning Agent**
I. Design Phase									
Develop budget for commissioning services	▫	■	▫	□	□	□	□	□	□
Select commissioning authority	▫	■	■	□	□	□	□	□	□
Identify commissioning team	□	▫	▫	□	□	□	■	□	□
Document Owners Project Requirements	□	□	□	□	■	■	□	□	□
Schematic design report and drawings for review	□	□	□	□	■	■	□	□	□
Design Intent & Basis of Design	□	□	□	□	■	■	□	□	□
Cx Design Review @ (30-60-90% & Bid Set)	▫	□	□	▫	□	□	■	▫	□
Participate Design Review Mtgs	■	■	■	■	■	■	■	■	□
Identify systems requiring commissioning	□	□	□	□	▫	▫	■	□	□
Develop Sequence of Operations	□	□	□	□	■	■	□	□	□
Develop commissioning specifications	□	□	□	□	■	■	▫	□	□
Develop commissioning plan	□	□	□	□	□	□	■	□	□
Prepare CD in compliance with Design Intent, Basis of Design, Sequence of Operations & Cx Plan	□	□	□	□	■	■	□	□	□
Develop Project schedule include Cx Process	□	□	□	□	□	□	▫	■	□
Document design phase activities	□	□	□	□	□	□	■	□	□
II. Construction Phase									
Commissioning Team Progress Mtgs	■	■	■	▫	■	■	■	■	■
Review Commissioning agent(s) qualifications	▫	■	□	□	▫	▫	■	■	□
Submittals & Shop Dwg Review for Cx Systems	□	□	□	□	■	■	■	■	▫
Pre-functional test including start-up & Check out proceedures	□	□	□	□	▫	▫	■	□	▫
Testing Adjusting & Balancing Plan Review	□	□	□	□	■	■	■	▫	▫
Functional Performance Testing procedures	□	□	□	□	▫	▫	■	□	▫
Final Commissioning Plan	□	□	□	□	□	□	■	□	□
Commissioning Activities:									
Installation of systems, equipment and components	□	□	□	□	□	□	▫	▫	■
Pre-functional testing - start-up and checkout	□	□	□	□	□	□	▫	▫	■
HVAC pipe testing and flushing	□	□	□	□	□	□	▫	▫	■
Duct testing and cleaning	□	□	□	□	□	□	▫	▫	■
Testing of the controls system before TAB	□	□	□	□	□	□	▫	▫	■
Testing, Adjusting & Balancing (TAB)	□	□	□	□	□	□	▫	▫	■
Certificate of Readiness prior to FPT	□	□	□	□	□	□	▫	■	■
Functional performance testing	□	□	□	□	□	□	■	▫	▫
Generate Deficiencies Log	□	□	□	□	□	□	■	▫	□
Acceptance Activities:									
O&M Manuals	□	□	□	□	▫	▫	□	■	■
Sytems & Energy Management Manuals	□	□	□	□	□	□	■	□	□
O&M Training Syllabus	□	□	□	□	□	□	■	▫	▫
O&M Training	□	□	□	□	□	□	▫	■	■
Final TAB and verification reports	□	□	□	□	□	□	▫	▫	■
Functional Performance testing and reporting	□	□	□	□	□	□	■	□	▫
Statement of Certification of Work	□	□	□	□	□	□	■	□	□
Commissioning report	□	□	□	□	□	□	■	□	□
Off -season deffered testing	□	□	□	□	□	□	■	▫	▫
Post-Occupancy Review & Documentation	▫	▫	▫	□	□	□	■	▫	▫
As-built record drawings & electronic database	□	□	□	□	■	■	□	■	□
Document construction phase activities	□	□	□	□	□	□	■	□	□

■ Primary Participant for task

▫ Assist in the Task

Table 2

APPENDIX

The following section includes the following:

Appendix 1
Construction Phase Application Forms

Appendix 2
Specification Structure

Appendix 3
New York State Executive Order 111

APPENDIX 1

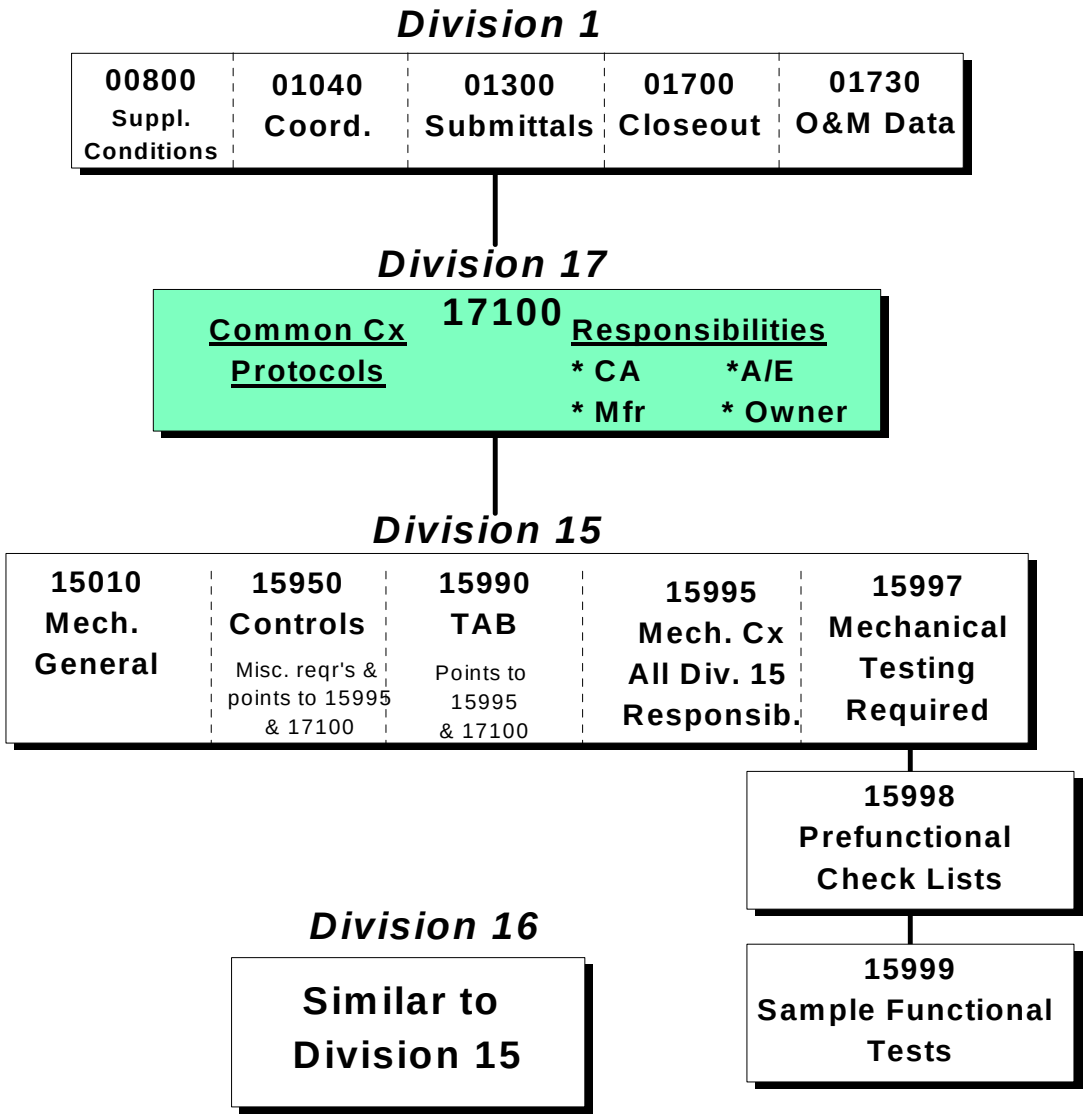
Construction Phase Application Forms

Form Number	Description	Name
*** C-1**	**Commissioning Issues Log**	**ISSULOG.C01**
C-2	Request for Documentation and Record of Submissions	DOCREQC2.XLS
C-3a	Commissioning Test or Review Approval	APROVAL2.C3A
C-3b	Commissioning Prefunctional Check Submittal/Approval	PCSUBMIT.C3B
C-3c	Commissioning Transmittal	TRANSMIT.C3C
C-3d	Commissioning Request for Information	INFOREQ.C3D
C-3e	Commissioning Memorandum	MEMORAND.C3E
C-3f	Submittal for Sequences & Test Forms	SUBFTFRM.C3F
*** C-4**	**Commissioning Progress Report**	**PROGREPT.C04**
Training	Project Training and Orientation Procedures	TRAINPRO.CED
C-5a	Overall Staff Training and Orientation Plan	TRAINPLN.C5A
C-5b	Training and Orientation Agenda	TRAINAGE.C5B
C-5c	Staff Training and Orientation Record	TRAINREC.C5C
C-6	Commissioning Corrective Action Report	CORECTON.C06
C-7	Commissioning Progress Record	RECORDC7.XLS
C-8	Plan and Documentation Requirements for Startup and Initial Checkout	STARTPLN.C08
C-9	Detailed Commissioning Schedule (blank)	TIMEBLC9.XLS
C-10	Detailed Commissioning Schedule (filled in)	TIMEFC10.XLS
C-11	Commissioning Functional Testing Plan Overview	FTOVRVU.C11
C-12	Phasing of Commissioning Testing	PHASES.C12
C-13	Owner-Contracted Tests	OWNRTEST.C13
C-14	Facility Staff Participation in Commissioning	STAFPART.C14
C-15	Functional Testing Scope Outline (example)	SCOPEFIL.C15
C-16	Commissioning Formal Written Work Products	PRODUCTS.C16
C-17	Commissioning Record Notebook Format	BOOK_C17.XL

**** Forms to be submitted to DASNY IFMIS Staff on a monthly basis during the complete Commissioning Process***

APPENDIX 2

Specification Structure



State of New York

Executive Chamber

No. 111

EXECUTIVE ORDER

DIRECTING STATE AGENCIES TO BE MORE ENERGY EFFICIENT AND ENVIRONMENTALLY AWARE "GREEN AND CLEAN STATE BUILDINGS AND VEHICLES"

WHEREAS, New York is dedicated to the mutually compatible goals of environmental protection and economic growth;

WHEREAS, New York has adopted measures designed to allow energy markets to operate more competitively and has significantly reduced taxes in order to reduce energy costs and encourage continue economic growth;

WHEREAS, the generation and use of energy has a significant impact on the environment, contributing to emissions of sulfur dioxide, nitrogen oxides, greenhouse gases, and other pollutants;

WHEREAS, State government is a major consumer of energy, spending approximately $300 million per year and purchasing approximately 1500 new vehicles annually with a concomitant impact on the environment; and

WHEREAS, it is appropriate that State government assume a leadership role in promoting the efficient use of energy and natural resources in the interest of the long-term protection and enhancement of our environment, our economy, and the health of our children and future generations of New Yorkers,

NOW, THEREFORE, I, GEORGE E. PATAKI, Governor of the State of New York, by virtue of the authority vested in me by the Constitution and Laws of the State of New York, do hereby order as follows:

I New Energy Efficiency Goals.

All agencies and departments over which the Governor has Executive authority, and all public benefit corporations and public authorities the heads of which hare appointed by the Governor (hereinafter referred to as "State agencies and other affected entities"), shall seek to achieve a reduction in energy consumption by all buildings they own, lease or operate of 35 percent by 2010 relative to 1990 levels. All State agencies and other affected entities shall establish agency-wide reduction targets and associated schedules to reach this goal and shall also be responsible for establishing peak electric demand reduction targets for each state facility by 2005 and 2010. No buildings will be exempt from these goals except pursuant to criteria to be developed by the New York State Energy Research and Development Authority ("NYSERDA"), in consultation with the Division of the Budget ("DOB"), the Office of General Services ("OGS") and the Advisory Council on State Energy Efficiency ("Advisory Council") as established herein.

II State Buildings Energy Efficiency Practices.

A. Existing Buildings.

Effective immediately, State agencies and other affected entities shall implement energy efficiency practices with respect to the operation and maintenance of all buildings that they own, lease or operate. Such practices may include, but shall not be limited to: (1) shutting off office equipment when it is not being used; (2) adjusting the setting of space temperatures; (3) turning off lighting in unoccupied areas; (4) inspecting and re-commissioning or re-tuning heating, air conditioning and ventilation equipment to ensure optimal performance; and (5) cycling and restarting equipment on a staggered basis to shed electricity loads and minimize peak electricity demand usage. State agencies and other affected entities shall strive to meet the ENERGY STAR® building criteria for energy performance and indoor environmental quality in their existing buildings to the maximum extent practicable. Within 180 days of the date of this Executive Order, NYSERDA shall develop guidelines to help agencies and other affected entities implement energy efficiency practices in their buildings.

B. New Buildings and Substantial Renovation of Existing Buildings.

In the design, construction, operation and maintenance of new buildings, State agencies and other affected entities shall, to the maximum extent practicable, follow guidelines for the construction of "Green Buildings," including guidelines set forth in Tax Law § 19, which created the Green Buildings Tax Credit, and the U.S. Green Buildings Council's LEED™ rating system. Effective immediately, State agencies and other affected entities engaged in the construction of new buildings shall achieve at least a 20 percent improvement in the energy efficiency performance relative to levels required by the State's Energy Conservation Construction Code, as amended. For substantial renovation of existing buildings, State agencies and other affected entities shall achieve

at least a ten percent improvement. State agencies and other affected entities shall incorporate energy-efficient criteria consistent with ENERGY STAR® and any other energy efficiency levels as may be designated by NYSERDA into all specifications developed for new construction and renovation.

III Procurement of Energy-Efficient Products.

Effective immediately, State agencies and other affected entities shall select ENERGY STAR® energy-efficient products when acquiring new energy-using products or replacing existing equipment. NYSERDA shall adopt guidelines designating target energy efficiency levels for those products for which ENERGY STAR® labels are not yet available.

IV Purchase of Power from Renewable Sources.

State agencies and other affected entities with responsibility for purchasing energy shall increase their purchase of energy generated from the following technologies: wind, solar thermal, photovoltaics, sustainably managed biomass, tidal, geothermal, methane waste and fuel cells. State agencies and other affected entities shall seek to purchase sufficient quantities of energy from these technologies so that 10 percent of the overall annual electric energy requirements of buildings owned, leased or operated by State agencies and other affected entities will be met through these technologies by 2005, increasing to 20 percent by 2010. No agency or affected entity will be exempt from these goals except pursuant to criteria to be developed by NYSERDA, in consultation with DOB, OGS and the Advisory Council.

V Procurement of Clean Fuel Vehicles.

State agencies and other affected entities shall procure increasing percentages of alternative-fuel vehicles, including hybrid-electric vehicles, as part of their annual vehicle acquisition plans. By 2005, at least 50 percent of new light-duty vehicles acquired by each agency and affected entity shall be alternative fueled vehicles, and by 2010, 100 percent of all new light-duty vehicles shall be alternative-fueled vehicles, with the exception of specialty, police or emergency vehicles as designated by DOB. State agencies and other affected entities that operate medium- and heavy-duty vehicles shall implement strategies to reduce petroleum consumption and emissions by using alternative fuels and improving vehicle fleet fuel efficiency.

VI Role of NYSERDA and Creation of the Advisory Council on State Energy Efficiency.

NYSERDA shall coordinate implementation of this Executive Order and shall assist each agency and affected entity in the fulfillment of the responsibilities imposed herein in a cost-effective manner. To assist NYSERDA in fulfilling the requirements imposed by this Executive Order, there is hereby established an Advisory Council on State Energy Efficiency consisting of the following members, who shall serve *ex officio*: the President of NYSERDA; the Director of the Division of the Budget; the Commissioners of OGS, the Department of Environmental Conservation, the

Department of Correctional Services, the Office of Mental Health and the Department of Transportation; the Chairman of the Public Service Commission; the Chancellor of the State University of New York; the Secretary of State; the Chairman of the New York Power Authority; the Chairman of the Metropolitan Transportation Authority; the Executive Director of the Dormitory Authority; and the President of the Long Island Power Authority. The President of NYSERDA shall serve as the chair of the Advisory Council. The members of the Advisory Council may designate one or more persons to act as their designee(s). The Advisory Council shall meet regularly, but no less than twice a year, for the purpose of advising NYSERDA as to how it can best assist State agencies and other affected entities in achieving the goals of this Executive Order with the greatest degree of cooperative effort and effectiveness. Members of the Advisory Council shall receive no compensation but shall be entitled to reimbursement for any necessary expenses incurred in connection with the performance of their responsibilities.

VII Assistance and Cooperation.

Every agency and department over which the Governor has executive authority, and all public benefit corporations and public authorities the heads of which are appointed by the Governor, shall provide all reasonable assistance and cooperation requested by NYSERDA and the Advisory Council for the purpose of carrying out this order. Such assistance may include the assignment of staff and the provision of support services.

VIII Participation of other governmental entities.

Local governments and school districts that are not subject to the requirements of this Executive Order are encouraged to review their energy efficiency practices and procedures, to institute appropriate operational and maintenance modifications, and to accelerate the implementation of energy efficiency projects. NYSERDA, OGS, the New York Power Authority and the Long Island Power Authority are hereby directed to offer any assistance as may be appropriate to assist local governments and school districts to achieve the goals of this Executive Order, including, but not limited to, assistance with procurement.

IX Repeal of Prior Executive Order.

Executive Order No. 132, promulgated on January 2, 1990, and continued unamended and unmodified, is hereby revoked and superseded by this Executive Order as of the date hereof.

GIVEN under my hand and the Privy Seal of the State in the City of Albany this tenth day of June in the year two thousand one.

BY THE GOVERNOR

George E. Pataki

REFERENCES

The following section includes the following:

Definitions

Reference Standards

Revisions

DEFINITIONS

Acceptable Performance - A component or system that is able to meet the specified requirements under all ranges of actual loads.

As-built Records - Documents that accurately represent the actual installed conditions, equipment, and systems, such as drawings, computer graphics, equipment data sheets, operation manuals, maintenance manuals, and the training program and videotapes.

Basis of Design - Documentation of the primary concepts and assumptions that have influenced design decisions that were made to comply with the design intent. The "basis of design" specifically describes the systems, components, conditions, and methods chosen to meet the design intent.

Building Systems - The architectural, mechanical, electrical, and control systems along with their respective subsystems, equipment, and components.

Certificate of Readiness - A document stating that all equipment, systems, and controls have been correctly installed; operated as specified, tested, adjusted, and balanced; and are verified as ready for functional performance testing and other acceptance procedures

Commissioning - A quality control process that is to ensure that specified components and building systems have been installed and properly started-up and then functionally tested to verify and document proper operation through all specified modes of operation and conditions, all of which shall perform in conformity with the design intent. In addition, training of operations and maintenance personnel, identified by the owner, is verified, and final project operations and maintenance documents are reviewed for completeness.

Commissioning Agent - The entity responsible for carrying out the detailed planning and implementation of the commissioning process. The commissioning agent can be an individual, an organization, or a team with individuals from more than one organization

Commissioning Authority (CA) - The owner's representative that ensures that the commissioning process is properly carried out. The commissioning authority leads the commissioning process and makes final recommendations to the owner regarding the performance of the commissioned building systems. The commissioning authority can be an individual, an organization, or a team with individuals from more than one organization.

Commissioning Plan - The document prepared for each project that describes all aspects of the commissioning process including schedules, responsibilities, documentation requirements, and functional performance test requirements. The level of detail depends on the scope of commissioning specified.

Commissioning Report - The document prepared during the acceptance phase of the commissioning process after all functional performance tests are completed. It summarizes the results of the commissioning process, including conformance to the contract documents, the design intent and the as-built system performance. It shall include the following:

Executive summary
Building description
Commissioning plan
Copy of the Design Intent document
Copy of the commissioning plan
Copy of the verified TAB report
List of deficiencies outside the scope of the HVAC system that impacts HVAC system performance
Copies of all corrective deficiencies and modification documentation
Copies of all pre-start/start-up check lists
Copies of all completed functional test check lists
List of off-season functional performance test(s) not performed and schedule for their completion.
Design & Construction Document Reviews
IAQ as it Relates to HVAC

Commissioning Specification - The contract document that details the objective, scope, and implementation of the construction and acceptance phases of the commissioning process as developed in the design-phase commissioning plan.

Commissioning Team - Those people responsible for working together in carrying out the commissioning process.

Construction Documents - The documents that contain the requirements for the construction and performance of a building and its components, equipment, systems, and subsystems. This includes, but is not limited to, construction drawings and specifications

Construction Manager - An organization whose role is to manage the construction team and various contractors to build and test the building systems for the project. The construction manager also works with the commissioning authority to identify and correct any deficiencies.

Design Intent - Documentation of the ideas and concepts considered by the owner to be important to the project, based on information gathered during the early stages of design (programming, conceptual, pre-schematic). The design intent must include at a minimum a narrative description of the systems, what the objectives of the systems are and how the systems will meet those objectives. It also should include facility functional and environmental needs. The design intent is developed by the design A/E from descriptions provided by the building owner. The design intent document shall include specifically, but not limited to the following items:

General description of the building type
Building code occupancy category
Particular needs (air purity, outside air volume, noise
Processes that require special environments
Climatic design conditions
Conditioned space and/or Interior design conditions
Relative pressurization of adjacent spaces
Operation and maintenance staff training
Operation and maintenance manual organization
Special systems such as security, video, and voice data systems
Emergency operation during utility outage
Applicable codes
Fire/Life safety requirements
HVAC systems selection
Light levels
Overall building pressurization
Special envelope requirements

Design Professionals - The architects, engineers, or other parties responsible for the design and preparation of documents for the various building systems.

Energy Efficiency Measure - Any equipment, system, or control strategy installed in a building for the purpose of reducing energy consumption and enhancing building performance. An energy efficiency measure may also be called an energy conservation measure.

Functional Performance Test (FPT) - The full range of checks and tests carried out to determine whether all components, subsystems, systems, and interfaces between systems function in accordance with the contract documents. In this context, “function” includes all modes and sequences of control operation, all interlocks, and conditional control responses and all specified responses during design day and emergency conditions.

Operations and Maintenance - The process of sustaining the performance of a building in accordance with design requirements and intent. “Operations” refers to functional activities related to building systems. The scheduling of equipment operation and temperature control are functions of operating a building. “Maintenance” involves servicing equipment so that it will run in accordance with the manufacturer’s intent for at least the duration of its expected service life.

Operations and Maintenance (O&M) Manual - The document that records the information pertinent to the operations and maintenance of the components, equipment, subsystems, and systems for the building, including all the information required by Section 638.8(k)(1).

Owner's Project Requirements – A written document that details the functional requirements of a project and the expectations of how it will be used and operated. These include project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information. (The term *Project Intent* is used by some owners for their Commissioning Process Owner's Project Requirements.)

Pre-Functional Performance Test (P-FPT) - A series of tests for specified equipment or systems, which determine that the systems are installed correctly, started up, and prepared for the functional performance tests. Often these tests are in a checklist format. The pre-functional test checklists may be completed as part of the normal contractor start-up test.

Re-commissioning - The periodic retesting of building systems using the original functional performance tests to ensure the equipment continues to operate as designed.

Seasonal Performance Tests - The full range of test procedures carried out to determine if all components, equipment, systems and interfaces between systems function according to design intent during heating or cooling design days. When it is not practical to perform the test during an actual design day, these conditions may be simulated.

Sequence of Operations - How the systems will react to changing conditions to achieve the proper operation of the system. The sequence must include the intended modes of operation, the steps needed to enact each mode, and the data that determines what, when, and how a step is performed.

Systems and Energy Management Manual - A composite document that expands the scope of the operation and maintenance manual by including the additional information gathered by the commissioning process as required by Section 638.8(k)(2).

System Commissioning - In a narrower sense, the act of statically and dynamically testing the operation of equipment and building systems to ensure they operate as designed and can satisfactorily meet the needs of the building throughout the entire range of operating conditions.

Statement of Certification of Work – A written statement issued certifying that all work has been completed, tested and verified and that all equipment and systems are functional and operational in accordance with the complete contract documents, including, but not limited to, design intent documents, shop drawings, submittals, commissioning plan, commissioning specifications, all systems manuals, operation and maintenance manuals, TAB reports, functional performance testing, and final commissioning report.

Testing, Adjusting, and Balancing (TAB) - The process of checking and adjusting all the heating, cooling and ventilating systems to meet the requirements of the construction documents and design intent. This process includes the following: (1) balancing air and water distribution systems; (2) adjusting the total system to provide design quantities; (3) electrical measurement; (4) establishing quantitative performance of equipment; (5) verifying automatic controls; and, as applicable, (6) sound and vibration measurement.

Verification - The full range of checks and tests carried out to determine if all components, subsystems, systems, and interfaces between systems operate in accordance with the contract documents. In this context, "operate" includes all modes and sequences of control operation, interlocks, conditional control responses, and specified responses to abnormal or emergency conditions.

Volatile Organic Compound (VOC) - (1) A chemical with high vapor pressure that exists as a gas or vapor at ambient temperatures, i.e., with lower boiling point limit between 50 and 100 degrees centigrade and an upper limit between 240 and 260 degrees centigrade and formaldehyde, or (2) any organic compound that participates in atmospheric photochemical reactions.

REFERENCE STANDARDS

ASHRAE The Commissioning Process, ASHRAE Guideline 0-2005
ASHRAE Publications Dept., 1791 Tullie Circle, NE, Atlanta, GA 30329.

ASHRAE HVAC Commissioning Process, ASHRAE Guideline 1-1996, 1996. ASHRAE Publications Dept., 1791 Tullie Circle, NE, Atlanta, GA 30329. (404) 636-8400
ASHREA Guideline 1-1996 "The HVAC Commissioning Process"

SMACNA HVAC Systems Commissioning Manual, Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), 1993. SMACNA, 4201 Lafayette Center Dr., Chantilly, VA 22021. (703) 803-2980

NYSGBTC New York State Green Building Tax Credit
6 NYCRR Part 638
Statutory Authority: Tax Law Section 19

ECCCNYS Energy Conservation Construction Code of New York State

USGBC LEED 2.1 United States Green Building Council
Leadership in Energy & Environmental Design
Version 2.1
November 2002

NYS EO 111 New York State Executive Order No. 111
" Green & Clean" State Buildings and Vehicles Guidelines
New York State Energy Research and Development Authority
December 2001

PECI Portland Energy Conservation, Inc
Model Commissioning Plan & Guide Specifications
Version 2.02
March 1997

REVISIONS

Date	Item Description	Page Location
February 2006	The DASNY Commissioning Guidelines were revised with clarification in the areas of the Commissioning Process and the roles and responsibilities.	Complete Document
April 2005	Revision to the Guidelines to add Appendix 3 Clarification to Commissioning Guidelines P 638.8(L)	Appendix 3 Page 41
March 2005	The DASNY Commissioning Guidelines were revised with clarification in the areas of the Commissioning Process and the roles and responsibilities.	Complete Document
April 2003	The DASNY Commissioning Guidelines were issued in draft form for pilot.	