Part I

Commissioning Requirements
--Design Phase--

For Inclusion in the RFP for A/E Services

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US Department of Energy
Seattle Regional Support Office
800 5th Ave. Suite 3950
Seattle, WA 98104

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Oregon Office of Energy
625 Marion Street NE
Salem, OR 97310
and
Portland Energy Conservation, Inc.

Prepared by:
Portland Energy Conservation, Inc. (PECI)
921 SW Washington, Suite 312
Portland, OR 97205
503-248-4636, Fax 503-295-0820

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Version 2.04 was distributed by PECI in 1997 and by USDOE in 1998, with USDOE referenced in the footer of each file. Since that version, changes and additions have been made by PECI without review by USDOE; subsequently in

Version 2.05 the reference to USDOE has been removed from the footers. Individual files may have been updated without changing the overall version number. An uptodate history of changes is found in the file history.__.

Part 1

Commissioning Requirements
--Design Phase--

Summary

The *Commissioning Requirements–Design Phase* are specifications relating to commissioning which the design team is required to carry out during the development of the contract documents. The requirements include a listing of the responsibilities for each member of the design team. In addition, for perspective the requirements list the responsibilities of all players during the construction phase. These requirements are intended to be included in the RFP for A/E services and for prospective commissioning authorities, after the Owner fills in the appropriate check boxes and blanks. The requirements include little detail, rather they point to the fully explained procedures in the *Model Commissioning Plan—Design Phase*.

In the Appendix to Part I, a sample request for proposal (RFP) for a commissioning authority is provided which will assist in engaging the services of a qualified commissioning authority for the project. This RFP was developed as a stand-alone document and is redundant of much of the material in the main part of this section.

The information in this section should be adapted for inclusion in any AIA or other standard documents used for acquiring design and consulting services. Special instructions to the specification or contract writer have been enclosed in boxes.

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Request for Proposal of A/E Services

--Design Team Commissioning Requirements--

Introduction

Commissioning is the process of achieving, verifying and documenting the performance of building systems in accordance with the design intent and the client's functional and operational needs. Commissioning starts in the design phase and extends through the construction process and into the warranty period. In brief, the commissioning process entails developing clear and complete design and operational intent documentation, verifying and documenting proper equipment and system performance, ensuring that appropriate O&M documentation is left with the building operating staff and ensuring that the building operators are sufficiently trained. Building commissioning is a team effort and requires cooperation by all parties to succeed efficiently.

1.0 General

1.1 Party Definitions

Commissioning Authority (CA) - an independent authority, not otherwise associated with the A/E team members or the Contractor, though he/she may be hired as a subcontractor to them. The CA or the architect may coordinate the commissioning during design. The CA coordinates the commissioning during construction. The CA reports directly to the Owner's Project Manager during design.

Commissioning Coordinator - the party assigned to coordinate the commissioning activities during the *design* phase. This may be the CA or the architect.

Project Manager (PM) - the contracting and managing authority for the Owner over the design and/or construction of the project.

Construction Manager (CM) - Owner's on-site representative or authority. The Contractor reports to the CM.

Contractor (GC) - the general contractor for the project.

Architect / Engineer (A/E) - the prime consultant (architect) and sub-consultants who comprise the design team dealing with mechanical and electrical systems, generally the HVAC mechanical designer/engineer and the electrical designer/engineer.

1.2 Participation

For the Design Phase, a commissioning authority will be hired by:

___the Owner directly
___the CM
___the A/E
___the GC

2.0 Responsibilities

By responding to this RFP, the A/E team acknowledges their willingness to participate in the commissioning process. The commissioning process is fully defined in the following reference documents developed by Region 10, USDOE included with this RFP: *Commissioning Guide Specifications, Model Commissioning Plan—Design Phase, Model Commissioning Plan—Construction Phase.* The *Building Commissioning Guide* is also a valuable general reference guideline. For use, modification or customizing, an electronic copy of the *Guide Specifications,* as well as the other two USDOE documents, will be provided to the parties awarded the design contract.

To provide an overall perspective of the commissioning process, a *summary* of the commissioning responsibilities of *all* parties is provided below for all design and construction phases. This includes the responsibilities and tasks of the CM, PM and GC, which are not a part of the scope of this RFP. The CA responsibilities during construction and warranty are not included in the scope of this RFP. If the CA is checked below, the CA services during Design Development and Construction Documents phase are included in the scope of this RFP.

In summary, only the tasks of the following checked parties are part of the scope of A/E commissioning services for this RFP.

___Architect (Programming through Warranty)
___HVAC mechanical designer (Programming through Warranty)
___Electrical designer (Programming through Warranty)
___Commissioning authority (during Design Development and Construction Documents Phases)

2.1 All Parties

All Phases

1. Follow the *Commissioning Plan—Design Phase* included with this RFP.

2.2 **Architect** (of the A/E team)

Programming and Conceptual Development Phases

1. Document the tenant and the Owner's building criteria, needs, etc. for this building in a programming report.
2. If assigned as the design phase commissioning coordinator, make any changes necessary to the original Commissioning Plan—Design Phase provided by the Owner.

Design Development

1. ___Coordinate the commissioning work, ___Commissioning authority coordinates the commissioning work.
2. Document the design intent for general building design and function as specified in the Commissioning Plan included with this RFP.

Construction Documents Phase

1. ___Coordinate the commissioning work, ___Commissioning authority coordinates the commissioning work.
2. Coordinate the development of the design intent by all design team members.

3. Document the design intent, design narrative and design parameters as specified in the Commissioning Plan included with this RFP and include this documentation in the specifications sections shown in the Commissioning Plan—Design Phase.
4. Adapt the Division 1, Sections 00800, 01040, 01300, 01700, and 01730 from Guide Commissioning Specifications into Division 1 for this project. Developing performance verification requirements to be executed by others shall not be construed to relieve the architect and design engineers of any responsibility assigned under the contractual agreement.

Construction and Acceptance Phase

1. ___Manage the CA contract, ___GC manages the CA contract, ___CM or Owner manages the CA contract.
2. Perform normal submittal review, construction observation, as-built drawing preparation, O&M manual preparation, etc., as contracted.
3. Provide any design narrative documentation requested by the CA.
4. Coordinate resolution of system deficiencies identified during commissioning, according to the contract documents.
5. Prepare and submit final as-built design intent documentation for inclusion in the O&M manuals. Review and approve the O&M manuals.

Warranty Period

1. Coordinate resolution of design non-conformance and design deficiencies identified during warranty-period commissioning.

2.3 HVAC Mechanical and Electrical Designers/Engineers (of the A/E team)

Programming and Conceptual Development Phase

—None—

Design Development Phase

1. Document design intent and general operating parameters according to the Commissioning Plan included with this RFP.

Construction Documents Phase

1. Complete the documentation of the design intent and operating parameters according to the Commissioning Plan included with this RFP and include this documentation in the specifications sections shown in the Commissioning Plan—Design Phase.
2. Adapt the Division 15 (HVAC mechanical designer) and Division 16 (electrical designer) Guide Commissioning Specifications into Division 15 and 16 for this project.

Construction and Acceptance Phase

1. Perform normal submittal review, construction observation, as-built drawing preparation, etc., as contracted. One site observation should be completed just prior to system start-up.
2. The designers shall provide the CA with additional detailed equipment and system information, as requested. The designers shall assist (along with the contractors) in clarifying the operation and control of commissioned equipment in areas where the

specifications, control drawings or equipment documentation are not sufficient for writing detailed testing procedures.

3. Participate in the resolution of Division 15, 16 and 17 system deficiencies identified during commissioning, according to the contract documents.
4. Prepare and submit the Division 15 and 16 final as-built design intent and design and operating parameters documentation for inclusion in the O&M manuals. Review and approve the O&M manuals.
5. Provide a presentation at the first training session for the Owner's personnel.

Warranty Period

1. Participate in the resolution of respective Division 15 and 16 non-compliance and design deficiencies identified during commissioning during warranty-period commissioning.

2.4 Commissioning Authority

The CA is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management. The CA may assist with problem-solving or resolving non-conformance or deficiencies, but ultimately these responsibilities reside with the general contractor and the A/E. The primary role of the CA is to develop and coordinate the execution of a testing plan, observe and document performance—that is determine whether systems are functioning in accordance with the documented design intent and in accordance with the Contract Documents. The Contractors will provide all tools or the use of tools to start, check-out and functionally test equipment and systems, except for specified testing with portable data-loggers, which shall be supplied and installed by the CA.

Programming and Conceptual Development Phase

—None—

Design Development Phase

1. If assigned as the design phase commissioning coordinator, make any changes necessary to the original *Commissioning Plan—Design Phase* provided by the Owner.
2. ___Coordinate the commissioning work, ___Architect coordinates the commissioning work.
3. ___Perform, ___Do not perform a design review at the end of Design Development.
4. Assist design team members in developing their portions of the design intent.

Construction Documents Phase

1. ___Coordinate the commissioning work, ___Architect coordinates the commissioning work.
2. Perform a review of the drawings and specifications when 50% and 95% complete.
3. Assist, review and approve the development of the design intent and operating parameters documentation by all design team members.
4. Develop a draft project-specific commissioning plan for the construction phase, using the Commissioning Plan—Construction Phase model document.
5. Coordinate the development of the construction commissioning specifications.
6. Assist, review and approve the development of the construction commissioning specifications by all design team members.

7. Assist the A/E in adapting the special commissioning Division 17 Guide Commissioning Specifications into Division ___ for this project.

Construction and Acceptance Phase

According to the Contract Documents:

1. Coordinate and direct the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines and schedules and technical expertise.
2. Coordinate the commissioning work and, with the GC and CM, ensure that commissioning activities are being scheduled into the master schedule.
3. Revise, as necessary, the Draft 2, Commissioning Plan—Construction Phase.
4. Plan and conduct a commissioning scoping meeting.
5. Request and review additional information required to perform commissioning tasks, including O&M materials, contractor start-up and checkout procedures.
6. Before startup, gather and review the current control sequences and interlocks and work with contractors and design engineers until sufficient clarity has been obtained, in writing, to be able to write detailed testing procedures.
7. Review and approve normal Contractor submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with the A/E reviews.
8. Write and distribute prefunctional tests and checklists.
9. Develop an enhanced start-up and initial systems checkout plan with Subcontractors.
10. Perform site visits, as necessary, to observe component and system installations. Attend selected planning and job-site meetings to obtain information on construction progress. Review construction meeting minutes for revisions/substitutions relating to the commissioning process. Assist in resolving any discrepancies.
11. 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 include documentation in O&M manuals. Notify owner's project manager of any deficiencies in results or procedures.
12. Witness all or part of any ductwork testing and cleaning procedures, sufficient to be confident that proper procedures were followed. Document this testing and include documentation in O&M manuals. Notify owner's project manager of any deficiencies in results or procedures.
13. Approve prefunctional tests and checklist completion by reviewing prefunctional checklist reports or by direct site observation.
14. Approve systems startup by reviewing start-up reports and by selected site observation.
15. Review testing, adjusting, and balancing (TAB) execution plan.
16. Oversee sufficient functional testing of the control system and approve it for use by TAB, before TAB is executed.
17. Approve air and water systems balancing by spot testing and by reviewing completed reports and by selected site observation.
18. With necessary assistance and review from installing contractors, write the functional performance test procedures for equipment and systems. This may include energy management control system trending, stand-alone data-logger monitoring or manual functional testing. Submit to CM for review, and approval if required.

19. Analyze any functional performance trend logs and monitoring data to verify performance.
20. Coordinate, witness and approve manual functional performance tests performed by installing contractors. Coordinate retesting as necessary until satisfactory performance is achieved.
21. Maintain a master deficiency and resolution log and a separate testing record. Provide to the CM written progress reports and test results with recommended actions.
22. Witness performance testing of smoke control systems by others and all other owner contracted tests or tests by manufacturer's personnel over which the CA may not have direct control. Document this testing and include in Commissioning Record in documentation in O&M manuals.
23. Review equipment warranties to ensure that the Owner's responsibilities are clearly defined.
24. Oversee and approve the training of the Owner's operating personnel.
25. Compile and maintain a commissioning record and building systems book(s).
26. Review and approve the preparation of the O&M manuals.
27. Provide a final commissioning report, including an executive summary, list of participants and roles, brief building description, overview of commissioning and testing scope and a general description of testing and verification methods. For each piece of commissioned equipment, the report should contain the disposition of the commissioning authority regarding the adequacy of the equipment, documentation and training meeting the contract documents in the following areas: 1) Equipment meeting the equipment specifications, 2) Equipment installation, 3) Functional performance and efficiency, 4) Equipment documentation and design intent, and 5) Operator training. All outstanding non-compliance items shall be specifically listed. Recommendations for improvement to equipment or operations, future actions, commissioning process changes, etc. shall also be listed. Each non-compliance issue shall be referenced to the specific functional test, inspection, trend log, etc. where the deficiency is documented. The functional performance and efficiency section for each piece of equipment shall include a brief description of the verification method used (manual testing, BAS trend logs, data loggers, etc.) and include observations and conclusions from the testing.

    Appendices shall contain acquired sequence documentation, logs, meeting minutes, progress reports, deficiency lists, site visit reports, findings, unresolved issues, communications, commissioning plan, etc. Prefunctional checklists and functional tests (along with blanks for the operators) and monitoring data and analysis will be provided in a separate labeled binder.

Warranty Period

1. Supervise any seasonal or deferred testing and deficiency corrections required by the specifications.
2. Return to the site at 10 months into the 12 month warranty period and review with facility staff the current building operation and the condition of outstanding issues related to the original and seasonal commissioning. 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 O&M manuals. Identify areas that may come under warranty or under the original

construction contract. Assist facility staff in developing reports and documents and requests for services to remedy outstanding problems.

3. Optional: Assist in the development of a preventative maintenance plan, a detailed operating plan or an energy and resource management plan or as-built documentation.

2.5 Contractor and Subcontractors

No part of these specifications are to be construed to relieve the Contractor of their responsibilities under the building contract.

Programming through Construction Documents Phases

—None—

Construction and Acceptance Phase

1. The GC shall ensure that all Subcontractors (Subs) execute their commissioning responsibilities according to the contract documents in a timely fashion.
2. A representative of the subcontractor for each applicable trade shall attend a commissioning scoping meeting.
3. Subs shall provide normal cut sheets and shop drawing submittals and O&M manuals, with one copy for each piece of commissioned equipment going to the CA. Subs shall provide the CA with additional detailed equipment and system information, as requested. Subs shall assist (along with the design engineers) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation are not sufficient for writing detailed testing procedures.
4. Subs shall provide limited assistance to the CA in preparation of the specific functional performance test procedures. Subs shall review test procedures to ensure feasibility, safety and equipment protection.
5. Subs shall execute their normal system prestart-up checkout procedures without a decrease in rigor. In addition, they will complete prefunctional performance checklists and tests provided to them by the CA.
6. Subs shall perform and clearly document their normal start-up and system check-out procedures without a decrease in rigor. Subs shall provide a start-up report and a copy of the manufacturer's recommended start-up procedures to the CA. Subs shall address all A/E punch list items to date and TAB shall be completed with discrepancies and problems remedied before functional testing. Subs shall perform standard start-up testing and system operational checkouts with normal rigor. Commissioning performance verification is intended to verify proper performance, not replace the start-up testing and system debugging responsibilities of the Subs.
7. Subs shall execute functional performance testing, witnessed by the CA.
8. Correct deficiencies (differences between specified and observed performance) as interpreted by the CA, CM and A/E.
9. Prepare O&M manuals according to the contract documents.
10. Prepare red-line as-built drawings for all drawings and final as-builts for contractor-generated coordination drawings.
11. Provide training of the Owner's operating personnel.
12. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.

13. Furnish a copy of all construction documents, addenda, change orders and approved submittals and shop drawings to the CA.
14. General contractor shall coordinate the training of owner personnel.

Warranty Period

1. Subs shall execute seasonal and other deferred functional performance testing, witnessed by the CA, according to the specifications.
2. Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

2.6 **Construction Manager** (Owner's Rep)

Programming through Design Development Phases

—None—

Construction Documents Phase

1. Perform a general review of the drawings and specifications. Perform a constructibility review and/or perform a value engineering analysis according to their contract.

Construction and Acceptance Phase

1. Facilitate the coordination of the commissioning work by the CA, and with the GC and CA ensure that commissioning activities are being scheduled into the master schedule.
2. Review and approve the final Commissioning Plan—Construction Phase.
3. Attend a commissioning scoping meeting.
4. Perform the normal review of Contractor submittals.
5. Review and approve the functional performance test procedures submitted by the CA, prior to testing.
6. Review periodic commissioning progress and deficiency reports.
7. Coordinate the resolution of non-compliance and design deficiencies identified in all phases of commissioning.
8. Assist the Contractor in coordinating the training of owner personnel.
9. Sign-off on individual commissioning tests completed and passing. Recommend completion of the commissioning process to the Project Manager.

Note: If the CA is hired by the CM or directly by GSA, the CM tasks listed above for the commissioning process become the responsibility of the CA, as the need for oversight of the CA is essentially eliminated, except for the coordination of deficiency resolution.

Warranty Period

1. Assist the CA as necessary in the seasonal testing and deficiency corrections required by the specifications.

2.7 **Project Manager** (of Owner)

Programming through Design Development Phases

1. Manage the A/E contract.
2. Work with the client in determining their functional needs.
3. Perform the normal reviews of the A/E work.
4. Approve the final Commissioning Plan—Design Phase.

Construction Documents Phase

1. Manage the A/E contract.
2. As normal, represent the Owner and the client in drawing and specification reviews.
3. Review and approve the design intent documentation.
4. Review and approve the commissioning specifications.
5. As normal, review the value engineering analysis and approve any changes to be incorporated.

Construction and Acceptance Phase

1. Manage the contract of the A/E and of the GC.
2. Arrange for facility operating and maintenance personnel to attend various field commissioning activities and field training sessions according to the Commissioning Plan—Construction Phase.
3. Provide final approval for the completion of the commissioning work.

Warranty Period

1. Ensure that any seasonal testing and any deficiency issues are addressed.