

REQUEST FOR PROPOSAL FOR INDEPENDENT COMMISSIONING SERVICES

--Detailed Version--

OWNER OF _____
REQUEST FOR PROPOSAL
FOR INDEPENDENT COMMISSIONING PROVIDER SERVICES

RFP Writer:

This template was intended to be applicable for cases when commissioning starts in design or when it starts during early construction, and for cases where the proposal is a fixed fee or a negotiated contract. The instruction boxes guide the modifications to fit each scenario.

For the construction phase tasks, the RFP Writer should understand clearly the management and responsibility scenario in the specifications and contracts.

When the contractor is required to hire a “test engineer” or “commissioning coordinator,” etc., the roles of that party can easily be confused and overlapped with the commissioning provider or authority that may be hired by the owner.

This RFP is intended for the independent commissioning provider or authority when there is not a contractor-hired test engineer or commissioning coordinator performing many of the day-to-day commissioning functions.

Issuance Date: _____

Closing Date: _____, 5 PM

The _____ (owner), requests written proposals to secure Commissioning Provider (CP) services for the _____ facility in, _____, (state). The Owner is committed to commissioning this facility to ensure that all systems are well designed, complete and functioning properly upon occupancy, and that the Owners staff have adequate system documentation, and training.

BACKGROUND

The Owner is seeking the services of a qualified commissioning provider/firm for a new construction project. The project currently is a _____ gross sf, ___ story, Class ___ [type] _____ building in [city & state] _____, _____, with a project budget of \$_____ million. The facility is expected to be comprised of ___% office space, ___% retail, ___% parking garage, ___% medical laboratory, etc.

RFP Writer: Delete and add spaces to match specific project. Provide as much information as possible.

The current phase of the project is: _____ (pre-design, schematic design, design development, construction documents). The construction documents planned to be completed by _____. Construction is anticipated to begin in _____ and final occupancy by _____. Project documents available for review are: _____.

RFP Writer: Provide proposers a copy of the programming report and any design documents completed to date.

OBJECTIVES

RFP Writer: Alter these objectives as appropriate for your desires and for the phases being commissioned.

The objective of commissioning is to provide documented confirmation that a facility fulfills the functional and performance requirements of the building owner, occupants, and operators. To reach this goal, it is necessary for the commissioning process to establish and document the owner's criteria for system function, performance, and maintainability; as well as, to verify and document compliance with these criteria throughout design, construction, start-up, and the initial period of operation. In addition, complete operation and maintenance (O&M) manuals, as well as training on system operation, should be provided to the building operators to ensure the building continues to operate as intended.

The commissioning provider should be involved throughout the project from the pre-design through the warranty phase. The primary role of the CP during the overall design phase is to develop detailed commissioning specifications and review design to ensure it meets the Owner's objectives. During construction, the CP develops and coordinates the execution of a testing plan, which includes observing and documenting all system's performance to ensure that systems are functioning in accordance with the Owner's objectives and the contract documents. The CP is not responsible for design or general construction scheduling, cost estimating, or construction management, but may assist with problem-solving or resolving non-conformance issues or deficiencies.

SCOPE OF WORK

The CP shall be responsible for carrying out the following tasks. The proposer is free to suggest changes and improvements to the following task list, but for this proposal it is assumed that these tasks will be completed. For this proposal ___pre-design phase, ___design phase, ___construction phase, ___warranty phase services are requested.

RFP Writer:
If the plans and specifications are complete or nearing completion, delete all the Pre-Design and Design Phase tasks. However, it is advised that if the project hasn't gone out to bid, the Commissioning Provider conduct a design review similar to Design Phase Task 3 and possibly Task 4 and that they provide some language for, or at least a review the commissioning or quality control language in the specifications. Clarifications to the bid package could be handled by addenda.

PRE-DESIGN PHASE

RFP Writer: The following tasks are generally included. Select as appropriate.

1. Assemble commissioning team, hold a scoping meeting and identify responsibilities.
2. Develop a draft design-phase commissioning plan.
3. Attend commissioning meetings as needed with project manager and design team.
4. Review the Owner Objectives documentation (design intent) for clarity and completeness.

RFP Writer: The following tasks may be included. Select and edit as appropriate.

5. Develop the written Owner Objectives for the following features: mechanical, electrical, plumbing, architectural, structural, lighting, energy consumption, commissioning, indoor environmental quality, environmental sustainability, siting, exteriors, landscaping, interiors, functionality for tenants, budget, _____, and _____. This will be accomplished by the Commissioning Provider: ___extracting salient concepts from the Owner's existing programming report and/or ___conducting a focus group, ___conducting interviews with owner stakeholders [describe how many]. The Owner Objectives will be ___general in nature, ___specific in nature, ___include specific performance criteria for ___some, ___most concepts.

DESIGN PHASE

RFP Writer: If the Commissioning Provider was not brought on during Pre-Design, it is recommended that they perform Pre-design Tasks 1 and 4.

1. Coordinate the commissioning work during design
2. Develop or update the design phase commissioning plan.
3. Perform focused reviews of the design, drawings and specifications at various stages of development (during schematic design, design development and contract document phases), as described in Exhibit 1.
4. Assist, review and approve the development and updating of the Design Record documentation by design team members (Owner Objectives, Design Narrative; Design Basis).
5. Develop a draft construction phase commissioning plan using an Owner-approved outline.
6. Develop full commissioning specifications for all commissioned equipment. Coordinate with and integrate into the specifications of the architect and engineers. One or more of the following documents can be used as a guide for content, rigor and format: 1) *Model Commissioning Plan and Guide Specifications*, USDOE/FEMP; Portland Energy Conservation, Inc. (PECI), 2) *The HVAC Commissioning Process*, ASHRAE Guideline 1-1996.. The PECI document can be downloaded free at <http://www.peci.org> and a copy of the ASHRAE document can be obtained by contacting ASHRAE at 404-636-8400.

The commissioning specification will include a detailed description of the responsibilities of all parties, details of the commissioning process; reporting and documentation requirements, including formats; alerts to coordination issues, deficiency resolution; construction checklist and startup requirements; the functional testing process; specific functional test requirements, including testing conditions and acceptance criteria for each piece of equipment being commissioned.

7. Coordinate a controls integration meeting where the electrical and mechanical engineers and the Commissioning Provider discuss integration issues between equipment, systems and disciplines to ensure that integration issues and responsibilities are clearly described in the specifications.

Bid Phase

1. Attend pre-bid meeting to answer commissioning related questions.

Construction Phase

RFP Writer: Include the following article if commissioning specifications exist for the project.

1. Perform the tasks and functions in the specifications ascribed to the _____ (title of the commissioning party as identified in the specifications), dated _____.
2. 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.
3. Coordinate the commissioning work and, with the contractor and construction manager (CM), ensure that commissioning activities are being scheduled into the master schedule.
4. Revise, as necessary, the construction phase commissioning plan developed during design, including scope and schedule.
5. Plan, conduct, commissioning meetings as needed and distribute minutes.
6. Request and review additional information required to perform commissioning tasks, including O&M materials, contractor start-up and checkout procedures. 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. Review requests for information and change orders for impact on commissioning and owner's objectives.
9. Review coordination drawings to ensure that trades are making a reasonable effort to coordinate.
10. Write and distribute construction checklists for commissioned equipment.
11. Develop an enhanced start-up and initial systems checkout plan with contractors for selected equipment.
12. 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.
13. Witness HVAC piping pressure test and flushing, sufficient to be confident that proper procedures were followed. Include testing documentation in the Commissioning Record.
14. Witness any ductwork testing and cleaning sufficient to be confident that proper procedures were followed. Include documentation in the Commissioning Record.
15. Document construction checklist completion by reviewing completed construction checklists and by selected site observation.
16. Document systems startup by reviewing start-up reports and by selected site observation.
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 will include manual functional testing, energy management control system trending and may include stand-alone data-logger monitoring. Submit to CM for review and approval if required.
19. Analyze functional performance trend logs and monitoring data to verify performance.
20. Coordinate, witness and document manual functional performance tests performed by installing contractors. Coordinate retesting as necessary until satisfactory performance is achieved. The functional testing shall include operating the system and components through each of the written sequences of operation, and other significant modes and sequences, including startup, shutdown, unoccupied mode, manual mode, staging, miscellaneous alarms, power failure, security alarm when impacted and interlocks with other systems or equipment. Sensors and actuators shall be calibrated during construction check listing by the installing contractors, and spot-checked by the commissioning provider during functional testing.

Tests on respective HVAC equipment shall be executed, if possible, during both the heating and cooling season. However, some overwriting of control values to simulate conditions shall be allowed. Functional testing shall be done using conventional manual methods, control system trend logs, and read-outs or stand-alone data loggers, to provide a high level of confidence in proper system function, as deemed appropriate by the commissioning provider and the Owner.

21. Prepare test plans for, assist with execution of, and document tests of commissioned equipment overseen by regulatory authorities and ensure that such tests meet the testing rigor desired by the Owner.
22. Maintain a master issues log and a separate record of functional testing. Report all issues as they occur directly to the CM. Provide directly to the CM written progress reports and test results with recommended actions.
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. Review and approve the preparation of the O&M manuals for commissioned equipment.
26. Compile a Commissioning Record, which shall include:
 - A. A brief summary report that includes a 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 provider 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
 - 5) Operator training.
 - B. 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.
 - C. Also included in the Commissioning Record shall be the issues log, commissioning plan, progress reports, submittal and O&M manual reviews, training record, test schedules, construction checklists, start-up reports, functional tests, and trend log analysis.

27. Compile a Systems Concepts and Operations Manual that consists of the following: Owner Objectives (by owner); Design Narrative and Basis of Design (by designer); Performance metrics, if completed during design; space and use descriptions, single line drawings and schematics for major systems (by designer); control drawings, sequences of control (by contractor); and a table of all setpoints and implications when changing them, schedules, instructions for operation of each piece of equipment for emergencies, seasonal adjustment, startup and shutdown, instructions for energy savings operations and descriptions of the energy savings strategies in the facility, recommendations for recommissioning frequency by equipment type, energy tracking recommendations, and recommended standard trend logs with a brief description of what to look for in them (all by commissioning provider).

Warranty Period

1. Coordinate and supervise required opposite season or deferred testing and deficiency corrections and provide the final testing documentation for the Commissioning Record and O&M manuals.
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.

SYSTEMS TO BE COMMISSIONED

The following systems and assemblies will be commissioned:

RFP Writer:

a. Delete and add systems as appropriate.

b. If this RFP is offered during pre- or early design, the list and description of equipment and systems should be kept fairly general, as shown below.

c. For RFP's sent out once the plans and specifications are mostly complete, more detail to the list below should be provided. List the components and issues that will be commissioned for the following: electrical, data and communications, paging, security, plumbing, building envelope and process instrumentation and controls.

- | | |
|---|---|
| 1. Central building automation system | 10. Electrical |
| 2. All equipment of the heating, ventilating and air conditioning systems | 11. Domestic and process water pumping and mixing systems |
| 3. Scheduled or occupancy sensor lighting controls | 12. Equipment sound control systems and testing |
| 4. Daylight dimming controls | 13. Data and communication |
| 5. Refrigeration systems | 14. Paging systems |
| 6. Emergency power generators and automatic transfer switching | 15. Security system |
| 7. Uninterruptible power supply systems | 16. Irrigation |
| 8. Life safety systems (fire alarm, egress pressurization, fire protection) | 17. Plumbing |
| 9. Laboratory, clean room, hoods and pressurization | 18. Vertical transport |
| | 19. Medical gas |
| | 20. Building envelope |

21. Process instrumentation and controls

DESIRED QUALIFICATIONS

RFP Writer: Add to and edit the desired qualifications according to your specific project, particularly for non-HVAC systems you are having commissioned.

It is the Owner's desire for the person designated as the site Commissioning Provider to satisfy as many of the following requirements as possible:

- ◆ Acted as the principal Commissioning Provider for at least three (3) projects over _____sf.
- ◆ Extensive experience in the operation and troubleshooting of HVAC systems, energy management control systems.
- ◆ Extensive field experience is required. A minimum of five (5) full years in this type of work is required.
- ◆ Knowledgeable in building operation and maintenance and O&M training.
- ◆ Knowledgeable in test and balance of both air and water systems.
- ◆ Experienced in energy-efficient equipment design and control strategy optimization.
- ◆ Direct experience in monitoring and analyzing system operation using energy management control system trending and stand-alone data logging equipment.
- ◆ Excellent verbal and writing communication skills. Highly organized and able to work with both management and trade contractors.
- ◆ Experienced in writing commissioning specifications.
- ◆ A bachelor's degree in mechanical or electrical engineering is strongly preferred, and P.E. certification is desired, however, other technical training, past commissioning, and field experience will be considered.
- ◆ Membership with the Building Commissioning Association will be considered a plus.

The required expertise for this project will be based on skill and experience set of the full team making the proposal. A member of the prime firm will be the designated Commissioning Provider who is the member of the team that will coordinate the commissioning activities from the technical perspective. This party may not necessarily be the team's overall project or contract manager. The Commissioning Provider must have significant in-building commissioning experience, including technical and management expertise on projects of similar scope. If the Commissioning Provider or prime firm does not have sufficient skills to commission a specific system, the prime firm shall subcontract with a qualified party to do so. Subcontractor qualifications shall be included and clearly designated in the response to this RFP.

PRE-PROPOSAL MEETING

A pre-proposal meeting will be held to answer questions and clarify any project issues. Attending the meeting is **not required** to submit a proposal. The meeting will be held at:

[State the location and time of the meeting]

PROPOSAL

Proposals need not be voluminous, but shall provide sufficient information to allow the Owner to evaluate the Consultant's approach, experience, staff and availability.

The proposer shall:

1. Limit their proposal to 15 single-sided pages, including graphics. A letter of introduction, section dividers, detailed resumes and the sample work products of item five below are not included in this limit.
2. Have the proposal must be signed by an officer of your firm with the authority to commit the firm.
3. Fill out the attached *Commissioning Firm Experience* form and the *Commissioning Task Listing* form (Exhibits 4 and 5) for each firm on the team. List no more than four projects in Exhibit 5.
4. Provide an organization chart for managing and executing this contract.
5. List the individual(s) who will be the Commissioning Provider for the design phase and for the construction phase of the contract (they may be different people). Describe his or her relevant qualifications and experience. This information is required in addition to any resumes the proposer submits.
6. Provide resumes for key staff and subconsultants. The resumes shall include specific information about expertise in commissioning tasks, (e.g. design reviews, specification writing, commissioning management, troubleshooting, test writing, test execution, energy management, etc.).
7. Briefly describe relevant experience of the proposer's team in the following areas. List each party's involvement.
 - a) projects similar to this one;
 - b) traditional test and balance;
 - c) O&M experience;
 - d) energy-efficient equipment design and control strategy optimization;
 - e) building simulation;
 - f) life cycle costing;
 - g) experience in environmental sustainable design;
 - h) project and construction management; and
 - i) system design (specify)

RFP Writer: Add or delete items in the above list for areas that you want the commissioning provider to provide specific task work.
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8. Describe your proposed approach to managing the project expertly and efficiently, including distribution of tasks, travel, duration of which staff will be on site during what periods of time, etc. Describe what approach you will take to integrate the commissioning into the normal design and construction process in order to minimize potential time delays. Describe what you will do to foster teamwork and cooperation from contractors and design team and what you will do to minimize adversarial relationships. Describe how you intend to determine the appropriate level of commissioning effort for the various systems and equipment.
9. As an attachment, provide the following work products that members of the proposer's team wrote. List the team member who actually wrote the document and the projects on which they were used. Work from the designated Commissioning Provider is preferred.
 - a) commissioning plan that was executed (the process part of the plan);
 - b) commissioning specifications; and
 - c) an actual functional test procedure form that was executed.

RFP Writer: If this is a fixed lump sum proposal for the work, include the following paragraph, or else delete it.

10. Provide a fixed lump sum total cost to accomplish the work with the breakdown in the budget table format below. Also provide an hourly rate for each team member for work that may exceed the scope. For each phase, provide the percentage level of effort for each of the primary team members.

RFP Writer: If this is a request for qualifications with a rate proposal, include the following paragraph, or else delete it.

11. This project will be set up on a time-and-materials basis. Provide both an *estimated* total fee to accomplish the work and an hourly rate for each team member, along with rates and fees for all other costs that the Owner could incur from the proposer in this contract (travel, mileage, per diem, communications, etc.). For each phase, provide the percentage level of effort for each of the primary team members.

RFP Writer: It is normally not appropriate to ask for a fixed budget figure for construction phase commissioning until the plans and specifications are nearing completion. However, if this RFP is sent out in early to mid-design, ask for budget details in the table below of the Pre-Design and Design Phase tasks only and include the following paragraph. Also, in the budget table delete all but one line for the total Construction phase budget.

Otherwise, if the commissioning project was started late in or after design, delete the following paragraph.

12. The Owner desires a cost proposal with a budget breakdown for the Pre-Design and Design Phase commissioning tasks. For planning purposes, a cost estimate range for the Construction and Warranty Phase tasks shall also be provided, using the form below.

RFP Writer: If the RFP was sent out near the end of, or after the design phase, delete the Pre-Design and Design tasks that are not going to be done from the budget table below.

13. Provide a proposed dollar budget to complete this scope of work in the following format. All task amounts include associated meetings, progress reports and direct costs (travel, etc.).

The respondent must submit three (3) copies of the proposal, each signed by an authorized representative of the firm. Facsimiles will not be accepted. Proposals must be submitted to arrive no later than close of business, **5:00 p.m.** on _____, _____ to:

[State the address, contact person, telephone number, fax number, e-mail address]

Budget

Task	Budget (\$)
Pre-Design and Design	
1 Develop or review Owner project objectives (per scope)	_____
2 Design documents reviews of plans, specifications; narratives	_____
3 Commissioning plan, specification development and bid meeting	_____
4 Other	_____
Subtotal	_____
Construction	
1 Commissioning plan and submittal reviews	_____
2 Construction checklists; observation of installation and startup	_____
3 Functional test writing	_____
4 Functional test execution and documentation	_____
5 O&M manual review and training review	_____
6 Compilation of Commissioning Record	_____
7 Systems Concepts and Operations Manual development	_____
8 Other	_____
Subtotal	_____
Warranty Period	
Seasonal testing	_____
Near-warranty end review	_____
Subtotal	_____
Total	_____

SELECTION PROCESS

Owner staff shall review all proposals and select and rank the _____ most qualified Consultants. The selection and ranking shall be based on the following criteria:

- ◆ Proposed approach to the project.
- ◆ Past experience in performing similar projects.
- ◆ Expertise of the team in performing the services required by the Project.
- ◆ Fee proposal.
- ◆ _____.

The Owner will negotiate/interview with the highest ranked Consultant on the tasks, staffing, schedule and fee proposal. Negotiations may be formally terminated if they fail to result in a contract within a reasonable time period. Negotiations will then ensue with the second ranked Consultant, and if necessary, the third ranked Consultant. If the second and third round of negotiations fail to result in a contract within a reasonable time period, the solicitation may be formally terminated.

CHANGE IN PERSONNEL

If the commissioning firm’s personnel or subconsultants change for this project, the Owner must review and approve the replacement personnel, in advance. The replacement personnel shall have, at minimum, equivalent qualifications as the original personnel.

EXHIBIT 1 FOCUSED DESIGN REVIEW SCOPE

RFP Writer: Check the areas for which you want the commissioning firm to provide input.

The commissioning provider will perform a review of the design documents for the following issues at the phases checked for each system commissioned.

Key: SD: Schematic Design Review DD: Design Development Review
 CD1: Contract Document Review #1 CD2: Contract Document Review #2

Design Area	Review Description	SD	DD	CD1	CD2
<i>Design narrative and design basis</i>	Ensure that design narrative and basis of design are clear, complete, and meet the original Owner Objectives				
<i>Commissioning facilitation</i>	Review to facilitate effective commissioning (see Exhibit 2).				
<i>Energy efficiency</i>	Review for adequacy of the effectiveness of building layout and efficiency of system types and components for building shell, HVAC systems and lighting systems.				
<i>Control system & control strategies</i>	Review ___HVAC, ___lighting, ___fire control, ___emergency power, ___security control system, strategies and sequences of operation for adequacy and efficiency.				
<i>Operations and maintenance (O&M)</i>	Review for effects of specified systems and layout toward facilitating O&M (equipment accessibility, system control, etc.).				
<i>Indoor environmental quality</i>	Review to ensure that systems relating to ___thermal, ___visual, ___acoustical, ___air quality comfort, ___air distribution maximize comfort and are in accordance with the Owner Objectives. (See Exhibit 3 for IAQ checklist).				
<i>O&M documentation</i>	Verify adequate building O&M documentation requirements.				
<i>Training</i>	Verify adequate operator training requirements.				
<i>Commissioning specifications</i>	Verify that bid documents adequately specify building commissioning, including testing requirements by equipment type.				
<i>Owner's design guideline or standard</i>	Verify that the design complies with the owner's own design guideline or standard.				
<i>Environmental sustainability</i>	Review to ensure that the ___building materials, ___landscaping, ___use of water, ___waste management create less of an impact on the environment and are in accordance with Owner Objectives.				
<i>Mechanical</i>	Review the mechanical concepts/design for enhancements.				
<i>Electrical</i>	Review the electrical concepts/systems for enhancements.				
<i>Envelope</i>	Review envelope design and assemblies for thermal and water integrity, moisture vapor control and assembly life.				
<i>Structural</i>	Review the structural concepts/design for enhancements.				
<i>Functionality</i>	Ensure the design maximizes the functional needs of the occupants.				
<i>Life cycle costs</i>	Perform a life cycle assessment of the primary competing mechanical systems relative to ___energy efficiency, ___O&M, ___IEQ, ___functionality, ___sustainability.				

EXHIBIT 2

COMMISSIONING FACILITATION REVIEW

The commissioning provider shall review the design documents for the following, but the review is not expected to be limited to only these issues:

- ◆ Clear and rigorous design documentation, including detailed and complete sequences of operation.
- ◆ An HVAC fire and emergency power response matrix that lists all equipment and components (air handlers, dampers, valves, etc.) with their status and action during a fire alarm and under emergency power.
- ◆ Access for reading gages, entering doors and panels, observing and replacing filters, coils, etc.
- ◆ Required isolation valves, dampers, interlocks, piping, etc. to allow for manual overrides, simulating failures, seasons and other testing conditions.
- ◆ Sufficient monitoring points in the building automation system (BAS), even beyond that necessary to control the systems, to facilitate performance verification and O&M.
- ◆ Adequate trending and reporting features in the BAS.
- ◆ Pressure and temperature (P/T) plugs close to controlling sensors for verifying their calibration.
- ◆ Pressure gages, thermometers and flow meters in strategic areas to facilitate verifying system performance and ongoing O&M.
- ◆ Pressure and temperature (P/T) plugs at less critical areas or on smaller equipment where gages and thermometers would be over-kill.
- ◆ Specification of the location and criteria for the VAV duct static pressure sensor and chilled water differential pressure sensor.
- ◆ Adequate balancing valves, flow metering and control stations and control system functions to facilitate and verify reliable test and balance.
- ◆ Uniform inlet connection requirements to VAV terminal boxes.
- ◆ Clear and complete commissioning specifications for the construction phase.
- ◆ Complete O&M documentation requirements in the specifications.
- ◆ Complete training requirements in the specifications.
- ◆ Review entire document and building information management plan from design through construction and turnover to ensure adequacy and compliance with the owner's program.

EXHIBIT 3

INDOOR AIR QUALITY COMMISSIONING REVIEW CHECKLIST

RFP Writer: Check all issues for which you want the commissioning firm to provide input.

Pre-Design Phase

Document the results from each of the following tasks:

- ___ Determine indoor air quality requirements in accordance with the initial Owner Objectives of the owner's needs. Codes, standards: *ASHRAE Standard 62-1989, Ventilation for Acceptable Air Quality* and *Standard 55-1992 Thermal Environmental Conditions for Human Occupancy*.
- ___ Identify the sources of outdoor pollutants in the vicinity of the building site: general ambient air quality, exhaust systems, nearby cooling towers, smoke stacks, parking garages, etc.
- ___ Review expected occupant activity, density and locations where special attention is needed: kitchens, break, photocopy, print and janitorial rooms, labs, material storage rooms, and conference rooms, etc. Review the need for exhaust systems or increased supply air capacity for each area, etc.

Design Phase

Document the results from each of the following tasks:

- ___ Ensure that the indoor air quality objectives established in the pre-design phase are included in the design and are well documented in the Owner Objectives.
- ___ Establish procedures for verifying and documenting ventilation rates in each area.
- ___ Establish air flow rates for needed exhaust systems, including spot pollutant source removal.
- ___ Determine how adequate ventilation rates will be maintained during all occupied modes of operations, particularly during VAV terminal box turn-down.
- ___ Review air intakes and exhausts for short-circuiting and for exterior pollution sources such as garages, loading docks, and cooling towers.
- ___ Review the impact of the office partitions configurations with respect to ventilation effectiveness.
- ___ Review choice of filtration type and design, materials, and location.
- ___ Review HVAC material specifications and application regarding potential for airflow erosion, corrosion and microbial contamination (HVAC insulation materials, etc.).
- ___ Review air supply system to ensure control and minimization of the presence of free water and to minimize microbial contamination (condensate trays, humidifiers, water baffles, mist eliminators, cooling towers).
- ___ Verify the suitability of access doors and inspection ports to all chambers and components of air handling system plenums. Verify that proper cleaning of both sides of coils, condensate pans and/or humidifier reservoirs can be accomplished through the doors.
- ___ Examine manufacturer's safety data sheets (MSDS) for products specified in contract documents that may be suspected contributors to indoor pollutants.
- ___ Obtain manufacturer's data on curing, drying and airing procedures to minimize emission rates.
- ___ Verify that the specifications specify proper methods and conditions for operating the HVAC system prior to full control and occupancy, to minimize dirt and unwanted moisture entering the duct work, coils, building cavities and any occupied portions of the building.

Note: Indoor air quality (IAQ) commissioning does not ensure that indoor air quality will be adequate or without deficiency at building turnover or during occupancy, unless the owner has specifically specified that actual air quality testing be performed. Commissioning for indoor air quality entails performing tasks that minimize the potential for IAQ problems, but it does not eliminate their possibility.

The primary source for this checklist was Annex C in *ASHRAE Guideline 1-1989R The HVAC Commissioning Process*, Public Review Draft, 1996.

EXHIBIT 4
COMMISSIONING FIRM EXPERIENCE
 FILL OUT A SEPARATE FORM FOR EACH FIRM ON THE TEAM

Company Name	Contact Person	Title
Address	City	State/Prov
		Zip/Postal Code
Telephone	Fax	E-Mail

Description of Business

Commissioning Activities

Percentage of overall business devoted to commissioning services _____%

How long has the firm offered commissioning services _____ years

Average number of commissioning projects performed each year: _____ projects

Systems or technologies for which firm has provided commissioning services (check all that apply)

- | | | |
|--|---|---|
| <input type="checkbox"/> Pkg or split HVAC | <input type="checkbox"/> Daylighting | <input type="checkbox"/> Commercial refrigeration |
| <input type="checkbox"/> Chiller system | <input type="checkbox"/> Electrical, general | <input type="checkbox"/> Telecommunications |
| <input type="checkbox"/> Boiler system | <input type="checkbox"/> Electrical, emerg. power | <input type="checkbox"/> Thermal Energy Storage |
| <input type="checkbox"/> Energy Mgmt. Sys. | <input type="checkbox"/> Envelope | <input type="checkbox"/> Labs & Clean Rooms |
| <input type="checkbox"/> Variable Freq. Drives | <input type="checkbox"/> Fire/Life Safety | <input type="checkbox"/> _____ |
| <input type="checkbox"/> Lighting Controls | <input type="checkbox"/> Plumbing | |

Number of registered engineers on staff who have directed commissioning projects: _____

The firm has provided commissioning services in the following: (check all that apply)

<u>Building Sector</u>	<u>New Construction Major Renovation</u>	<u>Existing Building Tune-up</u>	<u>Equipment Replacement</u>
• Office or retail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Grocery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Hospitals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Laboratories	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Schools or universities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Industrial / Manufacturing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Special purpose—prisons, museums, libraries, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

EXHIBIT 5
COMMISSIONING TASK EXPERIENCE LISTING ON SIMILAR PROJECTS
 FILL OUT A SEPARATE FORM FOR EACH FIRM ON THE TEAM

KEY:

Design Review: Reviewed design and provided comment during design phase Cx Plan: Wrote the commissioning plan Specifications: Wrote commissioning specifications for construction team Funct. T. Plans: Wrote functional test procedures Witnessed FT: Witnessed and documented functional tests Hands-on Tests: Performed functional tests (hands-on)	Data/Trending: Used data loggers or EMS trend logs for testing Training: Developed or approved staff training Review O&Ms: Reviewed completed O&M manuals CP in firm: Commissioning provider was part of the firm Supervised CP: Supervised commissioning provider subconsultant to the firm Worked w/CP: Worked with a commissioning provider hired by others
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Project Name, Date Bldg Size & Type (New/Exist)	City & State Owner Contact Title and Phone	Name & Role of Persons(s) Assigned to Project by Firm (identify any subconsultants)	Systems Commissioned (Identify if tested by subconsultants)	(Enter "X" if by own firm, "S" if by subconsultant)													
				Commissioning Tasks Performed									Management				
				Design Review	Cx Plan	Specifications	Funct. T. Plans	Witnessed FT	Hands-on Tests	Data/Trendings	Training	Review O&Ms	CP in firm	Supervised CP	Worked w/CP		

