

***The University of North Carolina at Charlotte***

Capital Projects

Facilities Management

9201 University City Blvd.

Charlotte, N.C. 28223-0001

TEL: 704/687-6280

**PROJECT:** Science Building  
***LEED™/Green Globes™ Commissioning Services***  
**Code 46626, Item 301**

Thank you for your interest in the subject project. This information is being provided to all firms which express an interest in the commissioning of the project. Limit the size of your submittal document to no greater than fifty (50) pages, 12½ inches in height and 9½ inches in width. Submittals are due in this office by 2:00 p.m., January 10th, 2017. **Do not transmit any submittal information via email.**

The University is seeking an engineering firm which is capable of reviewing design documents, preparing commissioning specifications and inspecting constructed facilities to ensure proper Mechanical, Electrical, and Plumbing commissioning of the facility described in the attachment. The selected firm will coordinate commissioning efforts with the project architect, Clark Nexsen, and the MEP engineering consultants.

Submittals are to include the attached cover sheet, standard 330 Form, Commissioning Project Experience Listing form, along with any additional information considered appropriate. Please deliver five (5) hard copies of the submittal to my office at the address noted above along with one (1) digital submission (on CD, DVD, thumb-drive, etc). Commissioning Project Experience Listing form in Excel format is available on request.

In your submittal, please emphasize the achievements and qualifications of those persons who would be working on our project. If you present information on previous projects, include complete descriptions of how each of your team members participated on those projects.

The preliminary evaluation process will be complete within 21 days following the submittal due date and firms winnowed for interviews, if necessary, will be notified by this office. From that group of firms, the committee will select and rank three finalist firms.

Please deliver all submittals to me at the address written above.

Sincerely,

Joyce Clay

# **The University of North Carolina at Charlotte**

## **Science Building**

### **Building Commissioning Services**

#### **PROJECT DESCRIPTION:**

The project is for an interdisciplinary science instruction facility to include undergraduate Chemistry, Biology, and Physics teaching labs, as well as graduate level Chemistry labs. The facility will also provide Chemistry and interdisciplinary research labs, including support space, and student write up areas. The building will house administrative offices for Chemistry, and satellite offices for Biology and Physics. This state of the art science facility will provide a collaborative learning environment with a multitude of casual encounter and study spaces. Transparency inside and out will place science on display providing inspiration to students and allowing insight into science education and research. The anticipated gross square footage of the facility will be between 110,000 and 122,000 square feet. In addition to the science facility the project will also provide a Regional Utility Plant, to replace the function of the existing campus steam plant. Service to a number of existing campus buildings currently receiving steam will be replaced with hot water. In combination with the Regional Utility Plant a new data center will also be provided.

The architect for this building is Clark Nexsen of Charlotte, NC. The project is currently in the Advance Planning phase. As project architect, Clark Nexsen is responsible for LEED™ or *Green Globes™* coordination and required design documentation and verification. The selected commissioning firm members will be active advisors to the Project Team and provide “Enhanced Commissioning” in accordance with University requirements and Senate Bill 668.

#### **SCOPE OF SERVICES**

The Commissioning Authority (CxA) will serve as the University’s agent to commission all identified components in the Project. The CxA is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management. The CxA may assist with problem solving or resolving non-conformance or deficiencies, but ultimately that responsibility resides with the general contractor and the architectural design team. The primary role of the CxA shall be to develop and coordinate the execution of a Commissioning Plan; observe and document the installation, checkout, start-up, and equipment and system testing to establish that equipment and systems are functioning in accordance with the requirements of the Contract Documents; and to assist in developing correct and complete documentation of the construction effort. The CxA shall support the architect with their preparation of the required building certification commissioning documentation, if applicable.

The Commissioning Team shall conduct a review of the Schematic Design and Design Development documents prior to the Construction Documents Phase, and shall conduct a separate review of the Construction Documents near completion of the Construction Document Phase.

#### **SYSTEMS TO COMMISSION**

Systems that shall be commissioned include mechanical, electrical and plumbing equipment; and systems to include building automation systems; chilled water systems and associated equipment; boilers/ heat exchangers and associated equipment; air handling units, exhaust and other specialty fans, and terminal units; chemical water treatment systems; utility metering systems; smoke control systems (interfaces, egress pressurization); emergency power system, interior and exterior lighting control systems, electrical system

from the building entrance through the main switchboard, switchgear, and to the distribution panels; ductwork and pipe; insulation; irrigation and water conservation fixtures; heat recovery systems; and Special Use Areas.

Also, all required systems related to fume hood exhaust, lab make up air, and pressurization of lab environments to the building in general and the exterior will require commissioning. The Commissioning agent shall assist in setting the standard for the exterior building envelope to achieve proper pressurization. Commissioning will include lab humidification systems, gas, air, vacuum, and any other specialized lab systems.

## **COMMISSIONING TASKS**

The following tasks will be accomplished by the CxA to provide Commissioning during the design, construction and acceptance phases of the project. Reference Attachment A for listing of minimum formal written documents required.

### **A. Design Phase**

The CxA shall advise and lead the owner and the Design Team in documenting the written Owner Project Requirements (OPR) and University design intent, and the Design Team's Basis of Design (BOD) and rationale for accomplishing these requirements. The CxA shall also provide Design Team members with Commissioning items to be considered during design, perform a focused design review of the Schematic Design and Design Development Documents and Construction Documents (95% design stage), prepare Commissioning specifications for the construction bid documents for all systems and equipment that are to be commissioned and prepare draft of functional tests for equipment and systems to include in specifications.

### **B. Construction Phase**

During the Construction Phase, the CxA will monitor construction progress to ensure that established commissioning objectives will be achieved. The CxA shall provide the following tasks during the construction phase:

- Conduct a Pre-construction Commissioning Meeting to review Commissioning scope, plan, and schedule with the Designer's architect and engineering team, Construction Project Manager, Site Superintendents, and Project Managers and Superintendents of applicable subcontractors. Applicable subcontractors must include mechanical, electrical and plumbing.
- Coordinate the Commissioning work and, with the General Contractor (GC), ensure that Commissioning activities are being scheduled into the Contractor's Project Schedule.
- Review Bulletin Drawings and Shop Drawings and inform University in situations where Commissioning Objectives are at risk.
- Attend Designer's Monthly Project Progress Meetings and address major issues which impact successful commissioning.
- Continue to update Commissioning Schedule and coordination throughout construction with GC and subcontractors.
- Continually update and modify Commissioning Plan based on actual construction and installed equipment, and distribute to University, Design Team and GC.
- Prepare final pre-functional and final functional test procedures for the equipment and systems.
- Review and approve TAB Execution Plan.
- Maintain a Construction Variance and Deficiency Log of any items observed to be a problem, poorly installed, or discrepancies.
- Witness a sample of pipe test and flushing procedure, sufficient to be confident that proper procedures are followed.
- Witness a sample of any ductwork testing and cleaning procedures, sufficient to be confident that proper procedures are followed.
- Witness a sample of checkout, TAB, end-to-end testing, and calibration of controls.

- Observe first Pre-functional Test of each type of system, including mechanical, controls, electrical, and specialty systems.

## C. Acceptance Phase

Commissioning during the Acceptance Phase is required to demonstrate that performance of the installed equipment and systems meet the requirements of the Contract Documents and Commissioning Plan. The CxA shall complete the following tasks during the Acceptance Phase:

- Obtain copies of Pre-functional Reports from Contractor with sign-offs verifying that the systems have been checked out in compliance with the Commissioning Plan and manufacturers requirements.
- Check the accuracy of the TAB effort. Direct the TAB contractor to take sample readings and compare to TAB report.
  - check 10% of the TAB report readings of diffusers, grilles, hoods, and terminal devices;
  - check 100% of the TAB report readings for main AHU's, main pumps, and main exhaust fans;
  - document findings.
- Witness Performance Testing of smoke purge systems.
- Witness Functional Testing of each major piece of equipment to demonstrate that each item of equipment and system is operating according to the Design Intent and contract documents. Functional Testing shall include operating the system and components through each of the written sequences of operation. Test on respective HVAC equipment shall be executed during both heating and cooling seasons.
- Assist in troubleshooting to resolve control problems as they are discovered. Functional Testing shall be performed on all control points.
- Check the system graphics to assure all specified graphics are provided. Check a 10% sample of mapped points to assure reported data is consistent with actual data of monitored point.
- Maintain a Functional/Performance Test Deficiency Log of any items found to be a problem, poorly installed, or discrepancies. Provide the log and test results to the Owner, Contractor, and ARCHITECT with recommended actions.
- Notify the Owner, GC and architect of the unacceptable findings if 10% of identical pieces of equipment fail to perform to the requirements of the contract documents.
- Review O & M documentation for completeness. This review shall be in parallel with the Design Team's review of the O & M documentation for conformance to the project specification.
- Provide the user staff with a one-day systems training on "how the building is supposed to operate."
- Review, pre-approve, and coordinate training of the university operating personnel by the contractor.
- Attend two green building certification review meetings to discuss issues, and prepare certification-required commissioning documents related to construction and acceptance phase work.
- Attend State Final Inspection.
- Perform seasonal testing checkout of equipment – in September for cooling systems and in January for heating systems.
- Provide five (5) hard copies and an electronic copy of the Commissioning management report (Commissioning Final Report). The report shall include an executive summary, list of participants and roles, brief building description, and the following sections:
  - OPR
  - Design Intent
  - Basis of design
  - Pre-functional checklists complete
  - Functional checklists complete
  - TAB reports

- System schematics
- Control strategies and set points
- Deficiency Log
- Guidelines for energy accounting

### **Test Equipment**

The Contractor shall provide all tools or the use of tools as specified by the CxA in the Construction Documents that are required to start, checkout, and functionally test equipment and systems, except for identified testing with supplemental portable dataloggers, which shall be supplied and installed by the CxA.

Datalogging equipment, monitoring devices, specialized equipment, and software not required to be provided by the installing contractor in the Contract Documents, and provided by the CxA to monitor, confirm, or verify the contractor's testing procedures, shall remain the property of the CxA. Equipment provided shall meet the minimum accuracy, calibration, and performance standards required by the specified Performance Test.

### **EXPECTATIONS OF THE COMMISSIONING TEAM**

Members of the Commissioning Team must be capable of listening, comprehending and responding to University leaders who will give both general and specific guidance for desired project parameters. The team must have a principal-in-charge that is a Professional Engineer in the State of North Carolina, with other Engineers as appropriate that are also registered Engineers. Project managers, lead field Engineers, and field support staff may be non-Engineers who have the technical training, past field experience and skill in Commissioning, especially in the areas of TAB, HVAC operations, DDC systems and electrical system operations. The required expertise for this project must be part of the skill and experience set of the firm making the proposal. It is the university's desire that the Commissioning Authority (CxA) satisfy as many of the following preferences as possible:

1. It is desirable that the CxA will have acted as the principal CxA for multiple projects over 100,000 square feet, and will have acted as principal CxA for a project of a similar type facility as the Project at hand.
2. The Commissioning team members should have extensive experience in:
  - A. operation and troubleshooting of HVAC systems,
  - B. direct digital control (DDC) systems,
  - C. lighting control systems, and
  - D. testing, adjusting, and balancing (TAB) of HVAC systems. Extensive (minimum of five years) field experience is required for this type work and systems.
3. Team members have knowledge and experience in building operations and maintenance, and have provided O & M training.
4. Team members have experience in energy-efficient systems design, and control strategy optimization.
5. Team members have experience writing commissioning specifications and test procedures.

## **BUDGET**

The construction budget for this project is approximately \$75,000,000.



This sheet is to be the cover sheet for the submittal. If the submittal is bound in a binder, this will be the top sheet visible upon opening the binder cover.

# **SUBMITTAL COVER SHEET**

## **COMMISSIONING SERVICES**

### **Science Building**

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Commissioning Firm

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Engineer of Record

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Mechanical Engineering Firm

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Mechanical Engineer

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Electrical Engineering Firm

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Electrical Engineer

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Plumbing Engineering Firm

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Plumbing Engineer

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Other Firm

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# ATTACHMENT A

## COMMISSIONING FORMAL WRITTEN WORK PRODUCTS

Product	Created By	Product and Form	Description	Due Date	Deliver To
Scoping Mtg Minutes	CxA	Minutes and notes of the scoping meeting		< 1 week after meeting	All Cx team
Develop OPR	CxA	Report		Prior to SD	Design Team & University
Obtain BOD	Design Team	Report		Prior to SD	Design Team & University
Schematic Design Review	CxA	Summary report of observed concerns and deficiencies relative to University Design Intent and Cx		1 week after release of SD	Design Team & University
Construction Documents Design Review	CxA	Summary report of observed concerns and deficiencies relative to University Design Intent and Cx		1 week after release of DD and 1 week after release of CD	Design Team & University
Final Cx Plan	CxA	Final Cx plan for const. phase (edited version of Draft plan of bid documents)		1-2 weeks after Cx scoping mtg.	All Cx team
Cx Schedule	CxA	Initial summary schedule and detailed version		Summary schedule: 1wk after scoping	All Cx team
Equipment submittals	All Subs	Detailed data on all Cx'd equip.		during normal submittals	CxA
Prefunctional tests and checklists	Specs and CxA	List by equipment of Prefunctional checklists and Prefunctional tests		During normal submittals	Subs
Start-up and initial checkout plans	All Subs and CxA	Specific listing of procedures for combining CxA Prefunctional checklists with Sub's startup and checkout.		2-weeks before execution	CxA
Start-up and initial checkout reports	All Subs	Filled out Prefunctional checklists, tests, startup and initial checkout		1-week after startup completion	CxA + normal others; O&M's
Controls Contractor Initial Check-out Plan	Controls Contr.	Complete step-by-step plan on checkout and CxA calibration procedures, including forms for documentating		3 weeks before beginning checkout	CxA

TAB plan and approach	TAB	Outline of TAB plan, approach and schedule	< 6weeks before TAB	CxA, CM; Cntrls contr.
TAB progress reports	TAB	List of discrepancies, interpretations needed, tests completed	Twice a week	CxA and CM
Draft TAB report	TAB	Draft TAB report with method and results	< 2weeks after TAB completion	CxA + normal others
Final TAB report	TAB	Draft TAB report with method and results	<2 weeks after TAB completion	CxA + normal others; O&M's
Change orders	CM; PM	Change orders that affect Cx'd equipment	<1-week after approved	CxA + others
Issues Log	CxA	Record / track of all issues and deficiencies	ongoing	CM + University
Non-Compliance /Deficiency reports	CxA	List of deficiencies and non-compliance with Contract Docs identified during Cx	Issued within 3 days of identifying	Cx Team
Cx'g Progress Record	CxA	Record / track of all submittals, checklists, tests, etc.	ongoing	CM
Cx progress reports	CxA	Gives scheduling needs and update, deficiency report, Cx progress	Weekly to Monthly	CM + University
Owner-contracted functional test forms	Subs/ vendor	Full description of test procedures in "form" format	>4-weeks before test	CxA
Functional test forms	CxA	Full description of test procedures in "form" format	>4-weeks before test	CM, Subs, O&Ms; ___A/E
Filled out functional test forms	CxA	Recorded documentation of the test on the form	With final report	CM, O&Ms; ___A/E
Functional test final approvals	CxA	List of test number, and descript., date of test, approval signatures of CxA	Within 4 days of successful completion of test	CM

O&M manuals (normal)	CM and Subs	Documentation of design, equipment, operations and maintenance, as-builts, etc.	Before substantial completion	CxA reviews on-site
Training plan	Subs	Topics and methods	2 weeks before training	CxA; CM
Training completion form	CxA	List of trainees, completed hrs and topics and approvals (Form C-5c)	<2 weeks after training completion	CxA
Final Cx report	CxA	4-6 page summary report with important findings, etc.	Draft within 60 days of substantial completion	CM + University
Deferred testing reports	CxA	Documentation of seasonal and deferred tests	Within 2 weeks of test	CM + University
LEED Templates (if applicable)	ARCHITECT	LEED Letter Templates signed by CxA confirming conformance to LEED guidelines	Within 30 days of State Final Inspection	ARCHITECT & University
Re-commissioning Manual	CxA	Information required for re-commissioning building systems	Draft within 30 days of State Final Inspection	University
Contract to review building operation	Owner	Proposal from CxA accepted and contract issued.	Within 30 days of State Final Inspection	CxA

# Attachment B



Commissioning RFQ  
Supplemental Informæ

Please click on above icon and fill out the spreadsheet.