Tates Creek High School Testing and Balancing RFP

1111 Centre Parkway, Lexington, KY 40517

7/27/20

RFP 27-20

This request is for a proposal for testing and balancing services for the new Tates Creek High School and Fieldhouse as described herein. The TAB contractor will be contracted directly with Fayette County Public Schools.

Client Contact Information:	Melinda Joseph-Dezarn, Director of Planning and Construction
	Fayette County Public Schools
	400 Springhill Drive
	Lexington, KY 40503
Project Address:	1111 Centre Parkway
	Lexington, KY 40517

Project Start Date:	7/2020
Expected End Date:	11/2022

The duct testing portion of the project shall be covered by an allowance of 112 hrs. included in the lump sum fee. Refer to 231200 Sheet Metal for duct testing scope. Any unused portion of the allowance shall be credited back to the owner at the unit price rate.

The proposal shall be lump sum fee.

The TAB service fee proposal is $_____

The duct testing unit price is $ _____

RFP responses to be sent to Melinda Joseph-Dezarn via email **on or before 8/3/20**.

melinda.josephdezarn@fayette.kyschools.us

SECTION 203100 - TESTING, BALANCING, LUBRICATION AND ADJUSTMENTS

1. GENERAL

A. The General Conditions, Instructions to Bidders, Section 200100, and other Contract Documents are a part of this specification and shall be binding on all Mechanical Contractors. It shall be each Contractor's responsibility to apprise himself of all information pertinent to his work prior to submitting his proposal. No adjustments will be made in this Contract which are a result of failure to comply with this requirement.

B. The Engineer, or his authorized representative, shall be notified by the Contractor twenty-four (24) hours in advance of any tests called for in these specifications or required by others. Any leaks or imperfections found shall be corrected and a new test run to the satisfaction of the Engineer or his authorized representative. Upon completion of a test, a written approval of that part of the work will be given to the Contractor. Only after written approval, signed by the Engineer, shall the Contractor apply insulation or paint or allow his work to be furred-in. This written approval, however, does not relieve the Contractor of the responsibilities for any failure during the guarantee period. The expense of all tests shall be borne by the Contractor, along with all temporary equipment, materials, gauges, etc. required for tests.

2. PLUMBING

A. Piping shall be tested before being insulated or concealed in any manner. Where leaks or defects develop, required corrections shall be made and tests repeated until systems are proven satisfactory.

B. Water piping systems shall be subjected to a hydrostatic test of one hundred fifty pounds. The system shall be proven tight after a twenty-four (24) hour test.

C. The house drain line, interior storm sewers, interior rain water conductors, and all soil, waste and vent piping shall be subjected to a hydrostatic test of not less than a 10-foot head or an air test of not less than 5 lbs. per sq. inch using a mercury column gauge and shall hold for 15 minutes.

D. Exterior sewer lines to the termination point outside the building shall be subject to a ten-foot hydrostatic test or an approved smoke test. These lines shall be subjected to a second test after 2 feet of backfill has been properly installed.

E. After fixtures have been installed, the entire plumbing system, exclusive of the house sewer, shall be subjected to an air pressure test equivalent to one-inch water column and proven tight. The Contractor responsible shall furnish and install all of the test tees required, including those for isolating any portion of the system for tests.

F. The Contractor shall perform all additional tests that may be required by the Kentucky Department of Health or other governing agency.

G. Set temperature control on water heaters and adjust tempering valves as required.

H. Any leaks or imperfections found shall be corrected and a new test run until satisfactory results are obtained. The cost of repair or restoration of surfaces damaged by leaks in any system shall be borne by the Contractor.

I. The compressed air system shall be tested for leaks for eight (8) hours at 250 PSI.

J. The natural gas piping shall be tested in accordance with requirements and/or recommendations of the local gas company.

K. Fuel oil piping shall be static tested at 250 PSI for eight (8) hours.

L. The domestic hot water recirculation system balancing shall be performed. The system shall be balanced as often as necessary to obtain desired system operation and results.

3. HEATING, VENTILATING AND AIR CONDITIONING

A. All piping shall be tested before being insulated or concealed in any manner. Where leaks or defects develop, required corrections shall be made and tests repeated until systems are proven satisfactory. Water piping systems shall be subjected to a hydrostatic test of not less than one hundred pounds and shall be proven tight after a twenty-four (24) hour test.

B. All motors, bearings, etc. shall be checked and lubricated as required. All automatic, pressure regulating and control valves shall be adjusted. Excessive noise or vibration shall be eliminated.

C. Thermometers and gauges shall be checked for accuracy. If instruments are proven defective, they shall be replaced.

D. For all balance valves, include pressure drop and balance valve setting in the final balance reports.

E. System balancing, where required, shall be performed only by persons skilled in this work. The system shall be balanced as often as necessary to obtain desired system operation and results.

F. All fan belts shall be adjusted for proper operation of fans. If sheaves are required to obtain the air flows specified, the Contractor shall provide them.

G. Set temperature controls on boilers, etc. as specified.

H. Pressure test ductwork if required by sheet metal specification section 231200.

I. The Contractor shall adjust all pump drives or balancing valves to obtain water flow specified. The Contractor shall also provide and change pump impellers, if required, to obtain flows specified.

J. The Contractor shall perform and be responsible for lubrication of all equipment prior to operation. Equipment damaged by failure to perform proper lubrication shall be repaired at his expense.

K. For the purpose of placing the heating, ventilating and air conditioning system in operation according to design conditions and certifying same, final testing and balancing shall be performed in complete accordance with AABC Standards for Field Measurements and Instrumentation Form No. 81266, Volume One, for air and hydronic systems as published by the Associated Air Balance Council. The Contractor shall procure the services of an AABC or NEBB Certified company, approved by the Engineer, that specializes in and whose business is to balance and test mechanical systems. The Balance Contractor must be independent and may not be a Branch or Company owned by any other Contractor on the project.

L. Instruments used for testing and balancing of air and hydronic systems shall have been calibrated within a period of six months prior to balancing. All final test analysis reports shall include a letter of certification listing instrumentation used and last date of calibration.

M. The temperature controls supplier shall provide thorough training, all required software and cable connections to the test and balance trades for use in balancing the systems.

N. The Contractor must submit any list of interim deficiencies and preliminary balance reports to the Engineer prior to final balance. The Contractor shall make all necessary corrective measures prior to the final balance report submittal.

O. Four (4) copies of the complete test reports shall be submitted to the Consulting Engineer prior to final acceptance of the project.

P. The Contractor shall provide and coordinate their work in the following manner:

(1) Provide sufficient time before final completion date so that tests and balancing can be accomplished.

(2) Provide immediate labor and tools to make corrections when required without undue delay.

(3) The Contractor shall put all heating, ventilating and air conditioning systems and equipment and range hood system into full operation and shall continue the operation of same during each working day of testing and balancing.

Q. Balance all water and air systems. Be sure to include:

(1) Domestic Hot Water Recirculating System.

R. Geothermal Balance

(1) Confirm flushing velocities (forward and backward) in geothermal well field.

(2) Confirm pressure drop values for each well field zone.

(3) Set flow rate for each well field zone.

(4) Submit report confirming above geothermal information to the Engineer prior to submission of final balance report.

S. Automatic Flow Control Balance Valves

(1) Verify that each installed automatic flow control device matches the GPM indicated on the drawings.

(2) Verify that the actual pressure at each automatic flow control device is within the pressure limits specified by the valve manufacturer.

(3) Include documentation of the above information for each control device in the final balance report.

4. BUILDING AIR TIGHTNESS TEST

A. The fan pressurization test shall be performed by the commissioning agent.

5. FIRE PROTECTION SYSTEM

A. Test in accord with local Fire Marshal requirements and/or requirements or recommendations of NFPA Regulations.

6. AQUISITION OF DOCUMENTS

The general contractor or construction manager shall furnish one set of all documents, addenda, change orders, shop drawings, etc to the balance contractor for his use.

7. TESTING, ADJUSTING, AND BALANCING TO BE PERFORMED UNDER SEPARATE CONTRACT

A. GENERAL

(1) Related Documents

a. All Divisions 200000 through 250000 specification sections, drawings, and general provisions of the contract apply to work of this section, as do other documents referred to in this section.

(2) Scope of Work

a. The Owner will directly contract with a certified testing, adjusting, and balancing (TAB Agency) to test, adjust, and balance the HVAC systems.

b. This specification section is included herein to assist and inform the Contractor of the standards, requirements and scope of the work to be performed by the TAB Contractor.

(3) Preparation and Coordination Requirements – General

a. Shop drawings, submittal data, up-to-date revisions, change orders, and other data required for planning, preparation, and execution of the TAB work shall be provided to the TAB Agency no later than 30 days prior to the start of TAB work.

b. System installation and equipment startup shall be complete prior to the TAB Agency's being notified to begin.

c. The building control system shall be complete and operational. The Building Control system contractor shall install all necessary computers and computer programs, and make these operational. Assistance shall be provided as required for reprogramming, coordination, and problem resolution.

d. All test points, balancing devices, identification tags, etc., shall be accessible and clear of insulation and other obstructions that would impeded TAB procedures.

e. Qualified installation or startup personnel shall be readily available for the operation and adjustment of the systems. Assistance shall be provided as required for coordination and problem resolution.

(4) Preparation and Coordination Requirements - HVAC Controls

a. Written notice shall be submitted through the General Contractor to the Architect stating that the Control System is operating and controlling the HVAC System.

b. The control subcontractor shall have entered all data needed for the TAB Agency to begin work.

c. The control subcontractor shall be available to correct any problems that the TAB Agency might have with the systems.

d. All costs for additional work by the TAB Agency due to the Contractor's failure to comply with the above shall be paid by the Contractor and any subcontractor(s) for HVAC controls.

(5) Preparation and Coordination Requirements – Mechanical

a. Written notice shall be submitted through the General Contractor to the Architect stating that the HVAC system is operational and ready for the TAB Agency.

b. The mechanical subcontractor shall have proved all units operational and all air outlets in the full open position.

c. The mechanical contractor shall be available to correct any problems that the TAB Agency might have with any equipment or systems.

d. The mechanical contractor shall furnish and install any replacement sheaves, pulleys and drive belts required for flow adjustments, as determined by the TAB Agency. Adjustable sheaves shall be selected so that the final adjustment position is in the middle third of the total adjustment range.

e. All costs for additional work by the TAB Agency due to the Contractor's failure to comply with the above shall be paid by the Contractor and any subcontractor(s) for mechanical work.

(6) Preparation and Coordination Requirements – Ductwork

a. Ductwork air leakage testing shall be performed by the TAB Agency.

b. The ductwork/sheetmetal subcontractor shall promptly correct any related problems discovered by the leakage tests.

c. All costs associated with retesting and/or delays or other problems which impede the TAB Agency from performing such testing shall be paid by the Contractor and any subcontractor(s) for ductwork.

(7) Work by TAB Agency

a. The work included in the remainder of this section consists of furnishing labor, instruments, and tools required in testing, adjusting and balancing the HVAC systems, as described in these specifications or shown on accompanying drawings. Services shall include checking equipment performance, taking the specified measurements, and recording and reporting the results. This work shall be performed by the TAB Agency under direct contract to the Owner. The remainder herein is also for the information of the Contractor and all subcontractors.

b. The TAB agency shall provide lifts, scaffolding, etc. as required to balance devices in areas with high ceilings such as gymnasiums, auditoriums, atriums, cupolas, etc.

c. The items requiring testing, adjusting, and balancing include the following:

Air Systems:

Supply Fan OA-1
Relief Fans OA-1
All lab exhaust Fans
Zone Branch and Main Ducts
Diffusers, Registers and Grilles
Coils (Air Temperatures) including IT fan coils
IT fan coil supply fans

Ventilation Fans
VAV Terminal Units
Air to water heat pumps

Hydronic Systems:

Hydronic Pumps
System Mains and Branches
Coils
Water to water heat pumps

(8) Qualifications

a. Agency Qualifications: The TAB Agency shall be a current member of a nationally recognized balance organization (National Organization). This Organization shall provide the Owner with National Guarantee document certifying the work of the TAB Agency. Acceptable organizations are Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB).

1) The selected TAB Agency must provide proof of certification for the total project (air, water, sound, vibration, etc.).

2) The selected TAB Agency shall possess computers, cables, and software needed to operate the building control system. This requires the TAB Agency to be properly licensed and/or trained to run the Control Contractor's software.

(9) Definitions, References and Standards

a. All work shall be in accordance with the latest edition of the National Standards, as published by the National Organization affiliated with the TAB Agency.

(10) Submittals

a. Qualifications: The TAB Agency shall submit a company resume listing personnel and project experience in air and hydronic system balancing and a copy of the Agency's test and balance engineer (TBE) certificate. Certification in noise, vibration, and air quality shall be submitted as the job requires.

b. Procedures and Agenda: The TAB Agency shall submit the TAB procedures and agenda proposed to be used.

(11) Reports

a. Final TAB Report: The TAB Agency shall submit the final TA report for review by the Engineer. All outlets, devices, HVAC equipment, etc., shall be identified, along with a numbering system corresponding to report unit identification. The TAB Agency shall submit

a National Project Performance Guaranty assuring that the project systems were tested, adjusted and balanced in accordance with the project specifications and National Standards.

b. Submit 3 copies of the Final TAB Report.

(12) Deficiencies

a. Any deficiencies in the installation or performance of a system or component observed by the TAB Agency shall be brought to the attention of the appropriate responsible person. Also notify the mechanical project representative from the Division of Engineering.

b. The work necessary to correct items on the deficiency listing shall be performed and verified by the affected contractor before the TAB Agency returns to retest. Unresolved deficiencies shall be noted in the final report.

B. INSTRUMENTATION

All instruments used for measurements shall be accurate and calibrated. Calibration and maintenance of all instruments shall be in accordance with the requirements of the National Standards.

(1) General

a. The specific systems shall be reviewed and inspected for conformance to design documents. Testing, adjusting and balancing on each identified system shall be performed. The accuracy of measurements shall be in accordance with National Standards. Adjustment tolerances shall be + or - 10% unless otherwise stated.

b. Equipment settings, including manual damper quadrant positions, manual valve indicators, fan speed control levers, and similar controls and devices shall be marked to show final settings.

c. All information necessary to complete a proper TAB project and report shall be per National Organization's standards unless otherwise noted. The descriptions for work required, as listed in this section, are guides to the minimum information needed.

(2) Air Systems

a. The TAB Agency shall verify that all ductwork, dampers, grilles, registers, and diffusers have been installed per design and set in the full open position. The TAB Agency shall perform the following TAB procedures in accordance with the National Standards:

For Supply Fans:

1) Fan Speeds - Test and adjust fan RPM to achieve maximum or design CFM. Confirm proper rotation direction.

2) Current and Voltage - Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure fan motor is not in or above the service factor.

3) Pitot-Tube Traverse - Perform a Pitot-tube traverse of main supply and return ducts, as applicable to obtain total CFM.

4) Outside Air - Test and adjust the outside air on applicable equipment using a Pitot-tube traverse. If a traverse is not practical use the mixed/air temperature method if the inside and outside temperature difference is at least 20 degrees Fahrenheit or use the difference between Pitot-tube traverses of the supply and return air ducts.

5) Static Pressure - Test and record system static profile of each supply fan.

For Relief Fans:

1) Fan Speeds - Test and adjust fan RPM to achieve maximum or design CFM. Confirm proper rotation direction.

2) Current and Voltage - Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure fan motor is not in or above the service factor.

3) Static Pressure - Test and record system static profile of each relief fan.

4) Pitot-Tube Traverse - If possible, per system ductwork, perform a traverse to determine relief air CFM.

For Exhaust Fans:

1) Fan Speeds - Test and adjust fan RPM to achieve maximum or design CFM. Confirm proper rotation direction.

2) Current and Voltage - Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure fan motor is not in or above the service factor.

3) Pitot-Tube Traverse - Perform a Pitot-tube traverse of main exhaust ducts to obtain total CFM.

For Zone, Branch and Main Ducts:

1) Adjust ducts to within design CFM requirements. As applicable, at least one zone balancing damper shall be completely open. Multi-diffuser branch ducts shall have at least one outlet or inlet volume damper completely open.

For Diffusers, Registers and Grilles:

1) Tolerances - Test, adjust, and balance each diffuser, grilles, and register to within 10% of design requirements.

2) Adjust all adjustable diffusers to minimize air drafts and eliminate suspended light fixture sway.

3) Adjustable diffusers in spaces with ceilings taller than 9 feet shall be adjusted to eliminate air stratification during heating season.

4) Identification - Identify the type, location, and size of each grille, diffuser, and register. This information shall be recorded on air outlet data sheets.

For Coils:

1) Air Temperature - Once air flows are set to acceptable limits, take wet bulb and dry bulb air temperatures on the entering and leaving side of each cooling coil. Dry-bulb temperature shall be taken on the entering and leaving side of each heating coil.

(3) Hydronic Systems

a. The TAB Agency shall, as applicable, confirm that all hydronic equipment, piping, and coils have been filled and purged; that strainers have been cleaned, and that all balancing valves (except bypass valves) are set full open. The TAB Agency shall perform the following testing and balancing functions in accordance with the National Standards:

For Pumps:

1) Test and adjust chilled water, hot water, and condenser water pumps to achieve maximum or design GPM. Check pumps for proper operation. Confirm proper rotation direction. Pumps shall be free of vibration and cavitation. Record appropriate gauge readings for final TDH and Clock/Off/Dead head calculations.

2) Current and Voltage - Test and record motor voltage and amperage, and compare data with the nameplate limits to ensure pump motor is not in or above the service factor.

For System Mains and Branches:

1) Adjust water flow in pipes to achieve maximum or design GPM.

For Coils:

1) Tolerances - Test, adjust, and balance all chilled-water and hot-water coils within 10% of design requirements.

2) Verification - Verify the type, location, final pressure drop and GPM of each coil. This information shall be recorded on coil data sheets.

For Domestic Hot Water System:

1) Balance domestic hot water recirculation system.

For Duct Testing:

1) See Specification Section 231200 for specific requirements.

(4) Other TAB Services

a. Preconstruction Plan Check and Review: The TAB Agency shall review the project documents and contractor submittals for their effect on the TAB process and overall performance of the HVAC system. It shall submit recommendations for enhancements or changes to the system within 30 days of document review.

b. Job Site Inspections: During construction, the TAB Agency shall inspect the installation of pipe systems, sheet metal work, temperature controls, and other component parts of the HVAC systems. Inspections shall be conducted a minimum of two times. (Typically, these are performed when 60% of the total system is installed and again when 90% of the total system is installed, prior to insulation of the duct and piping). The TAB Agency shall submit a written report of each inspection.

c. Duct Leakage Testing: The installing contractor shall isolate and seal sections of ductwork for testing. The test pressures required and the amount of duct to be tested shall be described by the Engineer in the appropriate duct classification section. All testing shall be based on one test per section only unless otherwise noted.

d. Temperature Testing: To verify system control and operation, a series of three temperature tests shall be taken at approximately two-hour intervals in each separately controlled zone. The resulting temperatures shall not vary more than two degrees Fahrenheit from the thermostat or control setpoint during the tests. Outside temperature and humidity shall also be recorded during the testing periods. (Random zones may be selected by the Engineer if such a test is needed to prove building system.)

e. Fume Hood Testing: The TAB Agency shall test and adjust fume hood total air flow by duct Pitot-tube traverse or best possible method. If a Pitot-tube traverse is not practical, an explanation of why a traverse was not made must appear on the appropriate data sheet. Test and record face velocities under design operating conditions using a maximum of a one square foot grid patterns across the entire open face. The TAB Agency shall set sash height on hoods to obtain face velocities within 20% to 100 feet per minute unless specified otherwise. It shall test and adjust VAV controllers to obtain design exhaust air flows and make-up air flows to maintain design hood pressures and face velocities, and design room pressurization. The TAB Agency shall test for turbulence and proper air flow patterns at the face and inside the hoods using a hand-held smoke puffer or other approved smoke-emitting device.

f. Kitchen Hood Testing: The TAB Agency shall test and adjust kitchen hood total airflow by duct Pitot-tube traverse or best possible method, if applicable under local code. All sealed of test holes in the exhaust duct to be by others per local code requirements. The TAB Agency shall test and record face velocities in accordance with design requirements. It shall test and adjust make-up airflow (if included) to meet design face velocities and pressurization and to minimize turbulence.

g. Building/Zone Pressurization: The TAB Agency shall test and adjust building/zone pressurization by setting the design flows to meet the required flow direction and pressure differential. For positive pressure areas, it shall set the supply air to design flow, and gradually reduce and exhaust air rate to obtain the required flow or pressure difference. For negative pressure areas, it shall set the supply air to design flow, and gradually increase the exhaust air rate to obtain the required flow or pressure difference.

END OF SECTION 203100