

**TP MECHANICAL CONTRACTORS**  
**SUBCONTRACT AGREEMENT**

<b>PROJECT</b>	UC SA CENTER FOR IDENTITY &
<b>CONTRACTOR</b>	PEPPER CONSTRUCTION CO
<b>SUBCONTRACTOR</b>	NATIONAL TAB
<b>PROJECT ARCHITECT</b>	
<b>SUBCONTRACT WORK</b>	ALL TEST & BALANC PER THE ATTACHED QUOTE, SCOPE REVIEW CONDUCTED ON 3/21/23. IN STRICT ACCORDANCE WITH THE ATTACHED SPECIFICATION.
<b>CONTRACT DATE</b>	3/21/2023
<b>MASTER AGREEMENT (Y or N)</b>	No
<b>CONTRACT AMOUNT</b>	\$5,505.00
<b>RETAINAGE PERCENTAGE</b>	10
<b>SUBCONTRACT NUMBER</b>	A1976-05

This Subcontract Agreement (“Agreement”) is entered into between by TP MECHANICAL CONTRACTORS, INC. (“TP”) and NATIONAL TAB (“Subcontractor”) for the purposes set forth below.

**Background Information**

A. TP has its principal corporate office at 1500 Kemper Meadow Drive, Cincinnati, Ohio 45240 and is in the business of providing labor, equipment, material and services to various customers;

B. “Owner” for the purposes of this agreement refers to the owner set forth in the purchase order provided by TP;

C. Subcontractor is in the business of providing labor, equipment, material and services, and other construction and maintenance work of a general nature and represents that it is skilled and experienced in the performance of such work and desires and agrees to perform such work for TP; and,

D. TP desires to enter into a Master Agreement with Subcontractor to cover one or multiple Projects.

**Statement of Agreement**

The parties, after acknowledging the accuracy of the above Background Information, agree to the following terms and conditions:

**ARTICLE 1**  
**SCOPE OF WORK**

1.1 TP has retained the Subcontractor as an independent contractor to provide labor, material, equipment and services as set forth in this Agreement (the “Subcontract Work”). Subcontractor shall perform the Subcontract Work under the general direction of TP in accordance with this Agreement.

1.2 In conjunction with this Agreement, Subcontractor may be issued a “Purchase order” for a specific Project or Projects. Such Purchase order will describe the specific work to be undertaken by the Subcontractor. Along with Purchase orders, TP may include plans, drawings, and particular work specifications with which Subcontractor must comply in completing the work specified in the Purchase order.

1.3 The scope of the Subcontract Work shall consist of all work necessary, or incidental to all work, in accordance with, and reasonably inferable from the Subcontract Work, and as being necessary to produce the intended results.



Project Name: UC Student Activity Center  
 Project Number: A1976  
 Project Manager: Jeff Rullman  
 Vendor Name: National Tab  
 Completed By: Rullman / Blust  
 Date Completed: 3/21/2023

**SUBCONTRACTOR SCOPE REVIEW - TEST & BALANCE**

Scope Requirements	Yes	No	Subcontractor Comments	Yes	No
<b>GENERAL</b>					
Drawing / Specification Date:			8/22/2022		
List Addendums / Bulletins Included in Scope:			None		
Lead Time for final TAB Report once Field Work is Complete:			1 week		
Is Certified Payroll Required:	x		If YES, Provided in Proposal:		
Will an AIA SOV be required from Subcontractor:	x		Per Building		
Will weekend work be required to meet Schedule:		x	If YES, Provided in Proposal:		
Will provide necessary insurance documents as required:			on file	x	
Will submit to background / drug checks if required on project:			COATS cards are required	x	
Will abide by all safety requirements while on project:				x	
Will attend weekly job meetings as requested:					x
Will provide clean up of own work daily:				x	
Will be responsible for own jobsite parking:				x	
Will provide all necessary work platforms to complete work:				x	
Will provide material handling as required:			n/a		
Other:			If YES, Provided in Proposal:		
<b>SUBCONTRACTOR - TEST &amp; BALANCING (S00400)</b>					
TAB Testing Prior to Construction Required:		x	If YES, Provided in Proposal:		
PLBG-Domestic Water Balance Required:	x		If YES, Provided in Proposal:		
PLBG-Domestic Recirculation Pumps Balance Required:	x		If YES, Provided in Proposal:		
PLBG-Pump Balance Required:	x		If YES, Provided in Proposal:		
HYD-Chilled Water System Balance Required:		x	If YES, Provided in Proposal:		
HYD-Condenser Water System Balance Required:		x	If YES, Provided in Proposal:		
HYD-Cooling Tower Equipment Balance Required:		x	If YES, Provided in Proposal:		
HYD-Heating Hot Water System Balance Required:		x	If YES, Provided in Proposal:		
HYD-Pump Balance Required:		x	If YES, Provided in Proposal:		
HYD-Equipment Coils (CWS&R, HHWS&R) Balance Required:	x		If YES, Provided in Proposal:		
HYD-Reheat Coils (HHWS&R) Balance Required:	x		If YES, Provided in Proposal:		
HVAC-AHU (S/A, R/A, OA, Relief Air) Balance Required:		x	If YES, Provided in Proposal:		
HVAC-Air Flow Monitoring Station Balance Required:		x	If YES, Provided in Proposal:		
HVAC-Exhaust Fans Balance Required:		x	If YES, Provided in Proposal:		
HVAC-MUA / SA Fans Balance Required:		x	If YES, Provided in Proposal:		
HVAC-LAB Flow Control Valves Balance Required:		x	If YES, Provided in Proposal:		
HVAC-LAB Hood Systems Balance Required:		x	If YES, Provided in Proposal:		
HVAC-Kitchen Hood Systems Balance Required:	x		If YES, Provided in Proposal:		
HVAC-Final VFD / Speed Control Adjustment Required:		x	If YES, Provided in Proposal:		
HVAC-Ductwork Systems Balance Required:		x	If YES, Provided in Proposal:		
HVAC-Air Device Balance Required:	x		If YES, Provided in Proposal:		
HVAC-Replacement Sheaves & Belts Required:		x	If YES, Provided in Proposal:		
HVAC-Duct Pressure Testing Required:		x	If YES, Provided in Proposal:		
Other:			If YES, Provided in Proposal:		
Other:			If YES, Provided in Proposal:		

**VENDOR PROPOSAL**

Any Specific Exclusions in the Proposal:		If YES, note below:	
a.			
b.			
c.	Possible reimbursement for lift		
d.			
e.			
f.			

Is this a Taxable project:	CHOOSE	If YES, Provided in Proposal:	<input checked="" type="checkbox"/>	x
Is this a Prevailing Wage project:	CHOOSE	If YES, Provided in Proposal:	<input checked="" type="checkbox"/>	x
Bid Price:		\$5,505.00		
Final Proposal Amount:		\$5,505.00		
Freight Terms:				
Any Discount Terms:		If YES,		
Payment Terms:		PER TPMC SUBCONTRACT		

**SCHEDULE**

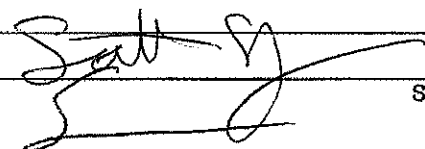

Anticipated TAB Start Date:	5/1/2023
Anticipated TAB Completion Date:	Fall 2023
Anticipated Project Completion Date:	Fall 2023
Final TAB Report Required by:	
Other:	


**OTHER COMMENTS**

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**ACKNOWLEDGEMENT**

By signing the Scope Review below, the Subcontractor acknowledges that he has reviewed all drawings and specifications and that the product & services being provided meets or exceeds all design criteria, with the exception of those exclusions specifically listed above. And in doing so, the Subcontractor is obligated to turn-over a fully functional / operational system at the conclusion of the project.

Supplier:		VP of Regional Markets	3/21/23
		Signature and Title	Date
TP Mechanical:		VP Technical Operations	3-21-23
		Signature and Title	Date

		1329 E KEMPER RD. SUITE 4210	
		CINCINNATI, OH 45246	
		513-860-2050	
		joe@nationaltab.com	
Client:	TP Mechanical	Project:	UC Student Affairs Center UPAV
Email:	kelly.simerman@tpmechanical.com	QUOTE #:	JMH-NT-14328
ATTN:	Kelly Simerman	BID DATE:	3/21/2023
Address:		Jobsite location:	2618 University Circle - Cincinnati, OH

Thank you for allowing National TAB this opportunity to bid on the testing and balancing of this project. The following is our understanding of the scope of work and the associated cost.

<u>Equipment:</u>	<u>Qty.:</u>	<u>Equipment:</u>	<u>Qty.:</u>
VAVs	10	Air Devices	

**SCOPE OF WORK:**

1. 1st Shift Work Only
2. TAB of listed equipment

This proposal includes a written report to be submitted upon completion of all work by National TAB.

**TOTAL PRICE = \$ 2,630.00**

Any parts if required will be additional. However, no parts will be provided without initial approval unless National TAB, LLC has agreed with the client for a set fee to perform specific task. Lift rental to be additional if required if not provided by owner or GC. Work to be performed 1<sup>st</sup> shift only. Prevailing wage rates are not required for TAB per section 4101:9-4-02 of the Ohio revised code. If owner/client desires to have our team paid the PW rate, please contact our office for any ADD for PW


**Not included in price: Prevailing Wage, Sound and Vibration testing, Indoor Air Quality testing, and Pre-testing is not included unless price is specified separately above.**

WE HEREBY PROPOSE to furnish labor complete in accordance with NATIONAL TAB specifications,

#NAME?

Terms as specified by our acct department. New accounts are required to fill out a credit application.

<p><b>Acceptance of proposal</b> - The above prices, specifications and conditions are satisfactory and are hereby accepted. You are authorized to do the work as specified. Payment will be made in accordance to terms agreed upon.</p> <p>Client Signature _____</p> <p>Client Date of Acceptance _____</p>	<p><b>Authorized Signature for NT:</b></p> <p style="text-align: center;"><u>Joe Hertenstein</u></p> <p>Date: <u>03/21/23</u></p>
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		1329 E KEMPER RD. SUITE 4210	
		CINCINNATI, OH 45246	
		513-860-2050	
		joe@nationaltab.com	
Comfort. Under control.			
Client:	TP Mechanical	Project:	UC Student Affairs Center CII
Email:	kelly.simerman@tpmechanical.com	QUOTE #:	JMH-NT-14327
ATTN:	Kelly Simerman	BID DATE:	12/13/2022
Address:		Jobsite location:	2801 Main St. - Cincinnati, OH

Thank you for allowing National TAB this opportunity to bid on the testing and balancing of this project. The following is our understanding of the scope of work and the associated cost.

<u>Equipment:</u>	<u>Qty.:</u>	<u>Equipment:</u>	<u>Qty.:</u>
VAVs	11	Air Devices	
Kitchen Hoods	1	VAV Reheat	11

**SCOPE OF WORK:**

1. 1st Shift Work Only
2. TAB of listed equipment

This proposal includes a written report to be submitted upon completion of all work by National TAB.

**TOTAL PRICE = \$ 2,875.00**

Any parts if required will be additional. However, no parts will be provided without initial approval unless National TAB, LLC has agreed with the client for a set fee to perform specific task. Lift rental to be additional if required if not provided by owner or GC. Work to be performed 1<sup>st</sup> shift only. Prevailing wage rates are not required for TAB per section 4101:9-4-02 of the Ohio revised code. If owner/client desires to have our team paid the PW rate, please contact our office for any ADD for PW

**Not included in price: Prevailing Wage, Sound and Vibration testing, Indoor Air Quality testing, and Pre-testing is not included unless price is specified separately above.**

WE HEREBY PROPOSE to furnish labor complete in accordance with NATIONAL TAB specifications, for the sum of: Two Thousand Eight Hundred Seventy Five US Dollars and Zero Cents and any selected options stated above. Payment to be Terms as specified by our acct department. New accounts are required to fill out a credit application.

<p><b>Acceptance of proposal</b> - The above prices, specifications and conditions are satisfactory and are hereby accepted. You are authorized to do the work as specified. Payment will be made in accordance to terms agreed upon.</p> <p>Client Signature _____</p> <p>Client Date of Acceptance _____</p>	<p><b>Authorized Signature for NT:</b></p> <p style="text-align: center;"><u>Joe Hertenstein</u></p> <p>Date: <u>12/13/22</u></p>
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## SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

### PART 1 - GENERAL

#### 1.1 SUMMARY

#### 1.2 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An independent entity meeting qualification to perform TAB work.
- F. TDH: Total dynamic head.
- G. UFAD: Underfloor air distribution.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. System Readiness Checklists: Within 30 days of Contractor's Notice to Proceed, submit system readiness checklists, as specified in "Preparation" Article.
- B. Certified TAB reports.
- C. Instrument calibration reports, to include the following:
  - 1. Instrument type and make.
  - 2. Serial number.
  - 3. Application.
  - 4. Dates of use.
  - 5. Dates of calibration.

#### 1.4 QUALITY ASSURANCE

- A. TAB Specialists Qualifications, Certified by AABC, NEBB, or TABB
  - 1. TAB Field Supervisor: Employee of the TAB specialist and certified by one of the agencies above.
  - 2. TAB Technician: Employee of the TAB specialist and certified by one of the agencies above.

- B. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."
  - 1. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- C. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.7.2.3 - "System Balancing."
- D. Code and AHJ Compliance: TAB is required to comply with governing codes and requirements of authorities having jurisdiction.

### 1.5 FIELD CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

## PART 2 - PRODUCTS (Not Applicable)

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.
- B. Examine installed systems for balancing devices, such as test ports, gauge cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data, including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine ceiling plenums and underfloor air plenums used for HVAC to verify that they are properly separated from adjacent areas and sealed.
- F. Examine equipment performance data, including fan curves.
  - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
  - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in

AMCA 201, "Fans and Systems," or in SMACNA'S "HVAC SYSTEMS - DUCT DESIGN." Compare results with the design data and installed conditions.

- G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- H. Examine test reports specified in individual system and equipment Sections.
- I. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.
- J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
- K. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- L. Examine system pumps to ensure absence of entrained air in the suction piping.
- M. Examine operating safety interlocks and controls on HVAC equipment.
- N. Examine control dampers for proper installation for their intended function of isolating, throttling, diverting, or mixing air flows.
- O. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

### 3.2 PREPARATION

- A. Prepare a TAB plan that includes the following:
  - 1. Equipment and systems to be tested.
  - 2. Strategies and step-by-step procedures for balancing the systems.
  - 3. Instrumentation to be used.
  - 4. Sample forms with specific identification for all equipment.
- B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:
  - 1. Airside:
    - a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
    - b. Duct systems are complete with terminals installed.
    - c. Volume, smoke, and fire dampers are open and functional.
    - d. Clean filters are installed.
    - e. Fans are operating, free of vibration, and rotating in correct direction.
    - f. Variable-frequency controllers' startup is complete and safeties are verified.
    - g. Automatic temperature-control systems are operational.
    - h. Ceilings are installed.
    - i. Windows and doors are installed.

- J. Suitable access to balancing devices and equipment is provided.

### 3.3 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 (sub)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 impede 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.

### 3.4 PREPARATION AND COORDINATION REQUIREMENTS – HVAC CONTROLS

- A. Written notice shall be submitted through the General Contractor to the Architect-Engineer stating that the Control System is operating and controlling the HVAC System.
- B. The Contractor/Control (sub)contractor shall have entered all data needed for the TAB Agency to begin work.
- C. The Contractor/Control (sub)contractor shall be available to correct any problems that the TAB Agency may encounter 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.

### 3.5 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 Contractor/Mechanical subcontractor shall have proved all units operational and all air outlets in the full open position.
- C. The Contractor/Mechanical subcontractor shall be available to correct any problems that the TAB Agency might have with any equipment or systems.

- D. The Contractor/Mechanical subcontractor 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.

### 3.6 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.

### 3.7 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system in accordance with the procedures contained in AABC's "National Standards for Total System Balance, NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems ", or ASHRAE 111 for LEED Projects.
- B. Cut insulation, ducts, pipes, and equipment casings for installation of test probes to the minimum extent necessary for TAB procedures.
  - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
  - 2. Where holes for probes are required in piping or hydronic equipment, install pressure and temperature test plugs to seal systems.
  - 3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish in accordance with Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping Insulation."
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

### 3.8 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

- B. Prepare schematic diagrams of systems' Record drawings duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.

### 3.9 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

- A. Adjust the variable-air-volume systems as follows:
  - 1. Verify that the system static pressure sensor is located two-thirds of the distance down the duct from the fan discharge.
  - 2. Verify that the system is under static pressure control.
  - 3. Select the terminal unit that is most critical to the supply-fan airflow. Measure inlet static pressure, and adjust system static pressure control set point so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
  - 4. Calibrate and balance each terminal unit for maximum and minimum design airflow as follows:
    - a. Adjust controls so that terminal is calling for maximum airflow. Some controllers require starting with minimum airflow. Verify calibration procedure for specific project.
    - b. Measure airflow and adjust calibration factor as required for design maximum airflow. Record calibration factor.
    - c. When maximum airflow is correct, balance the air outlets downstream from terminal units.
    - d. Adjust controls so that terminal is calling for minimum airflow.
    - e. Measure airflow and adjust calibration factor as required for design minimum airflow. Record calibration factor. If no minimum calibration is available, note any deviation from design airflow.
    - f. On constant volume terminals, in critical areas where room pressure is to be maintained, verify that the airflow remains constant over the full range of full cooling to full heating. Note any deviation from design airflow or room pressure.
  - 5. After terminals have been calibrated and balanced, test and adjust system for total airflow. Adjust fans to deliver total design airflows within the maximum allowable fan speed listed by fan manufacturer.

- a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
  - b. Set terminals for maximum airflow. If system design includes diversity, adjust terminals for maximum and minimum airflow, so that connected total matches fan selection and simulates actual load in the building.
  - c. Where duct conditions allow, measure airflow by main Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses close to the fan and prior to any outlets, to obtain total airflow.
  - d. Where duct conditions are unsuitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
6. Measure fan static pressures as follows:
- a. Measure static pressure directly at the fan outlet or through the flexible connection.
  - b. Measure static pressure directly at the fan inlet or through the flexible connection.
  - c. Measure static pressure across each component that makes up the air-handling system.
  - d. Report any artificial loading of filters at the time static pressures are measured.
7. Set final return and outside airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.
- a. Balance the return-air ducts and inlets.
  - b. Verify that terminal units are meeting design airflow under system maximum flow.
8. Re-measure the inlet static pressure at the most critical terminal unit, and adjust the system static pressure set point to the most energy-efficient set point to maintain the optimum system static pressure. Record set point and give to controls Contractor.
9. Verify final system conditions as follows:
- a. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to match design if necessary.
  - b. Re-measure and confirm that total airflow is within design.
  - c. Re-measure final fan operating data, speed, volts, amps, and static profile.
  - d. Mark final settings.
  - e. Test system in economizer mode. Verify proper operation and adjust if necessary. Measure and record all operating data.
  - f. Verify tracking between supply and return fans.

### 3.10 HVAC CONTROLS VERIFICATION

- A. In conjunction with system balancing, perform the following:
1. Verify HVAC control system is operating within the design limitations.
  2. Verify that controllers are calibrated and function as intended.
  3. Verify that controller set points are as indicated.
  4. Verify the operation of lockout or interlock systems.
  5. Verify the operation of valve and damper actuators.
  6. Verify that controlled devices are properly installed and connected to correct controller.

7. verify that controlled devices travel freely and are in position indicated by controller: open, closed, or modulating.
8. Verify location and installation of sensors to ensure that they sense only intended temperature, humidity, or pressure.

- B. Reporting: Include a summary of verifications performed, remaining deficiencies, and variations from indicated conditions.

### 3.11 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

- A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.

1. Measure and record the operating speed, airflow, and static pressure of each fan and equipment with fan(s).
2. Measure and record flows, temperatures, and pressures of each piece of equipment in each hydronic system. Compare the values to design or nameplate information, where information is available.
3. Measure motor voltage and amperage. Compare the values to motor nameplate information.
4. Check the refrigerant charge.
5. Check the condition of filters.
6. Check the condition of coils.
7. Check the operation of the drain pan and condensate-drain trap.
8. Check bearings and other lubricated parts for proper lubrication.
9. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.

- B. TAB After Construction: Before performing testing and balancing of renovated existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished in accordance with renovation scope indicated by Contract Documents. Verify the following:

1. New filters are installed.
2. Coils are clean and fins combed.
3. Drain pans are clean.
4. Fans are clean.
5. Bearings and other parts are properly lubricated.
6. Deficiencies noted in the preconstruction report are corrected.

- C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.

1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed and the face velocity of filters and coils.
2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
3. If calculations increase or decrease the airflow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.

4. Balance each air outlet.

### 3.12 TOLERANCES

- A. Set HVAC system's airflow rates and water flow rates within the following tolerances:
  1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent. If design value is less than 100 cfm, within 10 cfm.
  2. Air Outlets and Inlets: Plus or minus 10 percent. If design value is less than 100 cfm, within 10 cfm.
- B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

### 3.13 PROGRESS REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for system-balancing devices. Recommend changes and additions to system-balancing devices, to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance-measuring and -balancing devices.

### 3.14 FINAL REPORT

- A. Final TAB Report – The TAB Agency shall submit the final TAB report for review by the engineer. All equipment including but not limited to fans, outlets, traverses, static pressure profiles, pumps, coils, etc. shall be identified in the report. The report must also include, at minimum, electronic drawings that correspond to all test points for additional report clarification. The TAB Agency shall submit an "National Project Performance Guarantee" assuring that the project systems were tested, adjusted and balanced in accordance with the project specifications and National Standards.
- B. Submit three (3) electronic copies of the Final TAB Report to the Architect-Engineer, and (1) electronic copy to the Project Manager from the Division of Engineering and Contract Administration. A maximum of three (3) additional hard copies shall be submitted on request.
- C. Payments for the TAB work shall be contingent upon the proper submittal and approval of the TAB reports.

### 3.15 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 and Contract Administration.

- 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.

END OF SECTION 230593

## SECTION 220593.00 - TESTING, ADJUSTING AND BALANCING FOR PLUMBING SYSTEMS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section specifies the requirements and procedures total plumbing systems testing, adjusting, and balancing. Requirements include measurement and establishment of the fluid quantities of the plumbing systems as required to meet design specifications, and recording and reporting the results.
- B. Test, adjust, and balance the following plumbing systems:
  - 1. Sump pumps
  - 2. Hot Water Return Systems
  - 3. Additional Tests
- C. Related Sections:
  - 1. Section 22 05 03 "Submittals for Plumbing".

#### 1.3 DEFINITIONS

- A. Adjust: To regulate fluid flow rate at the terminal equipment, such as to reduce pump speed or adjust a valve.
- B. Balance: To proportion flows within the distribution system, including submains and branches, according to indicated quantities.
- C. Barrier or Boundary: Construction, either vertical or horizontal, such as walls, floors, and ceilings that are designed and constructed to restrict the movement of fluid.
- D. NC: Noise criteria.
- E. NEBB: National Environmental Balancing Bureau
- F. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.
- G. Report Forms: Test data sheets for recording test data in logical order.
- H. Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.

- I. Suction Head: The height of fluid surface above the centerline of the pump on the suction side.
- J. System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
- K. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a pump when installed under conditions different from those presented when the pump was performance tested.
- L. TAB: Testing, adjusting, and balancing.
- M. Test: A procedure to determine quantitative performance of systems or equipment.
- N. Testing, Adjusting, and Balancing (TAB) Firm: The entity responsible for performing and reporting TAB procedures.

#### 1.4 ACTION SUBMITTALS

- A. Agency Data
  - 1. Submit proof that the proposed testing, adjusting, and balancing agency meets the qualifications specified below.
- B. Maintenance Data: Submit maintenance and operating data that include how to test, adjust, and balance the building systems. Include this information in maintenance data specified in Division 1.
- C. Certified Reports: Submit testing, adjusting, and balancing reports bearing the seal and signature of the Test and Balance Engineer. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting, and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Follow the procedures and format specified below:
  - 1. Final Report: Upon verification and approval prepare final reports, type written, and organized and formatted as specified below. Submit 2 complete sets of final reports.
  - 2. Report Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, three-ring binders. Provide binding edge labels with the project identification and a title descriptive of the contents. Divide the contents of the binder into the below listed divisions, separated by divider tabs:
    - a. General Information and Summary
    - b. Sump pumps
    - c. Domestic Hot Water Return Systems
- D. Qualification Data: Within 30 days from Contractor's Notice to Proceed, submit 6 copies of evidence that the TAB firm and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.

- E. Contract Documents Examination Report: Within 30 days from Contractor's Notice to Proceed, submit 6 copies of the Contract Documents review report as specified in Part 3.
- F. Strategies and Procedures Plan: Within 60 days from Contractor's Notice to Proceed, submit 6 copies of TAB strategies and step-by-step procedures as specified in Part 3 "Preparation" Article. Include a complete set of report forms intended for use on this Project.
- G. Certified TAB Reports: Submit two copies of reports prepared, as specified in this Section, on approved forms certified by TAB firm.
- H. Sample Report Forms: Submit two sets of sample TAB report forms.

## 1.5 QUALITY ASSURANCE

- A. Codes and Standards:
  - 1. AABC: "National Standards for Total System Balance".
  - 2. ASHRAE: ASHRAE Handbook, Systems Volume, Chapter 37, Testing, Adjusting, and Balancing.
- B. Agency Qualifications
  - 1. The Plumbing Contractor shall procure the services of an independent Balance and Testing Agency, approved by the Engineer, and a member of NEBB, which specializes in the balancing and testing of plumbing systems, to balance, adjust and test all water systems and equipment as herein specified.
  - 2. All work by this agency shall be done under direct supervision of a qualified plumbing Engineer employed by this agency.
  - 3. All instruments used by this agency shall be accurately calibrated and maintained in good working order.
- C. The Balance and Testing Agency must provide the technicians with the following instruments including, but not limited to, for field use:
  - 1. One set of pressure gages and fittings.
  - 2. Thermocouple unit and thermocouples.
  - 3. Set of balancing cock adjustment wrenches.
  - 4. Portable field flowmeter.
- D. TAB Firm Qualifications: Engage a TAB firm certified by NEBB.
- E. TAB Conference: Meet with Owner's and Architect's representatives on approval of TAB strategies and procedures plan to develop a mutual understanding of the details. Ensure the participation of TAB team members, equipment manufacturers' authorized service representatives, HVAC controls installers, and other support personnel. Provide seven days' advance notice of scheduled meeting time and location.
  - 1. Agenda Items: Include at least the following:
    - a. Submittal distribution requirements.
    - b. The Contract Documents examination report.
    - c. TAB plan.
    - d. Work schedule and Project-site access requirements.
    - e. Coordination and cooperation of trades and subcontractors.
    - f. Coordination of documentation and communication flow.

2. Certification of TAB Reports: Certify TAB field data reports. This certification includes the following:
    - a. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
    - b. Certify that TAB team complied with approved TAB plan and the procedures specified and referenced in this Specification.
  - F. TAB Report Forms: Use standard forms from NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" or TAB firm's forms approved by Architect.
  - G. Instrumentation Type, Quantity, and Accuracy: Required Instrumentation for NEBB Certification."
  - H. Instrumentation Calibration: Calibrate instruments at least every six months or more frequently if required by instrument manufacturer.
    1. Keep an updated record of instrument calibration that indicates date of calibration and the name of party performing instrument calibration.
- 1.6 SEQUENCING AND SCHEDULING
- A. Systems shall be fully operational prior to beginning procedures.
- 1.7 PROJECT CONDITIONS
- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.
- 1.8 COORDINATION
- A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, controls installers, and other mechanics to operate plumbing systems and equipment to support and assist TAB activities.
  - B. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.
  - C. Perform TAB after leakage and pressure tests on plumbing systems have been satisfactorily completed.
- 1.9 GUARANTEE
- A. Special Guarantee: Provide a guarantee on NEBB forms stating that NEBB will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Guarantee shall include the following provisions:

1. The certified TAB firm has tested and balanced systems according to the Contract Documents.
2. Systems are balanced to optimum performance capabilities within design and installation limits.

## PART 2 - PRODUCTS (NOT APPLICABLE)

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper testing and balancing of systems and equipment.
- B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings. Note the locations of devices that are not accessible and/or deficiencies exist within the design of the contract drawings to allow for proper testing and balancing prior to installation.
- C. Examine the reviewed submittals for plumbing systems and equipment.
- D. Examine system and equipment installations and verify that field quality control testing, cleaning and adjusting specified in individual system and equipment Sections.
- E. Examine plumbing equipment and verify that bearings are greased and equipment with functioning controls are ready for operation.
- F. Examine operating safety interlocks and controls on plumbing equipment.
- G. Report deficiencies discovered before and during performance of the testing and balancing procedures. Observe and record system reactions to changes in conditions. Record default setpoints if different from indicated values.
- H. Verify the domestic hot water return system is correctly balanced to ensure all hot water return loop(s) maintain the designed set delivery temperature.

### 3.2 PRELIMINARY PROCEDURES FOR PLUMBING SYSTEM BALANCING

- A. Examine valves for proper installation and function.
- B. Examine equipment performance data including pump curves.
- C. Open valves to full open position.
- D. Remove, clean and reinstall all strainers.
- E. Lubricate all motors and bearings.

### 3.3 PREPARATION

- A. Prepare a testing and balancing plan that includes the following:
  - 1. Equipment and systems to be tested.
  - 2. Strategies and step-by-step procedures for balancing the systems.
  - 3. Instrumentation to be used.
  - 4. Sample forms with specific identification for all equipment.
  
- B. Prepare system-readiness checklists for use by systems installers in verifying system readiness for T&B. These shall include, at a minimum, the following:
  - 1. Piping is complete with terminals installed.
  - 2. Systems are flushed, filled and air purged.
  - 3. Strainers are pulled and cleaned.
  - 4. Shutoff and balance valves have been verified to be 100 percent open.
  - 5. Pumps are started and proper rotation is verified.
  - 6. Pump gage connections are installed directly at pump inlet and outlet flanges or in discharge and suction pipe prior to valves or strainers.
  - 7. Variable-frequency controllers' start-up is complete and safeties are verified.
  - 8. Suitable access to balancing devices and equipment is provided.

### 3.4 MEASUREMENTS

- A. Provide all required instrumentation to obtain proper measurements, calibrated to the tolerances specified in the referenced standards. Instruments shall be properly maintained and protected against damage.

### 3.5 PERFORMING TESTING, ADJUSTING, AND BALANCING

- A. Perform testing and balancing procedures on each system identified, in accordance with the detailed procedures outlined in the referenced standards.
  
- B. Cut insulation and piping for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.
  - 1. Patch insulation and housings using materials identical to those removed.
  - 2. Seal piping after testing. Then test for leaks and repair if found.
  - 3. Seal insulation to re-establish integrity of the vapor barrier.
  
- C. Mark equipment settings, including valve indicators and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.
  
- D. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.

### 3.6 GENERAL PROCEDURES FOR PLUMBING SYSTEMS

- A. Prepare test reports for pumps. Obtain approved submittals and any manufacturer-recommended testing procedures.

- B. Verify that hydronic systems are ready for testing and balancing:
1. Check liquid level in expansion tank.
  2. Check that makeup water has adequate pressure to highest vent.
  3. Check that valves are in their proper position.
  4. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
  5. Verify that motor starters are equipped with properly sized thermal protection.
  6. Check that air has been purged from the system.
- C. Adjust pumps to deliver total design gpm.
1. Measure total water flow.
    - a. Position valves for full flow through valves.
    - b. Measure flow by main flow meter, if installed.
    - c. If main flow meter is not installed determine flow by pump total dynamic head (TDH) or exchanger pressure drop.
  2. Measure pump TDH as follows:
    - a. Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
    - b. Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
    - c. Convert pressure to head and correct for differences in gauge heights.
    - d. Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.
    - e. With all valves open, read pump TDH. Adjust pump discharge valve until design water flow is achieved.
  3. Monitor motor performance during procedures and do not operate motor in an overloaded condition.
- D. Adjust flow measuring devices installed in mains and branches to design water flows.
1. Measure flow in main and branch pipes.
  2. Adjust main and branch balance valves for design flow.
  3. Re-measure each main and branch after all have been adjusted.
- E. Adjust flow measuring devices installed at terminals for each space to design water flows.
1. Measure flow at all balancing valves.
  2. Adjust each terminal to design flow.
  3. Re-measure each terminal after all have been adjusted.
- F. For systems with pressure-independent valves:
1. Measure differential pressure and verify that it is within manufacturer's specified range.
  2. Perform temperature tests after all flows have been verified.

- G. For systems without pressure-independent valves:
  - 1. Measure and balance by pressure drop or temperature method.
  - 2. If balanced by pressure drop, perform temperature tests after all flows have been verified.
- H. Verify final system conditions as follows:
  - 1. Re-measure and confirm that total water flow is within design.
  - 2. Re-measure all final pumps' operating data, TDH, volts, amps, static profile.
  - 3. Mark all final settings.
- I. Verify that all memory stops have been set.

### 3.7 PROCEDURES FOR MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
  - 1. Manufacturer's name, model number, and serial number.
  - 2. Motor horsepower rating.
  - 3. Motor rpm.
  - 4. Phase/Hertz (Hz)
  - 5. Nameplate and measured voltage, each phase.
  - 6. Nameplate and measured amperage, each phase.
  - 7. Starter size and thermal-protection-element rating.
  - 8. Service factor and frame size.
- B. Motors Driven by Variable-Frequency Controllers: Test the manual bypass of the controller to prove proper operation.

### 3.8 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

- A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.
  - 1. Measure and record the operating speed, flow, and static pressure of each pump.
  - 2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
  - 3. Check the condition of strainers.
  - 4. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.
- B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:
  - 1. New strainers are installed.
  - 2. Pumps are clean.
  - 3. Deficiencies noted in the preconstruction report are corrected.

- C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.
  - 1. Compare the indicated flow of the renovated work to the measured pump flows, and determine the new pump speed.
  - 2. Verify that the indicated flows of the renovated work result in pump speeds that are within the acceptable limits defined by equipment manufacturer.
  - 3. Adjust pump speeds within the limits of the installed drives to achieve design airflow.
  - 4. Balance system to design flows indicated.

### 3.9 FINAL TEST AND BALANCE REPORT

- A. The report shall be a complete record of the plumbing system performance, including conditions of operation, items outstanding, and any deviations found during the T&B process. The final report also provides a reference of actual operating conditions for the owner and/or operations personnel. All measurements and test results that appear in the reports must be made on site and dated by the test and balance engineers.
- B. The report must be organized by systems and shall include the following information as a minimum:
  - 1. Title Page:
    - a. NEBB certified company name
    - b. Company address
    - c. Company telephone number
    - d. Project identification number
    - e. Location
    - f. Project Architect
    - g. Project Engineer
    - h. Project Contractor
    - i. Project number
    - j. Date of report
    - k. NEBB Certification Statement
    - l. Name, signature, and certification number of TBE
  - 2. Table of Contents.
  - 3. National Performance Guaranty.
  - 4. Report Summary:
    - a. The summary shall include a list of items that do not meet design tolerances, with information that may be considered in resolving deficiencies.
  - 5. Instrument List:
    - a. Type.
    - b. Manufacturer.
    - c. Model.
    - d. Serial Number.
    - e. Calibration Date.

6. T&B Data

- C. One copy of the final test and balance report shall be sent to the engineer of record. Provide five additional copies to the contractor.

3.10 VERIFICATION OF T&B REPORT

A. Final Verification:

1. After testing and balancing is complete and accurately documented in the final report, request that a final verification be made by the engineer of record
2. The engineer of record shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
3. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
4. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final verification, the testing and balancing shall be considered incomplete.

3.11 REVERIFICATION

- A. T&B Agency shall recheck all measurements and make adjustments as required to complete the balancing. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second verification.
- B. If the second verification also fails, the engineer of record may contact NEBB Headquarters regarding the NEBB National Performance Guaranty.

3.12 ADDITIONAL TESTS

- A. Seasonal Periods: If initial T&B procedures were not performed during near-peak conditions, the engineer of record may request a flow recheck to further verify performance at near-peak conditions.

End of Section 220593.00

- 1.4 In performing the Subcontract Work, Subcontractor shall have total control of the manner in which the Subcontract Work is performed. However, TP and/or TP's customer, the Owner, shall retain the right, but not the obligation, to inspect, stop work, prescribe alterations, and generally supervise the Subcontract Work to ensure that it conforms to Owner's installation specifications.
- 1.5 The Purchase order shall control and govern the scope of the Subcontractor Work. The Purchase order shall supersede all other documents received from Subcontractor prior to the execution of this Agreement, including but not limited to any Proposal, Bid or Conditional Bid.
- 1.6 Subcontractor's obligations to complete its Work under this Agreement shall survive this Agreement and the completion of any Project contemplated by this Agreement, including any termination under paragraph 21.3.
- 1.7 Regardless of the fact that this is a Master Agreement, TP shall have no obligations to issue any Purchase orders during its term.

## **ARTICLE 2 SUBCONTRACT DOCUMENTS**

- 2.1 The "Subcontract Documents" that shall govern the relationship between the parties consist of this Agreement and the following listed documents, schedules and attachments which are all incorporated by reference and made a part hereof:
- (a) "The Prime Contract Documents", hereinafter referred to as the "Prime Contract";
  - (b) "Owner's Plans, Specifications and Other Requirements";
  - (c) "TP Safety Plan";
  - (d) Any Trade Code or Standards attached;
  - (e) Uniform Standard Specifications distributed by the Owner;
  - (f) All Municipal Ordinances and State Codes, which may apply to the Subcontract Work;
  - (g) TP Commissioning Plan; and
  - (h) TP Water response and Mold Prevention Program.
- 2.2 TP shall make available to Subcontractor the Subcontract Documents to review and copy during TP's regular business hours. It is the Subcontractor's responsibility to review and/or obtain copies of all Subcontract Documents, including TP Mechanical's subcontractor with their customer or owner.

## **ARTICLE 3 MUTUAL OBLIGATIONS**

- 3.1 TP and Subcontractor shall be mutually bound by the terms of this Agreement and, to the extent that provisions of the Prime Contract apply to the Subcontract Work, TP shall assume toward the Subcontractor all obligations and responsibilities that TP, under the Prime Contract, assumes toward Owner. TP shall have the benefit of all rights, remedies, and redress against the Subcontractor, that Owner has under the Prime Contract against TP. Where a provision of the Prime Contract is inconsistent with the provisions of this Agreement, this Agreement shall govern.

## **ARTICLE 4 SUBCONTRACT PRICE**

- 4.1 The firm fixed-price, unit prices, cost plus, and/or time and material rates and prices referenced in the Purchase order for the project are hereinafter referred to as the "Subcontract Price".
- 4.2 TP will designate in a Purchase order the method (whether fixed-price, unit prices and/or time and materials) to be used to arrive at the Subcontract Price for the Purchase order when TP issues the Purchase order.
- 4.3 Subcontractor shall pay all sales taxes, use taxes, occupation taxes, excise taxes, FICA taxes, unemployment taxes and any other tax or levy applicable to this Subcontract Agreement.

**ARTICLE 5  
TERM OF THIS AGREEMENT**

- 5.1 The terms of this Agreement shall be for a period of 5 years unless otherwise terminated in accordance with Article 21 of this Agreement.
- 5.2 Subcontractor agrees to maintain its unit prices in accordance with the Schedule of Unit Prices attached to each purchase order issued for the entire term of the purchase order . Subcontractor also agrees to maintain its time and material rates and prices in accordance with the Schedule of Labor and Material Costs attached to each purchase order for the entire term of the purchase order. .

**ARTICLE 6  
DATE OF COMMENCEMENT AND COMPLETION**

- 6.1 The date of commencement for any Subcontract Work is the date provided by TP to Subcontractor in the Purchase order.
- 6.2 In issuing a Purchase order, TP will provide to Subcontractor the completion date and/or schedule with milestone dates for the work. All work is to be completed on or before the completion and/or milestone dates. Subcontractor shall prosecute the Subcontract Work with promptness and diligence, and shall complete the several parts of the whole herein with program schedules as may be prepared and issued by Subcontractor to TP.
  - 6.2.1 If the Subcontractor believes that the scheduled completion and/or milestone dates cannot be met, Subcontractor shall propose a revised completion date to TP prior to the Subcontract Work beginning.
- 6.3 It is expressly understood and agreed that time **IS OF THE ESSENCE** of this Agreement on the part of the Subcontractor, that Subcontractor shall at all times have a sufficient number of labor, material and equipment on the Project, and that all work shall be done expeditiously by the Subcontractor.
  - 6.3.1 If, in TP's opinion and sole discretion, Subcontractor is not diligent prosecuting the Subcontract Work or any portion thereof, and after a seventy-two (72) hour written notice then Subcontractor must provide a written plan to recover their deficiencies, if at that time TP Mechanical does not approve plan, then at the Subcontractor's expense, additional labor, shifts and overtime to promptly complete the Subcontract Work, and TP shall be entitled to withhold any payment to Subcontractor until such time as Subcontractor has complied with the time allowed for completion of the Subcontract Work.
- 6.4 Subcontractor acknowledges and recognizes that its proper and timely performance of the Subcontract Work is necessary for TP to successfully complete its work for Owner under the Prime Contract. Subcontractor acknowledges that it shall be responsible to TP for any and all liquidated damages assessed against TP by Owner to the extent and in the amount provided for in the Prime Contract for the delays caused by or contributed to by Subcontractor, Subcontractor's employees and agents, sub-Subcontractors, suppliers, or any other person or entity for whose acts Subcontractor may be liable, including all or a portion of any liquidated damages assessed by Owner against TP attributable in whole or in part to such Subcontractor-caused delays. In the event liquidated damages or actual damages, or both, are caused by the Subcontractor and another entity, TP shall have the right to reasonably apportion said damages between the parties, and such apportionment shall be binding on the Subcontractor.

- 6.5 Subcontractor acknowledges that revisions may be made in the commencement and completion date set forth in the Purchase order and this Article 6 and Subcontractor agrees to make no claim for acceleration or delay by reason of such revisions so long as such revisions are of the type normally experienced in the work of this scope and complexity. In the event Subcontractor is unable to maintain progress in accordance with the dates for commencement and completion by reason of events for which extensions of time are permitted in the Subcontract Documents, Subcontractor's time for completion shall be extended for a reasonable mutually agreed upon time, provided that a time extension is given by Owner to TP, and further, provided that timely notification of delay is given within 3 days of the start of such delay. This time extension shall be the sole remedy for such delays, inefficiencies or impacts. Subcontractor shall not be entitled to recover damages from TP for any delays, inefficiencies or impacts if TP is not fully compensated by Owner for any such delays of Subcontractor. No such extension shall be deemed a waiver by TP of its right to terminate this Contract for cause as hereinafter provided or relieve the Subcontractor from full responsibility for performance of its obligations hereunder, and no such delay shall give rise to any right to the Subcontractor to claim damages therefore from TP. TP shall not be liable for any damages that may occur from delays or other causes on the part of other contractors or subcontractors involved in the Subcontract Work, or the furnishing of materials, pertaining to the Project specified in the Purchase order.

## **ARTICLE 7 PERFORMANCE OF SUBCONTRACT WORK**

- 7.1 The Subcontractor shall use its best care, skill and diligence in supervising, directing, and performing the Subcontract Work. Subcontractor shall have responsibility and control over the performance of the Subcontract Work.
- 7.2 The Subcontract Work shall be performed by individuals as employees of the Subcontractor, which is an independent contractor, and not as employees of TP. The Subcontractor and its employees do not have authority to act for TP, or to bind TP in any respect whatsoever, or to incur any debts or liabilities in the name of or on behalf of TP.
- 7.3 Subcontractor shall furnish all tools, vehicles and equipment needed by Subcontractor to carry out the Subcontract Work at its own expense. Subcontractor shall be liable for any injury or property damage resulting from the use, misuse or failure of such tools, vehicles and equipment.
- 7.4 Subcontractor shall perform the Subcontract Work with diligence in accordance with the standards of the Subcontract Documents, including those practices set forth in the Prime Contract and such other requirements as may be set forth in writing.
- 7.5 Subcontractor shall timely notify all utility companies and others who may have underground facilities in the vicinity of the Subcontract Work should the Subcontract Work involve excavation or construction. Subcontractor shall obtain appropriate information of the location of buried cable and utilities prior to performing any Subcontract Work, and shall be responsible for locating, exposing and protecting from damage all existing underground facilities, including electrical, telephone, water, gas, sewer or other utilities. Subcontractor has assumed the risk of underground facilities in its price and shall not be entitled to any extra or additional with respect thereto.
- 7.5.1 The Subcontractor shall indemnify, defend and hold harmless TP, its agents and employees from any and all claims, judgments, costs, liabilities, damages and expenses (including reasonable attorneys' fees) arising out of or related to damage or destruction of existing underground or other facilities caused directly or indirectly by the Subcontractor or any of its employees, Subcontractors, or agents.
- 7.5.2 Subcontractor shall ensure, at its own expense that immediate temporary repairs are made for any damage caused to subsurface structural properties and at the same time report the damage to the Owner of the property and TP. The Subcontractor shall not make permanent repairs to such structures unless the consent of the Owner of the property has first been obtained. This provision shall survive the termination of the Agreement.
- 7.6 Subcontractor shall contact all Owners of public and private right of way to obtain the permission required to perform the Subcontract Work prior to entering the property or starting any work thereon. Subcontractor shall comply with all conditions of such rights of way.

- 7.7 Subcontractor shall provide “as-built drawings” to TP upon completion of the Subcontract Work. The “as-built drawings” shall be submitted with the Subcontractor’s request for final payment. Final payment will not be made until complete “as-built drawings” have been received by TP.

**ARTICLE 8  
SUBCONTRACTOR’S OBLIGATIONS**

- 8.1 Subcontractor acknowledges that it will visit and inspect each site on which the Subcontract Work is to be performed and will gain an understanding of the local conditions as much as reasonably possible. Subcontractor further acknowledges that no additional compensation shall be paid to Subcontractor for costs caused by usual or ordinary work associated with subsurface objects, obstructions, including but not limited to, excessive flow of traffic, pedestrians, terrain of the work area, construction access to property or other such obstacles, that would have been reasonably discoverable in advance of the start of the Subcontract Work.
- 8.2 If in the performance of the Subcontract Work the Subcontractor finds latent, concealed or subsurface physical conditions which differ materially from the conditions the Subcontractor reasonably anticipated, or if physical conditions are materially different from those normally encountered and which caused additional cost to the Subcontractor in completing the Subcontract Work, Subcontractor must provide TP with written notice within 3 days of the discovery of these conditions. The Subcontractor may be entitled to an equitable adjustment in the Subcontract Price to the same extent TP receives such an adjustment from Owner.
- 8.3 Every part of the Subcontract Work shall be executed in strict accordance with the Subcontract Documents and in a workmanlike and substantial manner. All materials used in the Subcontract Work shall be new except such materials as may be expressly provided in the Subcontract Documents to be otherwise.
- 8.4 The Subcontractor shall correct in a timely fashion any Subcontract Work rejected by TP or Owner for failing to comply with the Subcontract Documents. Any and all such corrective work shall be performed solely at the Subcontractor’s own cost and time.
- 8.5 Subcontractor is required to perform all work in a safe and reasonable manner, and to protect employees and other persons at the site, materials and equipment stored at the site, and all property and structures located at the site and adjacent to work areas. The Subcontractor shall give all required notices and comply with all applicable rules, regulations, orders and other lawful requirements established to prevent injury, loss or damage to persons or property.
- 8.6 Subcontractor shall give immediate verbal notice to TP’s onsite supervisor and prompt written notice to TP of any accident involving personal injury requiring a physician’s care or any property damage exceeding an estimated value of \$500.

**ARTICLE 9  
SUBCONTRACTOR’S LIABILITIES**

- 9.1 Subcontractor hereby assumes the entire responsibility and liability for all work, supervision, labor and materials provided hereunder, whether or not erected in place, and for all plant, scaffolding, tools, equipment, supplies and other things provided by Subcontractor until final acceptance of the work by Owner. In the event of any loss, damage or destruction thereof from any cause, Subcontractor shall be liable therefore, and shall repair, rebuild and make good said loss, damage or destruction at Subcontractor's cost.
- 9.2 Subcontractor shall be liable to TP for all costs TP incurs as a result of Subcontractor's failure to perform this Subcontract in accordance with its terms. Subcontractor's failure to perform shall include the failure of its suppliers and/or subcontractors of any tier to perform. Subcontractor's liability shall include, but not be limited to (1) damages and other delay costs payable by TP to Owner; (2) TP's increased costs of delays or improper Subcontractor work; (3) warranty and rework costs; (4) liability to third parties; (5) excess costs; and (6) attorneys' fees and related costs.

- 9.3 If, as a result, in whole or in part, of negligence (or other act for which there is legal liability) of Subcontractor, his employees, agents or lower tier Subcontractors, any persons (including employees of Subcontractor) suffers injury or death or any property is damaged, lost or destroyed, Subcontractor assumes the liability therefore and agrees to hold TP and its agents, servants, employees and sureties harmless therefore.
- 9.4 In the event that Subcontractor or any of its agents, employees, suppliers, or lower-tier subcontractors utilize any machinery, equipment, tools, scaffolding, hoists, lifts, or similar items belonging to or under the control of TP, Subcontractor shall be liable to TP for any loss or damage (including personal injury or death) which may arise from such use, except where such loss or damage shall be due solely to the negligence of TP's employees operating TP-owned or TP-leased equipment.
- 9.5 Subcontractor's assumption of liability is independent from and not limited in any manner by the Subcontractor's insurance coverage required by this Agreement or otherwise. All amounts owed by Subcontractor to TP as a result of the liability provisions of this Subcontract shall be paid upon demand.
- 9.6 Subcontractor's liability for TP's costs under this Article 9, and under any other applicable provision of this Subcontract, shall include a 5% markup. This markup is not a penalty but is established as liquidated damages to compensate TP for its administrative costs and/or to allow TP a reasonable profit on work which TP must perform as a result of Subcontractor's failure to properly perform.
- 9.7 The Subcontractor's liability under this Article shall also be in addition to any indemnity liability imposed by the Contract Documents.

#### **ARTICLE 10 SUBCONTRACTOR'S WARRANTIES**

- 10.1 The Subcontractor warrants that the Subcontract Work shall be performed in a professional and competent manner, defect free and shall be of the quality specified by TP and Owner and in accordance with all criteria set forth in the Subcontract Documents. Subcontractor warrants its work and materials hereunder to TP on the same terms, and for the same period, as TP warrants the work to Owner under the Subcontract Documents; and, with respect to the Subcontract Work, Subcontractor shall perform all warranty obligations and responsibilities assumed by TP under the Contract Documents. The Subcontractor agrees to satisfy any and all warranty obligations without cost to TP.
- 10.2 If any portion of the Work should be covered by the Subcontractor contrary to the request of TP or Owner, or to requirements specifically expressed in the Contract Documents, it must, if required in writing by TP or Owner, be uncovered for observation and shall be replaced at the Subcontractor's expense.
- 10.3 The Subcontractor shall also: (1) promptly correct all Work rejected by TP or Owner as defective or as failing to conform to the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The Subcontractor shall bear all costs of correcting such rejected Work, including compensation for TP's and/or architect's additional services made necessary thereby; (2) If, within one year after the date of final completion of the work or designated portion thereof or within one (1) year after acceptance by the Owner of designated equipment or within such longer period of time as may be prescribed by law or by the terms of any applicable special warranty required by the Contract Documents, any of the Work performed by the Subcontractor is found to be defective or not in accordance with the Contract Documents, the Subcontractor shall correct it promptly after receipt of a written notice from TP or Owner to do so unless the Owner has previously given TP and/or Subcontractor a specific written acceptance of such condition; (3) The Subcontractor shall remove from the site all portions of the Work which are defective or non-conforming and which are defective or non-conforming and which have not been corrected unless removal is waived by the Owner; (4) If the Subcontractor fails to correct defective or non-conforming Work, TP may correct it at the Subcontractor's expense and/or exercise any of the options provided for in Article 23; and (5) The Subcontractor shall bear the cost of making good all work of the Owner or separate contractors destroyed or damaged by such correction or removal.

#### **ARTICLE 11 PAYMENT**

- 11.1 TP agrees to pay the Subcontractor for the full and faithful performance of the Subcontract Work in current funds, subject to the additions and deductions for changes in the Subcontract Work as may be agreed upon in writing before the work is performed; provided, however, that no payments are to be made unless the Subcontractor's rate of progress, work done and materials and/or services furnished are satisfactory to TP in its sole discretion and as herein agreed upon. Payments to the Subcontractor shall be made monthly, based on TP's estimate, or upon invoices or progress payment requests that have been submitted in a timely manner and approved and paid by Owner, which properly reflect the work actually and satisfactorily accomplished. All materials and work covered by partial payments shall become the property of TP, or, if the Contract Documents so provide, the property of Owner; however, this provision shall not relieve Subcontractor from the sole responsibility and liability for all work and materials upon which payments have been made until final acceptance thereof by Owner. TP encourages the subcontractor to consider an early payment discount if subcontractor is paid on the 10<sup>th</sup> of the month following its billing month.
- 11.2 As a condition for receiving payment, Subcontractor shall provide, in a form satisfactory to TP and Owner, lien or claim waivers and affidavits from Subcontractor, its sub-Subcontractor's and suppliers, on TP's approved form, for all work performed and materials supplied through the current payment request. If such lien waivers are conditional upon receipt of payment by TP, Subcontractor, with the next payment applications, will provide full and unconditional lien or claim waivers and affidavits for the previous month's payment from Subcontractor, its sub-Subcontractors and suppliers.
- 11.3 TP shall hold retainage from any and all payments due to Subcontractor equal to the percentage retained by Owner, from payments made to TP.
- 11.4 Applications for payment shall be made monthly by the 20<sup>th</sup> of the month which the work is being performed. Invoice should include any cost through the current work month.
- 11.5 It is specifically understood and agreed that TP is not obligated to make any payments to Subcontractor for any work done pursuant to this Agreement, unless and until Owner has paid TP therefor.
- 11.6 Subcontractor shall insure that all sub-subcontractors, employees and suppliers, at all times, are paid all amounts due in connection with the performance of this Subcontract. After the first partial payment hereunder, TP shall have the right to withhold any subsequent partial payments until Subcontractor submits evidence satisfactory to TP that all amounts owed in connection with performance of this Subcontract have been paid. Further, Subcontractor agrees that TP shall have the right but not the obligation, to pay all persons that have not been paid the monies due them in connection with this Subcontract whether or not a lien has been filed, and Subcontractor shall, to the extent that TP has not recovered these amounts pursuant to withholding, pay said amounts to TP upon demand. Any such payment by TP shall in no way relieve the Subcontractor of any obligation under this Subcontract. Subcontractor shall also immediately reimburse TP for any amounts paid under TP's payment bond in connection with this Subcontract and indemnified by TP. In the event TP is required to pay or indemnify any person hereunder, Subcontractor shall immediately reimburse TP for the *full cost* thereof, plus 5% for administrative and overhead costs.
- 11.7 All materials and work covered by partial payments shall become the property of TP, or, if the Contract Documents so provide, the property of Owner; however, this provision shall not relieve Subcontractor from the sole responsibility and liability for all work and materials upon which payments have been made until final acceptance thereof by Owner.
- 11.8 Final payment for the Subcontract Work, constituting the entire unpaid balance owed for the Subcontract Work, including retention, shall be paid within thirty (30) days after all of the following have occurred: (a) the Subcontract Work has been complete; (b) the Subcontract Documents have been fully performed; (c) the Subcontract Work has received and passed any and all final governmental inspections; (e) Subcontractor has provided full, final and unconditional lien or claim waivers and affidavits from Subcontractor, its sub-Subcontractors and suppliers; payment may be made sooner if TP Mechanical is paid in full by the owner, however, TP Mechanical has the right to withhold payment to subcontractor if owner has not paid TP Mechanical because of outstanding warranty items causing TP Mechanical's non-payment with the owner.

**ARTICLE 12  
LABOR RELATIONS**

12.1 The Subcontractor may employ union labor. If the Subcontractor employs union labor, Subcontractor agrees that it shall maintain in full force and effect for the duration of the Subcontract Work, a valid collective bargaining agreement between the Subcontractor and any appropriate union. All Subcontract Work performed by the Subcontractor shall be rendered in accordance with the terms and provisions of any such collective bargaining agreement and any revisions, extensions or renewals thereof, and Subcontractor shall timely pay all fringe benefits or other charges to any appropriate union. The Subcontractor agrees that it will bind by written contract, a copy of which shall be supplied to TP, all of its union Subcontractors to the appropriate collective bargaining agreement or agreements hereinabove referred to.

**ARTICLE 13  
INSURANCE**

13.1 Subcontractor shall fully comply with the workers' compensation laws for each state in which the Subcontract Work is performed by its employees, and with the safety, health and other regulations of the governmental authorities which administer such laws. Before commencing Subcontract Work, Subcontractor shall deliver to TP certificates evidencing such compliance with respect to each applicable state. Subcontractor shall procure and maintain in full force and effect workers' compensation insurance providing coverage for statutory benefits and employer's liability coverage of \$1,000,000 per occurrence. The policy shall contain an All States endorsement. The policy shall be endorsed to provide a waiver of subrogation in favor of TP. TP, without notice to Subcontractor, may pay any workers' compensation premiums, wage deficiencies or other payments charged against TP based on Subcontractor's payrolls. Subcontractor shall repay any sums so advanced by TP upon demand.

Commercial General Liability insurance shall be written on an occurrence basis with the limits not less than \$1,000,000 each occurrence and \$2,000,000 aggregate. The policy shall include coverage for premises/operations, independent contractors, contractual liability (sufficient to cover the liability assumed by the Subcontractor under this Agreement), property damage arising out of the "XCU" hazards, completed operations, products liability, broad form property damage and personal injury. The completed operations coverage shall be maintained for at least two (2) years after the final completion of the Project. If the policy contains a general aggregate limitation, then the policy shall be endorsed to provide a \$1,000,000 specific aggregate for Subcontract Work under this Agreement. The policy shall name TP and its officers, employees and agents as additional insureds and shall be endorsed to state that the insurance provided to TP shall be primary insurance in respect to TP and any other insurance policy that TP may have in effect shall be deemed excess and not contributory.

13.2 Subcontractor shall procure and maintain during the entire progress of the Subcontract Work no less than the following insurance coverage:

<b>Insurance Summary Table</b>	<b>Occurrence</b>	<b>Aggregate</b>
Commercial General Liability	\$1,000,000	\$2,000,000
Business Automobile Liability	\$1,000,000	\$1,000,000
Workers' Compensation	Statutory Limits	Statutory Limits

- (1) Commercial General Liability Insurance, of no less than \$1,000,000 per occurrence, \$2,000,000 in the aggregate, including:
  - (a) premises-operations coverage with blasting, collapse and underground exclusions deleted;
  - (b) products and completed operations coverage;

- (c) contractual coverage including both oral and written contracts covering the liability assumed under the indemnity provisions of this Agreement;
  - (d) broad form property damage coverage including completed operations; and
  - (e) personal injury coverage
- (2) Business Auto Liability insurance, with a combined single limit, including bodily injury and property damage, of no less than \$1,000,000.00 per occurrence, \$1,000,000.00 in the aggregate, including coverage for owned autos, hired or borrowed autos, and non-owned autos;
  - (3) Full and Unlimited Workers' Compensation Insurance, including employer's liability and unemployment compensation insurance
  - (4) Excess Liability coverage (umbrella) in the amount of \$2,000,000 shall be maintained throughout the project and for a period of two (2) years after project completion.
- 13.3 All insurance required hereunder shall name TP as an additional insured with coverage as set forth above, including completed operations, and shall waive all rights of subrogation against TP and/or Owner. If any policy of insurance requires an endorsement to maintain coverage with such additional insured requirement waivers, the Owner of such policy will cause the policy to be so endorsed.
- 13.4 Subcontractor insurance shall be maintained with insurance companies with a Best's Rating of A- or better, which companies shall be an admitted carrier subject to the insolvency fund of the state in which the project is located. Any exceptions to this requirement must be requested by subcontractor to TP Mechanical Contractors in writing and written consent received in writing from TP Mechanical Contractors at least five days prior to work commencement by subcontractor. The Subcontractor shall furnish TP with certificates of such insurance before commencement of the Subcontract Work. The insurance required by this article shall be written for not less than any limits of liability specified in this article, or required by law, whichever is greater.
- 13.5 The insurance shall also protect against claims resulting from acts or omissions of any Subcontractor or any anyone directly or indirectly employed by TP or any Subcontractor, or by anyone through whose acts any of them may be liable. The insurance required shall include contractual liability insurance applicable to the Subcontractor's obligations under Article 15 of this Agreement.
- 13.6 The insurance shall provide that any policy shall not be cancelled, non-renewed or reduced in coverage until thirty (30) days after written notice shall have been given to TP of cancellation, non-renewal or reduction in coverage.

#### **ARTICLE 14 SURETY BONDS**

- 14.1 TP shall have the right at any time, prior to signing a purchase order, to require the Subcontractor to furnish a bond or bonds covering the full and faithful performance of the Subcontract Work and the payment of all obligations arising there under. The surety providing the bonds to contractor must be Best's Rated A- or better and must appear on the Federal Treasury Register. Form of bonds must be acceptable to TP Mechanical Contractors.
- 14.2 The Subcontractor shall be reimbursed, without retainage, for the cost of any required performance and payment bonds with the first progress payment made by TP to Subcontractor after the performance and/or payment bonds are procured, provided that the Owner has paid TP.
- 14.3 In the event Subcontractor shall fail to promptly provide any required bonds, TP may terminate this Agreement. The Subcontractor shall pay all costs and expenses incurred by TP as a result of said termination.

**ARTICLE 15  
INDEMNIFICATION**

- 15.1 To the fullest extent permitted by law, the Subcontractor shall, at its expense, defend, indemnify and hold harmless TP and Owner, and the agents and employees of each of them (hereinafter "Indemnified Parties"), for, from and against any and all claims, losses actions, damages, expenses and any other liability, including, but not limited to, costs and reasonable attorney's fees, arising out of or resulting from performance of the Subcontract Work, its agents, subcontractors, or employees provided that any such claim, loss, action, damage, expense or other liability is attributable to bodily injury, sickness, disease or death, or to the injury to or destruction of tangible property including the loss of use resulting there from.

**ARTICLE 16  
SUBCONTRACTOR'S COMPLIANCE WITH LAWS / SAFETY**

- 16.1 Unless exempt under the rules and regulations of the Secretary of Labor or other proper authority, this Agreement is subject to applicable laws and executive orders relating to equal opportunity and nondiscrimination in employment. Subcontractor shall not discriminate in its employment practices against any person by reason of race, religion, color, sex or national origin and agrees to comply with the provisions of said laws and orders, as well as all laws and orders relating to the employment of the handicapped, the employment of veterans and the use of minority and women's business enterprises, to the extent any such laws and orders are applicable to the performance of the Subcontract Work or the furnishing of services, materials, equipment or supplies pursuant to this Agreement.
- 16.2 The Subcontractor shall comply, at its own expense, with all applicable provisions of workers compensation laws, unemployment compensation laws the Federal Social Security Law, the Fair Labor Standards Act, and all other federal, state and local laws and regulations which may be applicable to the Subcontractor as an employer of labor, including hiring verification and record keeping requirements and nondiscrimination provisions imposed by the Immigration Reform Control Act of 1986 insofar as it relates to the Subcontractor's employees. In addition, the Subcontractor shall comply, at its own expense, with all other federal, state, county, and municipal laws, ordinances, rules, regulations, orders, permits and franchises of any public authority bearing on the performance of the Subcontract Work.
- 16.3 The Subcontractor shall be responsible for its safety, the safety of its employees, its Subcontractors, and the site in general and shall comply with all applicable provisions of local, state and federal law, regulations and orders affecting safety and health, including but no limited to the occupational Safety and Health Act of 1970 (hereinafter collectively referred to as "OSHA"). The Subcontractor agrees that it shall give access to the authorized representatives of the Secretary of Labor or any state or local official for the purpose of inspecting, investigating or carrying out any duties under the OSHA and the Subcontractor shall immediately notify TP that access has been sought. The Subcontractor shall be solely responsible for any violation of the OSHA by it or its sub-Subcontractors, shall immediately remedy any condition giving rise to correct any violations, and shall defend and hold TP and Owner harmless from any penalty, fine or liability in connection therewith.
- 16.4 Safety Measures
- (a) Subcontractor shall take necessary or required safety precautions to protect the public during performance of the Subcontract Work, including, but not limited to providing, erecting, and maintaining proper warning signals, signs, lights, barricades, and fences on and along the line of the work. Subcontractor must have an on-site designated safety representative with minimum of 10-Hour OSHA Construction Training.
  - (b) Subcontractor must perform weekly toolbox talks and documented safety audits with a copy being forwarded to TP on-site management on a weekly basis or subcontractors employees must attend TP Mechanical's weekly Toolbox Talks and sign all appropriate attendee forms.
  - (c) Subcontractor must comply with the Occupational Safety and Health act, policies and procedures, owner's specific policies and procedures, and any other applicable federal, state, and local ordinances. Hard hats, safety glasses, and full clothing are required 100% on all projects.

(d) All Subcontractors must report incidents involving injury and or property damage to the TP Project Superintendent within ½ hour of occurrence.

**ARTICLE 17  
HAZARDOUS MATERIALS**

- 17.1 “Hazardous Materials” means any hazardous, radioactive, or toxic substance, material, or waste defined or regulated as such in or under any environmental, health or safety law including without limitation asbestos, lead, and those hazardous materials, substances, and wastes defined by the United States Department of Transportation (“DOT”), Occupational Safety and Health Administration (“OSHA”), Environmental Protection Agency (“EPA”) or the Nuclear Regulatory Commission (“NRC”) through their enabling statutes, or regulations, orders or rules.
- 17.2 In connection with its activities under this Agreement and all work under this Agreement, the Subcontractor shall comply with all applicable provisions of The Hazardous Materials Transportation Act (49 USC 1801, et seq.), the Resource Conservation and Recovery Act (42 USC 6901, et seq.), the Toxic Substances Control Act of 1976 (15 USC 2601, et seq.), the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 USC 9601, et seq.), the Occupational Safety and Health Act of 1970 (“OSHA”), and any other applicable federal, state and local laws and regulations governing Hazardous Materials or safety, including but not limited to state and federal motor carrier safety regulations, the DOT Hazardous Materials regulations and any regulations governing conveyance, packaging, marking, identification, storage, handling and/or disposition of Hazardous materials, or governing any accidents or incidents in connection with such activities involving Hazardous Materials, all as they may be amended or supplemented from time to time.
- 17.3 The Subcontractor will immediately notify TP of the discovery of any hazardous material or substance previously undisclosed to the Subcontractor. To the extent applicable, the Subcontractor shall furnish TP with Material Safety Data Sheets that comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200), as the same may be amended or supplemented from time to time, for any materials the Subcontractor furnishes under the Contract.
- 17.4 The Subcontractor shall indemnify and hold TP harmless in accordance with Article 15 entitled “Indemnification” for any claims, liabilities and damages, including but not limited to attorneys’ fees, costs of defense, clean-up costs, response costs, costs of corrective action, costs of financial assurance, and/or natural resource damages, that may arise, be imposed on, be incurred by, be asserted against or be sustained by TP by reason of the Subcontractor’s failure to comply with the terms of this Article.

**ARTICLE 18  
RIGHT TO INSPECT AND AUDIT**

- 18.1 Subcontractor shall maintain accurate and complete records for all charges incurred in connection with the Subcontract Work. Such records shall be maintained in conformance with generally accepted accounting principles and procedures. Subcontractor recognizes that TP and Owner reserve the right to inspect and audit said records, without notice, on the Subcontractor’s premises, during the Subcontractor’s business hours.

**ARTICLE 19  
CHANGES**

- 19.1 Owner may make changes in the Subcontract Work by issuing modifications to the Prime Contract. On receipt of any such modification issued subsequent to the execution of this Agreement, TP shall promptly notify the Subcontractor of the modification. Unless otherwise directed by TP in writing, the Subcontractor shall not thereafter order materials or perform Subcontract Work, which would be inconsistent with the changes made by the modifications to the Prime Contract.
- 19.2 TP may order the Subcontractor, without invalidating this Agreement, to make changes in the Subcontract Work within the general scope of this Agreement consisting of additions, deletions or other revisions, including those required by modifications to the Prime Contract issued after the execution of this Agreement, with the Subcontract

Price and the completion date being adjusted accordingly. The Subcontractor, prior to the commencement of such changed or revised Subcontract Work, shall submit written copies of a claim for adjustment to the Subcontract Price and completion date for such revised Subcontract Work to TP within 2 working days after receipt of the changes suggested by TP in a manner consistent with the requirements of the Subcontract Documents. If TP and Subcontractor agree on the price and/or extension of time for a change, TP will issue a change order. If TP and Subcontractor cannot agree upon the price of changes in the Work or an extension of time, Subcontractor must, after being directed in writing to perform the disputed work by TP, perform the work and the amount of the change being determined by Article 22.

- 19.3 The Subcontractor agrees to make all claims promptly to TP for additional costs, extensions of time or other causes in accordance with the Subcontract Documents. A claim that will affect or become part of a claim which TP is required to make under the Prime Contract within a specified time period or in a specified manner shall be made in sufficient time to permit TP to satisfy the requirements of the Prime Contract. Such claims shall be received by TP not less than 2 working days preceding the time by which TP's claim must be made. Failure of the Subcontractor to make such a timely claim shall bind the Subcontractor to the same consequences as those to which TP is bound under the terms of the Prime Contract. In the event the claim involves the Owner, in whole or in part, Subcontractor's claim against TP must be stayed until the dispute is resolved between TP and Owner. TP agrees that no more than 10% of contract and change orders to date will be required to proceed with unpriced or emergency change orders.

## **ARTICLE 20 FORCE MAJEURE**

- 20.1 The Subcontractor shall be excused from performance of the Subcontract Work if Subcontractor's performance is prevented by acts or events beyond the Subcontractor's reasonable control, including extreme and unusual weather conditions, industry wide strikes, pandemics, epidemics, fires, embargoes, actions of civil or military law enforcement authorities, acts of God or acts of legislative, judicial, executive, or administrative authority. Subcontractor's time for completion may be extended for a reasonable, mutually agreed upon time, provided that a time extension is given by Owner to TP and, further, provided that notification of the delay and request for an extension of time is given as provided in this Agreement. In that event, the time extension shall be Subcontractor's sole remedy for such a delay.

## **ARTICLE 21 TERMINATION**

- 21.1 It is the opinion of TP, Subcontractor shall at any time (1) refuse or fail to provide sufficient properly skilled workmen or materials of the proper quality, (2) fail in any respect to prosecute the work according to the current schedule; (3) cause, by any action or omission, the stoppage or delay of or interference with the work of TP or of any other TP or Subcontractor; (4) fail to comply with all provisions of this Subcontract or the Contract Documents; (5) be adjudged a bankrupt, or make a general assignment for the benefit of its creditors; (6) have a receiver appointed; (7) become insolvent or a debtor in reorganization proceedings; or (8) be or become unable to complete the work for financial reasons or otherwise, then, after serving 2 days written notice, unless the condition specified in such notice shall have been eliminated within such 2 days, TP, at its option (i) without voiding the other provisions of this Subcontract and without notice to the sureties, may take such steps as are necessary to overcome the condition, in which case the Subcontractor shall be liable to TP for the cost thereof, (ii) terminate the Subcontract for default; or (iii) seek specific performance of Subcontractor's obligations hereunder, it being agreed by Subcontractor that specific performance may be necessary to avoid irreparable harm to TP and/or Owner. In the event of termination for default; TP may, at its option, (a) enter the Project site and take possession, for the purpose of completing the work, of all materials, tools and specialized equipment of Subcontractor; (b) require Subcontractor to assign to TP any or all of subcontracts or purchase orders involving the Project; or (c) either itself or through others complete the work, by whatever method TP may deem expedient. In case of termination for default, Subcontractor shall not be entitled to receive any further payment until the work shall be completed and accepted by Owner. At such time, if the unpaid balance of the price to be paid shall exceed the expense incurred by TP, such excess shall be paid by TP to Subcontractor. If such amount due TP shall exceed such unpaid balance, then Subcontractor shall pay TP the difference.

- 21.2 The Subcontractor may terminate this Agreement for the same reasons and under the same circumstances and procedures with respect to TP as TP may terminate with respect to Owner under the Prime Contract.
- 21.3 TP reserves the right to terminate any Agreement with Subcontractor in the event that TP, in its sole discretion, believes that it has defaulted or is in default on any other Projects covered by this Agreement.
- 21.4 TP may, at any time, terminate this Agreement for TP's convenience and without cause. Upon receipt of written notice from TP of such termination for TP's convenience, the Subcontractor shall: (1) cease operations as directed by TP in the notice; (2) take actions necessary, or that TP may direct, for the protection and preservation of the Subcontract Work; and (3) except for Subcontract Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing work and purchase orders entered into and enter into no further purchase orders or other work. In case of such termination for TP's convenience, Subcontractor will only be entitled to receive payment for work actually accomplished and equipment and materials supplied pursuant to this Agreement and no profit or overhead on unperformed work.

## **ARTICLE 22 DISPUTE RESOLUTION**

- 22.1 Any and all controversies or claims, whether based on contract, statute, tort, fraud, misrepresentation or other theory, related directly or indirectly to this Agreement between TP and the Subcontractor, shall be resolved in accordance with the dispute resolution procedures set forth in the Prime Contract.
- 22.2 If a dispute arises out of or relates to this Agreement or its breach, the parties shall endeavor to settle the dispute first through direct discussions. If the dispute cannot be resolved through direct discussions, the parties shall participate in mediation under the Construction Industry Mediation Rules of the American Arbitration Association before recourse to any other form of binding dispute resolution. The location of the mediation shall be the location of the Project. Once a party files a request for mediation with the other party and with the American Arbitration Association, the parties agree to commence such mediation within thirty (30) days of filing of the request.
- 22.3 Either party may terminate the mediation at any time after the first session, but the decision to terminate must be delivered in person to the other party and the mediator. Engaging in mediation is a condition precedent to any other form of binding dispute resolution. Unless otherwise agreed in writing, the Subcontractor shall continue the Subcontract Work and maintain the Progress Schedule during any dispute resolution proceedings.
- 22.4 In any controversy or claim between TP and Owner in any way arising out of or related to the Subcontract Work, Subcontractor agrees that it may be joined as a party by TP and that any litigation or arbitration, which may take place pursuant to this Agreement, may be consolidated with any litigation or arbitration between Owner and TP. In the event that the provisions for resolution of disputes between TP and the Owner contained in the Subcontract Documents do not permit consolidation or joinder with disputes of third parties, such as the Subcontractor, resolution of disputes between the Subcontractor and TP involving in whole or in part disputes between TP and the Owner shall be stayed pending conclusion of any dispute resolution procedure between TP and the Owner. At the conclusion of those proceedings, disputes between the Subcontractor and TP shall be submitted again to mediation. Any disputes not resolved by mediation shall be decided in the manner selected in the agreement between the Owner and TP.

## **ARTICLE 23 CLEANUP**

- 23.1 It is understood and agreed that the Subcontractor will, during the progress of the work, remove from the Project at his own expense and on a daily basis, the dirt and debris resulting from his operations, unless TP shall direct otherwise in writing. If the Subcontractor fails to perform the required daily housekeeping activities, the work may be performed by TP after 48 hours written notice to Subcontractor's on-site supervisor, with the resulting costs charged to the Subcontractor. Upon completion of his work, he shall remove from the Project all equipment and unused materials and leave the premises in a condition satisfactory to TP.

**ARTICLE 24  
COOPERATION WITH OTHER CONTRACTORS**

- 24.1 The Subcontractor agrees to cooperate fully with all other contractors and/or subcontractors performing work on this Project and to carefully fit his own work to that provided for under such contracts and/or subcontracts as may be directed by TP Mechanical Contractors. The Subcontractor shall not commit or permit any act and/or omission that will interfere with the performance of work by any other contractor or subcontractor.

**ARTICLE 25  
SUBCONTRACTOR'S RESPONSIBLE PERSON**

- 25.1 During the progress of the Subcontractor Work, Subcontractor's responsible person shall be as set forth in the Purchase order. The responsible person shall at all times supervise the Subcontractor's work and shall act as a representative of the Subcontractor with the right and power to obligate the Subcontractor. The Subcontractor shall give ten (10) days prior written notice to TP of any change in the responsible person, and TP must consent to the replacement. Subcontractor is required to provide TP Mechanical's superintendent a 4-Week Look Ahead work schedule each week that the subcontractor is onsite.

**ARTICLE 26  
COMMISSIONING**

- 26.1 Where applicable, the Subcontractor is required to assist TP in the Commissioning Process per TP Commissioning plan as follows:

DDC Control Contractors

Attendance will be required at bi-weekly start up and commissioning meetings beginning at approximately 60% of project completion, or as TP Mechanical's Commissioning Agent deems necessary, or 2 months before system start up. All attendees will be required to be responsible and capable of making decisions related to the project.

A complete sequence of operation, including adjustable set point values, shall be submitted to TP for functional test purposes no later than 50% of project completion.

DDC contractor will be required to assist the test and balance contractor in the performance of the test and balance operation. It will be acceptable for the DDC contractor to "loan" any operating software to the test and balance contractor in lieu of assisting in the completion. Hand held devices for test and balance will not be acceptable.

A DDC technician will be required to be on site during functional testing. Pending Owner's approval, the functional testing can be inclusive with the owners training.

All testing and check out performed on the DDC system will be required to be documented and copies of those documents will be turned over to TP for inclusion into commissioning binder.

Test and Balance Contractors

Attendance will be required at start up and commissioning meetings beginning at approximately 90% of project completion, and continuing until owner acceptance.

A contract drawing review will be done during the bid phase in order to generate a list of all missing dampers and balance devices. This list will be submitted to TP before construction.

Attendance will be required at all functional testing exercises that will relate to or create system balance issues.

A completed balance report will be submitted no more than 10 working days after test and balance work is completed.

## **ARTICLE 27 LIENS**

- 27.1 The Subcontractor agrees that if at any time there shall be evidence of any lien or any other claim of any kind or description for which TP may become liable, and which is chargeable to the Subcontractor, or any subcontractor of his, and/or when damage shall be caused by this Subcontractor to the work of TP, or any other contractor or subcontractor, the Subcontractor shall promptly discharge or relieve such lien and/or claim by bonding, payment or otherwise, and in case of the failure of the Subcontractor to so discharge such lien and/or claim, TP shall have the right in addition to any other right afforded to him under the contract, to retain out of any payment then due, or thereafter to become due, an amount sufficient in the opinion of TP to completely indemnify TP against any such lien or claim.

## **ARTICLE 28 SUBLETTING OR ASSIGNMENT**

- 28.1 Subcontractor agrees that he will not sublet, assign, or transfer this Subcontract or any part thereof, or any interest therein, or any monies due hereunder, without first obtaining the written consent of TP. Any work so sublet, assigned or transferred, or any transfer of any interest or any monies due hereunder, shall be subject to all the provisions herein and such subletting, assignment or transfer shall not relieve the Subcontractor, his assignee or transferee, or any of the responsibilities required by this Subcontract.

## **ARTICLE 29 DISPUTES INVOLVING OWNER**

- 29.1 All disputes arising under or relating to the Prime Contract and/or the Owner's conduct hereunder shall be governed by and resolved in accordance with the disputes clause of the Prime Contract (or other similar provision providing a method or procedure for resolving disputes between Owner and TP) to the extent permitted by law, which clause is hereby incorporated by reference herein.
- 29.2 All "claims," as that term is defined under the disputes clause of the Prime Contract by Subcontractor arising under or relating to the Prime Contract and/or the Owner's conduct hereunder, shall be made in writing and submitted to TP within sufficient time, but no later than (72) hours after subcontractor becomes aware of the issue causing the claim, to permit TP to comply with the terms of the Prime Contract. Subcontractor shall submit with its claim all certifications required by the Prime Contract.
- 29.3 TP shall submit to the Owner those claims of Subcontractor which have been properly certified in accordance with the requirements of the disputes clause of the Prime Contract and which in TP's judgment are not frivolous or a sham.
- 29.4 Any decision of the Owner with respect to claims submitted on behalf of Subcontractor that binds TP shall likewise bind Subcontractor.

- 29.5 Subcontractor shall be responsible for the pursuit of any claim, suit or appeal under this Article submitted by TP to Owner solely on Subcontractor's behalf. Subcontractor shall be responsible for all costs, expenses and attorneys' fees incurred in connection therewith. With respect to claims, suits or appeals in the joint interest of TP and Subcontractor, TP shall be responsible for pursuing such claim, suit or appeal and each party shall be responsible for its own costs, expenses and attorneys' fees incurred.
- 29.6 TP shall have no liability to Subcontractor on account of any claim, suit or appeal arising under or relating to the Prime Contract or the Owner's conduct hereunder except that recovered by TP from the Owner on Subcontractor's behalf, if any, less any markups and other amounts due TP on account of such claim, suit or appeal,
- 29.7 Nothing said or written in the prosecution of any claims) against the Owner shall constitute nor be regarded as admissions or declarations against interest of either party in any litigation between TP and Subcontractor.
- 29.8 Unless otherwise directed by TP in writing, pending resolution and a final decision of any dispute under this Article, Subcontractor shall proceed diligently with the performance of the Contract. Any failure by Subcontractor to continue to perform in strict accordance with the terms of the Contract pending resolution (unless otherwise directed) shall constitute a default by Subcontractor.

### **ARTICLE 30 MISCELLANEOUS PROVISIONS**

- 30.1 This Agreement, and all work performed under this Agreement, shall be governed by and interpreted or construed in accordance with the laws of the State of Ohio. Venue and jurisdiction shall be exclusively in Ohio.
- 30.2 In any dispute which in any way arises from or relates to the Subcontract Work or any of the terms and conditions of this Agreement, the prevailing party shall be entitled to recover all costs and expenses, including attorneys' fees, incurred in any adversary proceedings, including but not limited to litigation and/or arbitration.
- 30.3 The Subcontractor shall not assign this Agreement, sublet it as a whole, or delegate or subcontract its duties hereunder, without the written consent of TP, which consent TP may withhold in its sole discretion
- 30.4 The parties agree and represent that this Agreement comprises the full and entire agreement between the parties affecting the Subcontract Work and no other agreement or understanding of any nature concerning the Subcontract Work has been entered into or will be recognized and that all negotiations, proposals, acts, work performed or payments made prior to the execution of this Agreement shall be deemed merged in, integrated and superseded by this Agreement. This Agreement can be modified only by written agreement signed by authorized representatives of TP and the Subcontractor.
- 30.5 Waivers of any breach of this Agreement shall not constitute a waiver of any subsequent breach of the same or any other provision of this Agreement.
- 30.6 The headings appearing in this Agreement are inserted as a matter of convenience only and for reference purposed only and are not intended to be a part of this Agreement, or in any way to define or describe the scope and intent of the particular section to which they refer.
- 30.7 If any terms of this Agreement or any application thereof to any person or circumstance shall, to any extent, be invalid or unenforceable, the remainder of this Agreement, or the application of such terms to persons or circumstances other than those to which it is invalid or unenforceable, should not be affected thereby, and each term and provision of this Agreement shall be valid and be enforceable to the fullest extent permitted by law.
- 30.8 Any notice provided in this Agreement shall be deemed received either when delivered personally, transmitted via fax or electronic communication, or two (2) business days after being sent by first class United States mail, postage prepaid, to the following persons at the addresses set forth below, or to such other persons and/or addresses as either party hereto may from time to time designate in writing and deliver in a like manner to the other party.
- 30.9 This effective date of this Agreement shall be the date it has been signed by both parties.

**FROM: TP Mechanical Contractors, Inc.**  
1500 Kemper Meadow Dr  
Cincinnati, OH 45240  
Phone: 513-851-8881  
Fax: 513-851-0612

**TO: NATIONAL TAB**  
**1329 E KEMPER RD**  
**SUITE 4210**  
**CINCINNATI, OH 45246**

**CC TO:** \_\_\_\_\_  
\_\_\_\_\_

IN WITNESS WHEREOF, the parties have duly executed this Agreement, as of the date set forth below.

**TP Mechanical Contractors**

**NATIONAL TAB**

By: Gina Lewis

By: [Signature]

Its: OFFICE MANAGER

Its: Joe Hertenstein

Date: 3/29/23

Date: 3-28-23