

From Estimate to Occupancy: Critical Documentation for TAB Projects



By Scott Fielder, Director, National Balancing Council

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About National Balancing Council & National Comfort Institute



At National Balancing Council (NBC), we have long known that true system performance and efficiency goes beyond traditional testing and balancing. NBC trained and certified professionals specialize in comprehensive HVACR system diagnostics. Technicians have the expertise to measure and verify *actual* system operating performance.



National Comfort Institute, Inc. (NCI) is the world leader in HVAC System Performance training and Air Balancing. We created the industry's best practices, processes, and forms and have been teaching them for decades. What makes NCI's approach different? We show you how to thoroughly test and diagnose the system using practical, easy-to-follow methods so you'll know exactly what to do to provide your customers with optimum comfort and energy efficiency. During the past two decades, NCI has trained and certified more than 25,000 HVAC industry professionals.

If You Don't Measure, You're Just Guessing™

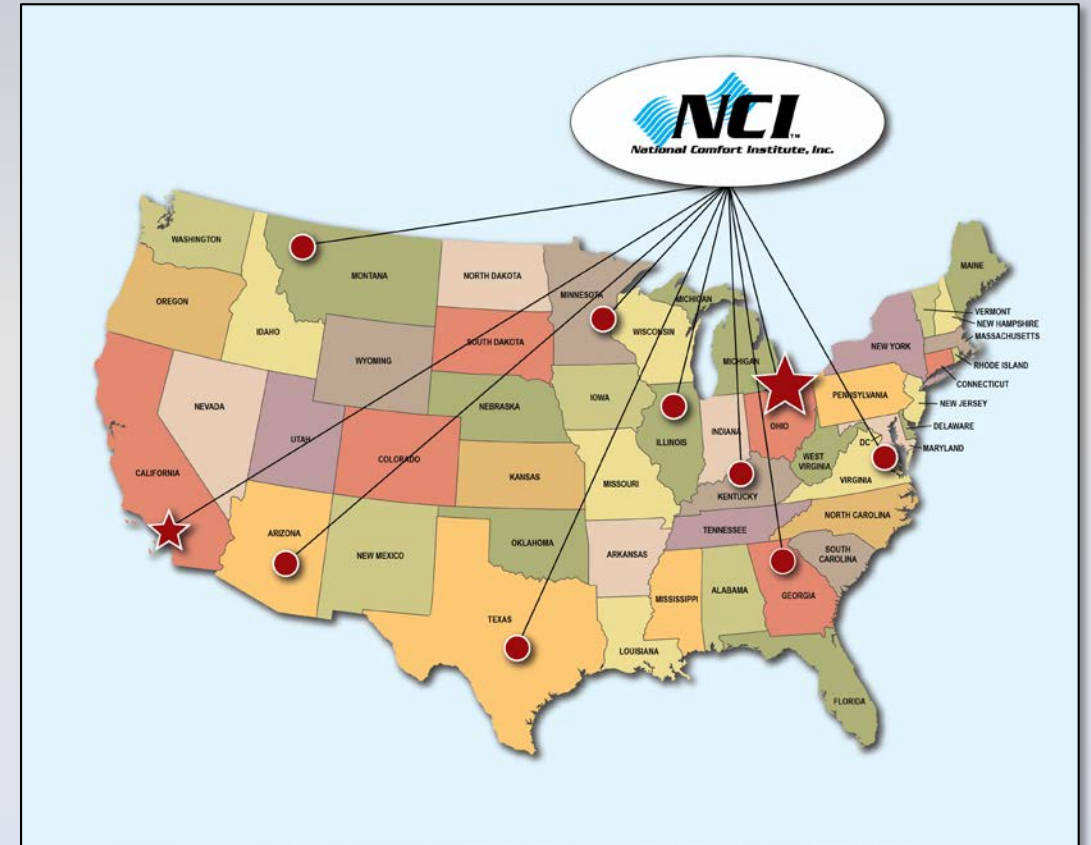


About National Balancing Council & National Comfort Institute

The parent company to NBC, NCI has offices and staff in 10 states across the USA. NBC is the *only* large commercial certification that also includes training as part of the certification process. NCI is active in HVAC utility energy savings programs as well. We hope that you enjoy this presentation, and if you want to learn more:

800-633-7058

ncilink.com/NBChome



FROM ESTIMATE TO OCCUPANCY;
CRITICAL DOCUMENTATION FOR
TEST AND BALANCE PROJECTS

Presenter –

Scott Fielder,
Director, National Balancing Council



Last Year at AHR 2017 in Las Vegas, I had the privilege to give a presentation on

“How To Read and Interpret A Testing, Adjusting and Balancing Report”

The feedback was tremendous. It was even turned into an article.

I started to receive phone calls and emails in regard to the presentation and article, with suggestions such as,

“You need to give a presentation on how to write a TAB proposal.”

Or

“You need to write an article on how to properly handle a rejected TAB report”



At the same time, given my position, I have the opportunity to review all types of TAB documentation on a regular basis.

There were enough issues out there related to bidding and estimating, that we increased our training in this regard.

Also, by virtue of my position, I received phone calls and emails from municipal inspectors, facilities managers, design teams, contractors, etc., asking for advice on a proposal, submittal, punch-list, final report and a variety of other TAB related documentation issues.

I am here to tell you that the issues are consistent and not restricted to any geographic region or certifying organization.



TAB Documentation – From Estimate to Occupancy

Primary Areas to be Covered:

- 1) Bid Documents
- 2) TAB Proposal
- 3) TAB Submittals
- 4) Pre-TAB Checklist
- 5) Field Reports / Punch Lists
- 6) TAB Reports
- 7) Rejected TAB Reports

TAB Proposal and Bid Documents

Required Documentation for Bidding TAB Projects:

Mechanical Drawings (often the ONLY document provided)

Mechanical Schedule

Mechanical Details

Specifications

Addendum



TAB Proposal and Bid Documents

What gets missed in the bid / proposal when the proper documentation isn't provided or requested:

Schedule & Details - part of the mechanical drawings, often overlooked, often have critical instructions for TAB firm such as -

Pre-audit of airflow

Controls verification

Life Safety verification

Recording Duct Traverse Locations

Opposite Season Testing



TAB Bid Documents

Specifications

Under the old Construction Specification Institute (CSI) codes, the Mechanical Specifications were under Section 15, and TAB was supposed to be under 15990, but there were over a dozen variations. Meaning TAB could be found under 15975, 15995, 15880, etc.

In 2004, CSI switched to a six digit code and made the mechanical section 23, with hopes of being very specific and avoiding confusion.

Under the 23 series code, TAB is supposed to be located under...

TAB Proposal and Bid Documents

Under Current CSI Specifications TAB is found under

23 05 93



TAB Bid Documents

Details under other specifications such as duct work / commissioning

HINT- if you see LEED on a project, The TAB professional needs to read the Cx specifications & Sheet Metal Specifications.

There are often requirements for the TAB firm to participate in Cx meetings & inspections, duct air leakage testing (DALT), etc.



TAB Proposal and Bid Documents

Addenda / Addendum – need to be addressed.

I've been told by dozens of organizations, contractors and estimators that they will toss out bids that do not properly address these items.

They **must** be itemized on the proposal.

TAB Proposal and Bid Documents

Given all of this information, anything that is unclear or missing, should result in an RFI – Request for information. NOW is the time to address issues that are ambiguous.

TAB Proposal and Bid Documents

Example Cause for RFI –

AIR COOLED CHILLERS												
MARK	LOCATION	CAP (TONS)	CHILLED WATER			MOTOR DATA				REF. TYPE	MANUFACTURER	REMARKS
			GPM	INLET TEMP°F	OUTLET TEMP°F	VOLTS	PH	MCA	MOC			
CH-1	ROOF	52.0	104.4	54.0	42.0	208	3	318.6	350	R410A	TRANE	CGAM-52 [1-10]

1. TRANE IS THE BASE OF DESIGN. NO EXCEPTIONS.
2. PROVIDE EXTRA EFFICIENCY, WIDE AMBIENT TYPE AIR-COOLED CHILLER.
3. PROVIDE WITH COMPREHENSIVE SOUND ATTENUATION PACKAGE.
4. PROVIDE WITH ADDITIONAL PUMP PACKAGE INCLUDING 100% REDUNDANT PUMPS, EXPANSION TANK, AIR SEPARATOR, GLYCOL FEED SYSTEM, VARIABLE FREQUENCY DRIVES ON PUMPS AND VFD CONTROLLER, BUFFER TANK AND ALL ACCESSORIES FOR A COMPLETE WORKING SYSTEM.
5. SYSTEM BASED ON 45% (-18.5 °F) PROPYLENE GLYCOL. CONTRACTOR TO PROVIDE.
6. EXPECTED DESIGN EFFICIENCY OF 10.4 EER.
7. PROVIDE WITH CORROSION PROTECTION – PHENOLIC EPOXY COATING, FACTORY APPLIED TO CONDENSER AND EVAPORATOR COILS.
8. PROVIDE WITH CONTROLS FOR TRANE CONCIERGE CONTROL SYSTEM.
9. PROVIDE WITH 300 GALLON BUFFER TANK AND 25 HP PUMPS AS PART OF PACKAGE.
10. PROVIDE WITH TOP MOUNTED ACOUSTICAL CONDENSER FAN PANELS, EQUIVALENT TO THE BRD NOISE HUSHCORE UNITARY PLUS SYSTEM, PAINTED TO MATCH THE CHILLER. ATTENUATOR SECTION TO BE SUPPORTED BY THE CHILLER.

TAB Proposal and Bid Documents

There were no pumps on MEP schedule of equipment or in submittal package, however....

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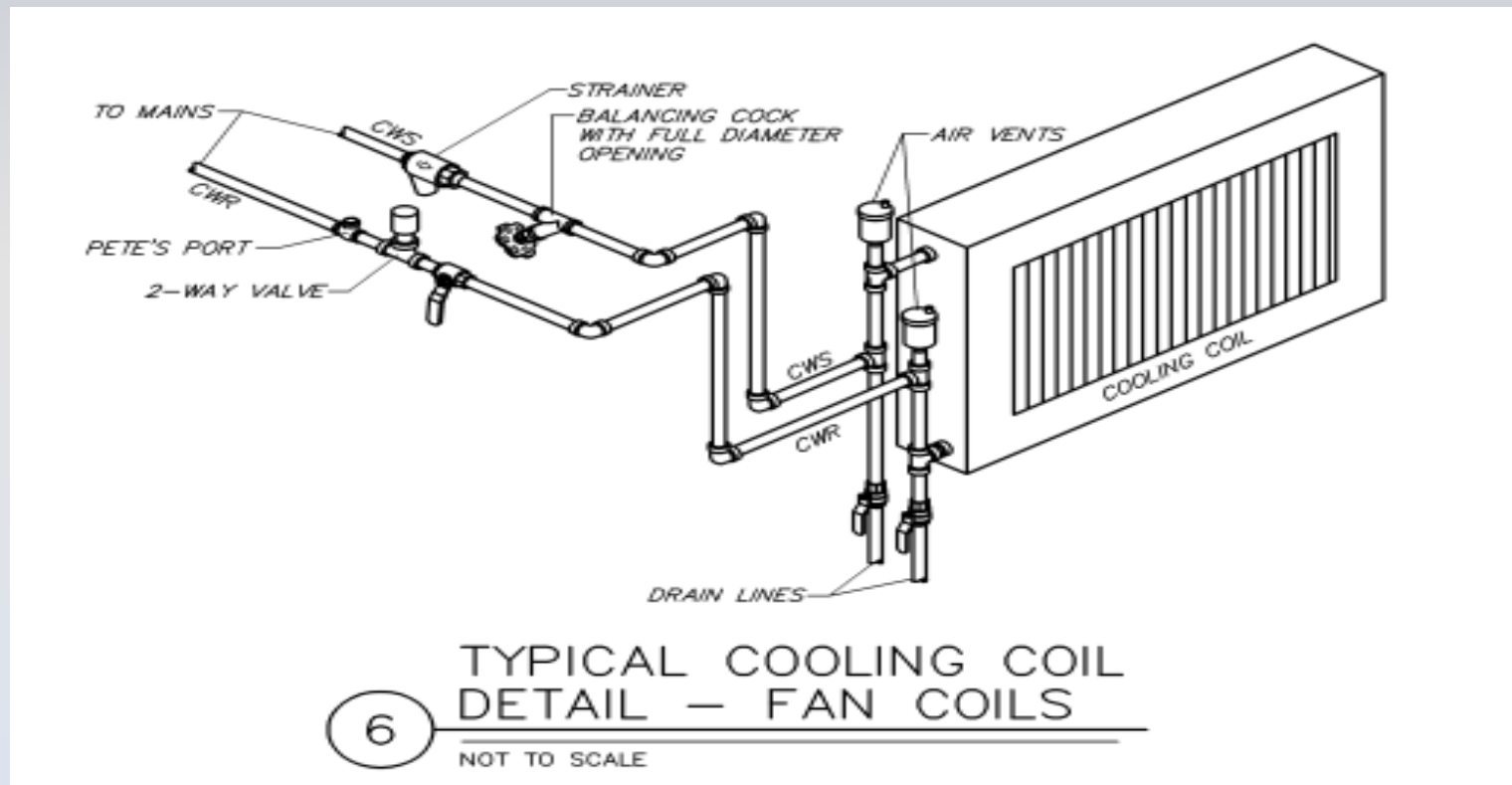
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TAB Proposal and Bid Documents

Mechanical Detail for hydronic cooling coils show no test ports or circuit setters.



TAB Proposal

- 1) Should be brief and concise
- 2) Should reference all bid documents with dates
- 3) Exclusions should be judicious – don't spend more time telling the contractor what you won't do; referencing the specifications are the exclusions.
- 4) Any VE options should be **clearly** stated.
Plan & Specification proposals are MUCH different than bidding existing buildings.

TAB Proposal

3 Types of TAB Proposals:

- 1) Plan & Specification based (Plan / Spec)
- 2) Design / Build
- 3) Existing / Diagnostic / Retro-Commissioning (RCx)

TAB Proposal

Note:

As a general rule, TAB is roughly 1% of the total project cost, yet being the VERY last trade, once a project is over budget and behind schedule, and TAB is the last check to be cut, it is not uncommon for the TAB contractor to adjust their pricing and find any Value Engineering option they can.

If this does occur, it is incumbent upon the TAB professional to document this process and

TAB Proposal

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Plan & Specification proposals are MJCH different than bidding existing buildings.

Sample TAB Proposal – Standard Plan & Specification Bid



July 25, 2018

Big Texan Construction
123 North Main Street
Oatmeal, Texas 76655

Attention: Mr. Bob Builder

Subject: ABC Retail Store #242 – XYZ Mall – Scovill Avenue, Cleveland, OH

RE: Testing, Adjusting and Balancing Proposal

Presented below is the pricing for the testing, adjusting and balancing of the new ABC Retail Store #242 at XYZ Mall located on Scovill Avenue in Cleveland, OH.

TAB Pricing Based Upon: Specification Section 230593 and mechanical drawings dated 10.5.17. Pricing based upon NCI Commercial Air Balance Certification. Exception to 230593, Section 1 has been granted. See attached approval from property land lord, per 230593, Section 2. Pricing includes functional performance / control sequence testing, per 230593, Section 5.

Addenda 1, 2, 3 & 4 have been reviewed and do not impact TAB pricing.

Testing, Adjusting and Balancing: \$3,575.00

Pricing is valid for 12 months if purchase order is received within 60 days. Two weeks' notice and written confirmation of complete system readiness is required for scheduling of TAB work.

National Balancing Services is a registered Veteran Owned Small Business that has performed testing, adjusting in balancing on over 500 retail projects in all fifty states. NBS is Licensed and Bonded, with over 20 years in business. With TAB Technicians certified by the National Comfort Institute, National Balancing Services is confident that we can assist Big Texan Construction bring this project to a successful conclusion.

Respectfully,

Joe Estimator,
Vice President of Sales.
440.555.1234
joe@nbsbalancing.com

NBS – PO Box 147 – Avon Lake, OH – 44012
800.555.1234 – www.nbsbalancing.com



Sample TAB Proposal – Standard Plan & Specification Bid

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TAB Proposal – Existing / Diagnostic / RCx TAB Projects

A common mistake is for TAB professionals to bid existing buildings as they would a “Plan & Spec” project.

Pricing of TAB projects on existing building **can not** be based on mechanical drawings alone.

If you receive a call to balance an existing building, there are already punch-items / deficiencies waiting for you.

A site visit and occupant interviews is critical to accurately determine the customer’s needs and to provide fair and reasonable pricing.

“You don’t own it unless you’re standing on it.”



TAB Proposal – Existing / Diagnostic / RCx TAB Projects



August 29th, 2018

Happy Madison Property Management
123 Buckeye Highway
Cleveland, OH

Attention: Bobby Boucher

Re: McGavin Plaza Building One – Bigalow Crewe LLP - 4th Floor System Audit.

NBC Balancing Company is pleased to submit our proposal to provide technical labor and equipment to conduct a system audit for the fourth floor of Building One at the McGavin Plaza Office Complex.

Objective:

To provide a complete and thorough evaluation of AHU and VAVs serving the 4th Floor of Building 1 and attempt to identify reasons for occupant comfort complaints.

Description:

The 4th floor occupied by Bigalow Crewe is served by (1) 60 ton air handling unit. Original mechanical drawings show 33 variable air volume & fan powered terminal units, and 150 supply diffusers. The exact number will be determined at time of system audit & TAB. The owners / occupants have complained of multiple hot and cold spots throughout the floor. Happy Maddison staff had made all adjustments possible, short of a complete system performance evaluation being conducted.

Scope:

1. Read and record supply, return and outside air for AHU serving 4th floor.
2. Record all unit data to include temperatures, static pressure, volts and amps for 4th floor AHU.
3. Inspect ductwork for leakage and ensure installation is in accordance with mechanical drawings.
4. Modify drawings provided to reflect any alterations and variances from original design mechanical drawings dated 6.6.1996.
5. Where conditions allow, balance system to design values provided on mechanical drawings.
6. Where conditions allow & specifically directed, adjust airflow for occupant comfort, regardless of original design values.
7. Calibrate all pneumatic thermostats where possible.
8. Calibrate and balance all pneumatic variable air volume and fan powered terminal units were possible.
9. Read and proportion available exhaust airflow to men's and women's rest rooms serving both the east and west ends of the 4th floor.
10. Perform complete evaluation of Exhaust Fan 3 & Exhaust Fan 8, to include total airflow readings on all floors.
11. Produce thorough and comprehensive list of all deficiencies and inoperative systems.
12. Meet with representatives from Happy Madison Property Management, Bigalow Crewe LLP, Boucher Mechanical and Zoollander Mechanical Engineering to review report and deficiency list.



Once all of the above steps are performed, NBS Balancing Company is confident that multiple comfort issues will be immediately corrected and that a road map for successfully correcting the remaining issues can be presented in a timely and efficient manner.

Qualifications:

NBS is an NBC certified Testing, Adjusting and Balancing firm that has successfully completed system performance reviews of multiple office and business complexes across United States. Major projects include the Empire State Building, NYC; Sears Tower Renovations, Chicago, IL and the Jerry Jones Office Park in Dallas, TX. NBC Balancing Company has over 20 years' experience performing system audits, system performance testing, retro-commissioning and TAB of both new and existing HVAC systems. In addition to having 3 NBC certified TAB Supervisors, our staff includes former controls contractors, electricians, sheet metal technicians and HVAC service & start-up personnel. Six of whom hold both Commercial Air Balance & Commercial System Performance certifications from NCI.

Pricing:

Complete System Performance Audit & TAB of 4th Floor: \$26,675

Pricing is based upon occupied, existing conditions that only permits evening & weekend work. Pricing does not include further TAB if recommended system renovations are made. TAB of renovated systems will be priced upon completion of renovations.

Respectfully,

Robert Price Barker,
Vice President, Special Projects
NBC Certified TAB Supervisor

Acceptance

Your signature below indicates acceptance of this proposal and the scope of work as stated.

Name: _____

Date: _____

Signature: _____

PO#: _____



TAB Proposal – Existing / Diagnostic / RCx TAB Projects

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TAB Proposal – Existing / Diagnostic / RCx TAB Projects

Scope of work & customer expectations **MUST** be clearly defined and explained.

The post-TAB / Diagnostic meeting is a must and should be priced into the project & explained in the proposal.

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TAB Proposal – Existing / Diagnostic / RCx TAB Projects

Post-TAB / Diagnostic actions must be clearly defined in the proposal. The TAB professional does not know what issues they will find, nor does the owner / contractors correct all items.

This can be covered by stating TAB or renovations will be re-priced, or simply pricing the project to go through every system TWICE, if project financing demands it.

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TAB Submittals

Often required by most specifications.

Every TAB firm should have a set prepared and ready to go.

Should be detailed and comprehensive

TAB Submittals

Should be professional

Should list all qualifications of firm and staff

Should provide sample report forms

Should list calibrated equipment

Should list history and major projects

TAB Submittals

Every TAB firm should invest a lot of time and energy into these.

No staff member is unimportant, no school or experience is irrelevant. List all certifications, trade schools, college, military experience, manufactures certifications, etc.

In regard to experience and capability, Don't list what you don't do! If you've never done medical or clean rooms, don't list it, etc.

TAB Submittals – Sample Staff Biographies

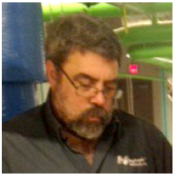
MEET THE HYDRAIR TEAM

ALBERT HAWKINS, President, CEO, owner



Al, began his career as an HVAC design draftsman for 2 prominent Architectural/Engineering firms in Buffalo NY. In 1975 was the co-founder of Seneca Balance Company, Inc.. Al was Seneca's Associated Air Balance Council (AABC) and National Environmental Balancing Bureau (NEBB) certified engineering supervisor. Seneca Balance became one of the largest balancing companies in the world with over 75 employees at its peak. Seneca performed work on every type of building project throughout the US and internationally. Upon the dissolution of Seneca Balance in 1995 Al became the AABC and NEBB certifying engineering supervisor for Hydrair Balance Company. As owner of Hydrair, Al continues to manage the company's day to day operations.

ROGER MILLER, VP, NBC certified field supervisor



Roger has been continuously employed for the past 28 years since 1989 by Hydrair Balance Company as a Testing and Balancing technician. For the past 22 years Roger has been Hydrair's senior supervisory technician having worked on every type of commercial and industrial building facility throughout a multi-state area. Roger has completed the National Environmental Balancing Bureau, NEBB home study course, The Associated Air Balance Council Technician Training Course, since 2001 is an IAQ Training Institute Certified Indoor Environmentalist, since 2004 has CIE and CMR American Council for Accredited Certification and since 2007 is a National Balancing Council (NBC) certified supervisor. Roger supervises the day to day field operations throughout Pennsylvania, West Virginia, Maryland and Ohio and oversees the supervision of Hydrair's NY field operations.

BERNIE PYLE, chief estimator



Bernie Pyle has been employed by Hydrair Balance Company for the past 25 years since 1992. Bernie served as assistant to the former President of Hydrair until 2013 performing estimating, sales and other administrative duties. From 2013 until present Bernie took over many primary administrative responsibilities for the company. Bernie is currently Hydrair's chief estimator and performs other administrative duties in a 4 state area including Pennsylvania, Ohio, West Virginia and Maryland. Bernie also oversees various administrative responsibilities for the New York office of Hydrair Balance.

LUKE EGETO, field supervisor



Luke has over 10 year's field experience as a testing and balancing technician. Luke has worked for several prominent TAB companies and has recently joined Hydrair's team as the NY testing and balancing field Supervisor. Luke brings to Hydrair the necessary field experience to supervise and perform its day to day field operations, having worked on all types of commercial and industrial HVAC building systems. Lul



Meet Our Staff

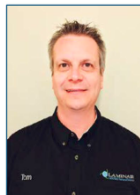


**Scott Sligowski
President & Balancing Supervisor**

Scott Sligowski is a US Navy Veteran that brings to your projects over 28 years of Engineering, HVAC, & Technical experience, as well as 12 years of test & balance experience. He is a 12 Year NCI Certified Member, licensed stationary engineer, certified CO & combustion analyst, and a member of ASHRAE & RSES. System design, duct design, and load calculations are also part of his expertise.

He is the firm's National Balancing Council Certified Balancing Supervisor & holds an NBC air and hydronic balancing certification with an emphasis in engineered solutions through diagnostics for total HVAC system efficiency.

Scott is an expert in HVAC system diagnostics, reaching beyond typical air balancing limits, and delivering complete HVAC system solutions, while creating measurable increases in total system performance.



**Thomas Kozak
Vice President & Project Manager (Assistant
Balancing Supervisor)**

Thomas Kozak has been managing projects for over 10 years, and is the company's project manager, balancing technician, and HVAC service technician. He handles all bids and is our "on-site" customer relations' expert on all of LaminAir's Test & Balance projects.

He ensures code compliance on the project, and communicates directly with village inspection authorities when required. Thomas is your first point of contact, will be able to get things started, coordinate all aspects of the job, and ensure the project keeps moving forward.

Thomas is a graduate of Elmhurst College, and holds a Bachelor's degree in Environmental Management, and a Master's degree in Management & Logistics.

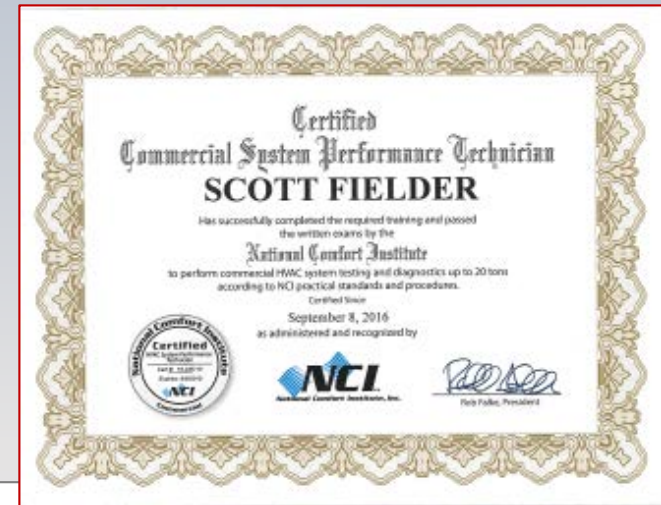
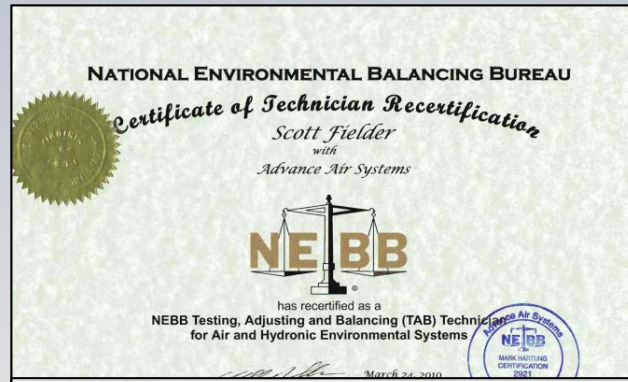


2018 AHREXPO

CHICAGO
JAN 22-24



TAB Submittals – Sample Staff Qualifications



TAB Submittals – Sample Completed Projects Lists



SOME OF OUR COMPLETED PROJECTS

Schools
Delta Technical College, South Haven, MS
Riverside High School, Belle, WV

Medical Facilities
All Medical Clinic, Bronx, NY
Fox Valley Healthy Paws, Woodstock, IL

Restaurants
Gus' Steak House, Sheffield, OH
Chandelier Restaurant, Belleville, NJ
Lola's Restaurant, Cleveland, OH, Iron Chef, Michael Symon
Tomo's Japanese Restaurant, Cedar Point Amusement Park, Sandusky, OH
Lastrada's, Cleveland, OH
Saga Steak House, Pittsburg, PA

Retail Stores
Talbot Clothing, Kettering, OH
Light Salon & Spa, Avon, OH
Avenberry Lodge, Avon, OH
Scotttrade, Erie, PA

Offices/Apartment Buildings
Offices of Miss America, Atlantic City, NJ
Magnum Building, Solon, OH
Park Ten Building, Houston, TX
Youth Detention Center, Las Vegas, NV
200 West Apartments, Fairview Park, OH

Government Facilities
US Coast Guard, Elyria, OH
AMETEK Industries, Garden City, NY

COMPLETED PROJECTS:

Some of our projects include but are not limited to:

Medical Facilities:
Wellmont Cardio Vascular Associates
Cinch Valley AHU-1
Wellmont Pharmacy 797
Bristol Regional Medical Center Isolation Rooms
Wellmont Madison House
Wellmont New CT Suite
Wellmont New Suite for Lonesome Pine Hospital
Hawkins Co. MOB Dr Jett Suite
Laughlin Memorial Hospital Clean Room
Laughlin Memorial Hospital Central Sterile
Francis Marion Nursing Home
JCMC Nuclear Medicine

Specialty Shops:
Versona at the Pinnacle
Kirkland's at the Pinnacle
Christopher & Banks

Communications:
CenturyLink Adamsville, TN
CenturyLink Chillers Bristol, TN
CenturyLink Gray, TN
CenturyLink Midway Central Office
CenturyLink AC B1

Military:
BAE Building 155

Prisons:
Keen Mountain Correctional Facility
UPS Lee Prison

Waste Water Treatment:
Claypool Hill Waste Water Treatment Plant

Pharmaceutical Companies:
Crown Labs
Dr. Reddy's Packaging & Processing
Dr. Reddy's Quarterly Test
New Facility for UPM Pharmaceutical 797
UPM Remoxy
UPM Building 8

Banks:
Wells Fargo Bristol, VA
Regions Bank Jefferson City, TN
Regions Bank Knoxville, TN
Regions Bank North West Knoxville, TN

Restaurants:
Panda Express
East Coast Wings
Hardee's Johnson City, TN
Huddle House

Schools:
Milligan College Chiller Replacement
Gate City Middle School
Webber City Elementary School Study
ETSU Innovation Lab
TN High HVAC Replacement
Emory & Henry School of Health Science
Elizabethton High School Band Room
Penland Gallery

Miscellaneous Projects:
Grandfather Golf & Country Club Fitness Center
Marquee Cinemas Bristol, TN
Pure Foods
Ken Jo #46
Norton US Forestry Building
Bell Helicopter
Bristol, VA City Offices
Freedom Hall Civic Center Johnson City, TN

Provision Environmental Systems and Testing LLC
1117 Dennis Lane Surgoinsville, TN 37873
(423) 754-3736 dustinleebowling@gmail.com



TAB Submittals – Instrumentation

SCHEDULE OF EQUIPMENT AND TEST INSTRUMENTS				
Instrument	Manufacture	Model No.	Serial No.	Calabration Date
Capture Hood	ALNOR	EBT-731	71539007	2015-09-21
Capture Hood	ALNOR	EBT-731	71539007	2015-09-21
Capture Hood	ALNOR	EBT-731	71539007	2015-09-21
Capture Hood Manometer	ALNOR	EBT-731	71539007	2015-09-21
Capture Hood Manometer	ALNOR	EBT-731	71539007	2015-09-21
Digital Manometer Kit S-3P	ALNOR	EBT731	71539007	2015-09-21
Manometer	ALNOR	EBT731	71539007	2015-09-21
Rotating Vane Aneometer	ALNOR	RVA801	A03474	2015-09-13
Thermoanemometer (Hot Wire)	TSI	960	P15210015	2015-05-19
Hydronic Manometer Probe	ALNOR	801290	71520004	2015-05-15
Hydronic Manometer	ALNOR	HM685	71515026	2015-05-15
18" Pitot Tube	TSI	160-18	na	As required
24" Pitot Tube	TSI	1602-24	na	As required
36" Pitot Tube	TSI	160-36	na	As required
48" Pitot Tube	TSI	160-48	na	As required
60" Pitot Tube	TSI	160-60	na	As required
Digital Tachometer	Testo	T465	1446599	As required
Infrared	Testo	830-T2	41920998	As required
Humidity Stick	Testo	605-H2	na	As required
Velocity Matrix	Alnor	801090	na	2015-05-15
Differential pressure meter	Testo	510	43461152/404	As required
1/2 Tap Kit	TSI	na	na	As required
3/8 polyethylene Plugs	TSI	500TP	na	As required
1/2" hole Plugs	TSI	500TP1/2	na	As required
Muiti Meter	Fluke	5520A/6	2550	2015-10-15
Cobra Air leakage air tester	Oriflow	Cobra	na	2015-10-05
1" Orifice plate	Oriflow	Cobra	12335	2015-10-05
2" Orifice plate	Oriflow	Cobra	21336	2015-10-05
3" Orifice plate	Oriflow	Cobra	21337	2015-10-05
4" Orifice plate	Oriflow	Cobra	21338	2015-10-05



TEST EQUIPMENT LIST

ONE OR MORE OF THE FOLLOWING EQUIPMENT MAY HAVE BEEN USED TO BALANCE THIS PROJECT

Instrument	Manufacturer	Model	Serial No.	Calibration Due Date	Equip. Use
Sensor	Evergreen Telemetry	E2FI	140038	4/16/2017	Pressure/Velocity
Sensor	Evergreen Telemetry	E2FI	140037	4/16/2017	Pressure/Velocity
Sensor	Evergreen Telemetry	BM-T	140046	4/16/2017	Temperature
Sensor	Evergreen Telemetry	SH3.5	140026	4/16/2017	Humidity
Micromanometer	Shortridge	ADM680-C	9477	7/11/2017	Temp/Velocity
Micromanometer	Shortridge	HOM300	W03006	8/11/2016	Water Testing
Micromanometer	TSI/Alnor	EB1721	9127029	9/24/2016	Temp/Velocity
Rotating Vane	Estech	AKS20	1001772	7/10/2017	Velocity
Wrist Reporter	Evergreen Telemetry	SSS	4200310	10/10/2016	Pres./Vel./Temp
Volt/Amp	Southwire	210301	130308589	5/15/2017	Electrical
Sound Meter	CEM	D1805	318074	8/20/2016	dB
Tachometer	Checkline	CD1000HD	710502	9/1/2017	Rotation Speed
Duct Leak Test	Driflow	CFM10	1503	10/30/2016	Leak Testing



TAB Pre-Balance Check List

No TAB firm should set foot on a project with out it.

This saves a lot of head ache and back-charges later.

This document sets the tone for the project.

This document ensures proper communication between all parties concerned.

This document protects all parties concerned.

Air Balance Pre-Balance Checklist



Yes No

- Each HVAC system installation is 100% complete
- Are all ceiling tiles installed?
- All registers and grilles are installed, dampers are 100% open and locked, and each has airflow.
- All equipment and accessories have been started up and are fully functional per factory representative?
- Can you provide a startup report?

Please provide the following information

Date and time project will be ready _____

Project Manager Name _____ Cell _____

Install supervisor name _____ Cell _____

Other comments _____

Prepared Signed and Submitted by _____

Prepared Signed and Submitted by _____

Please return report when work is ready to be scheduled to:

TAB Field Report / Punch List

I was once on a project in Dallas, and I found a 30 page “How to Punch Out a Project” guideline from a nationally recognized design firm that stated on the cover page, with their logo:

- 1) Don't leave your tape recorder in the car.
- 2) Bring extra batteries.
- 3) **NOW IS YOUR CHANCE TO GET BACK AT THE CONTRACTORS FOR ALL OF THE NEGATIVE COMMENTS THEY MADE ABOUT THE DRAWINGS AND DESIGN.**

TAB Field Report / Punch List

A punch list / field report is not a hammer. It is not supposed to be a weapon of vengeance.

DON'T PUNCH ANGRY!

It is meant to be a tool to assist all trades – mechanical, electrical, controls, life safety, etc, to better perform their jobs so that the project at hand can be completed and the owner / end user receives the product that they paid for.

The TAB professional must be brief, yet quantifiable.



Project: Tower Records	Project Number: 1453-16
Location: Cleveland Ohio	Owner: J. Hipster
Mechanical Contractor: GBK Mech	Date: September 8th 2017



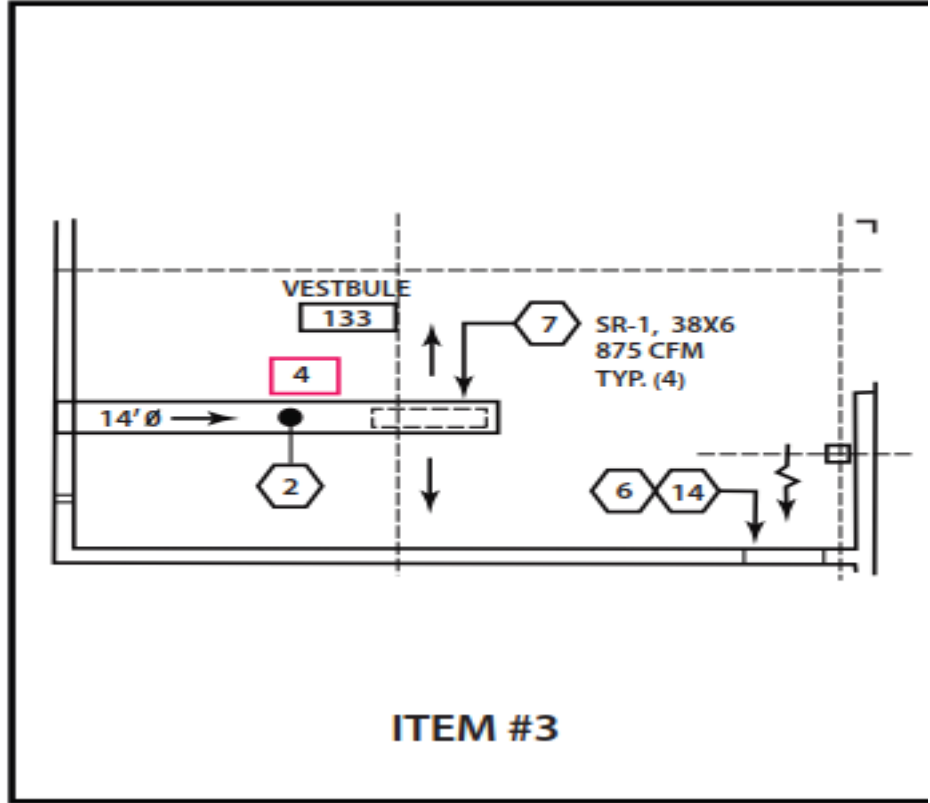
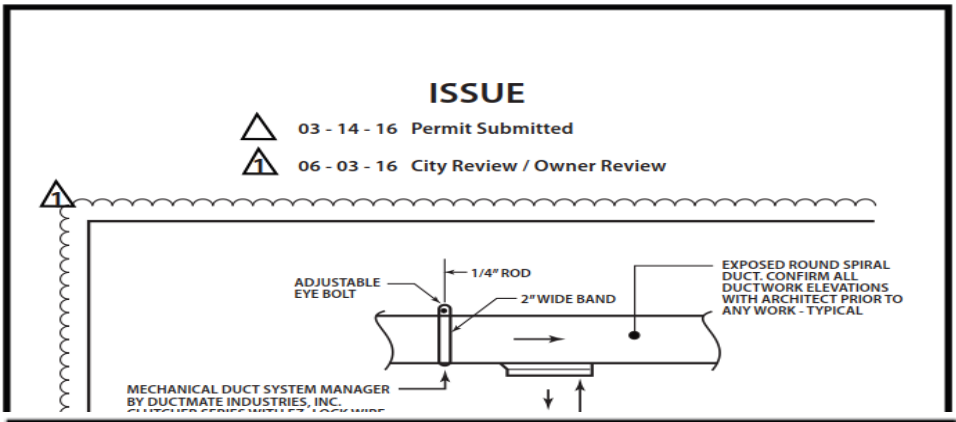
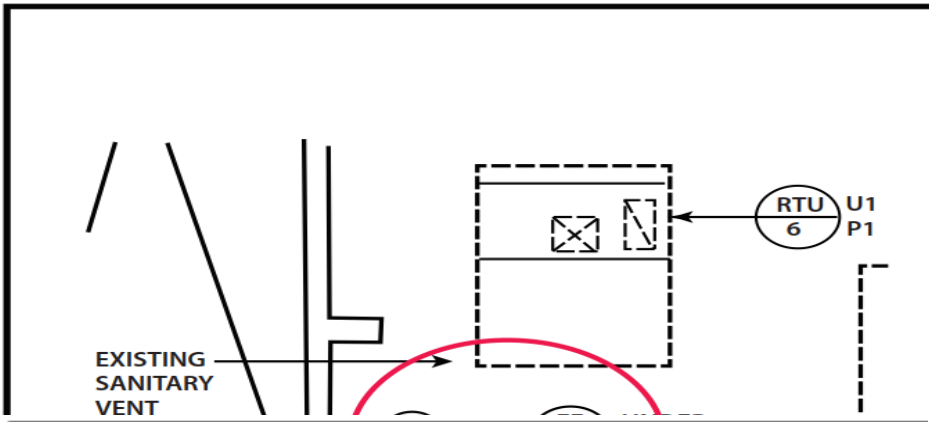
Project: Tower Records	Project Number: 1453-16
Location: Cleveland Ohio	Owner: J. Hipster
Mechanical Contractor: GBK Mech	Date: September 8th 2017
Certified TAB Firm: Tab Firm: NBS	Certified TAB Professional: DT Jr

NCI TAB Deficiency Report

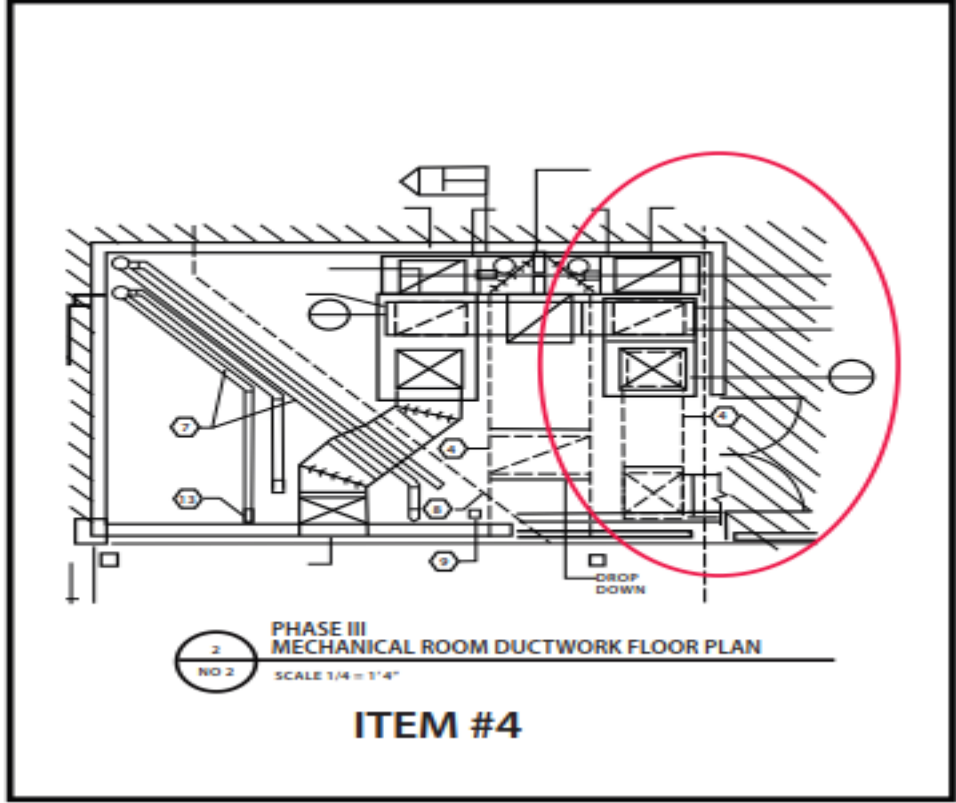
Item No.	System	Date	Issue	Status	Contractor Response
001	All	11.8.16	<i>Due to gas leak, all HVAC systems were shutdown & job site evacuated. Please notify office when conditions permit completion of TAB. All systems were not yet evaluated. Other items may follow.</i>	Open	
002	EF-8	11.8.16			
003	RTU-1	11.8.16	<i>Grille #4 serving vestibule 133 is missing Manual Volume Damper and is at 150% of design airflow. Per issue #1 on page M2.2 of MEP drawings, dated 06.03.16 MVDs are to be installed in all SR-1 ype diffusers</i>	Open	
004	AHU-2	11.8.16			
			<i>AHU-2 located in Mechanical Loft is operating at 78% of design airflow. A Browning VP 40 motor sheave with 5/8 bore or equivalent is required to obtain design airflow.</i>	Open	

010					





ITEM #3



ITEM #4

Final TAB Report

When the painter is done, the walls change colors. When the electrician is done, the lights come on. When the HVAC / Mechanical Contractor is done the building cools & heats.


When the TAB professional is complete, they hand in a piece of paper and state, “Pay me.”

The final TAB Report **MUST** reflect the professionalism and experience of the contractors that performed the work.

Final TAB Report – Seven Items to Look For


- 1) Over All Professionalism
- 2) Certification
- 3) Distribution List
- 4) Remarks / Deficiencies
- 5) Discrepancies In Design Values vs. Actual Readings
- 6) Mechanical Drawings / Floor Plans
- 7) Additional Items

Final TAB Report – Overall Professionalism




LAMINAIR
Certified Test and Balance

Belmont House of God




NATIONAL BALANCING COUNCIL
Certification Number 15-001-03



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DIRECT FLOW



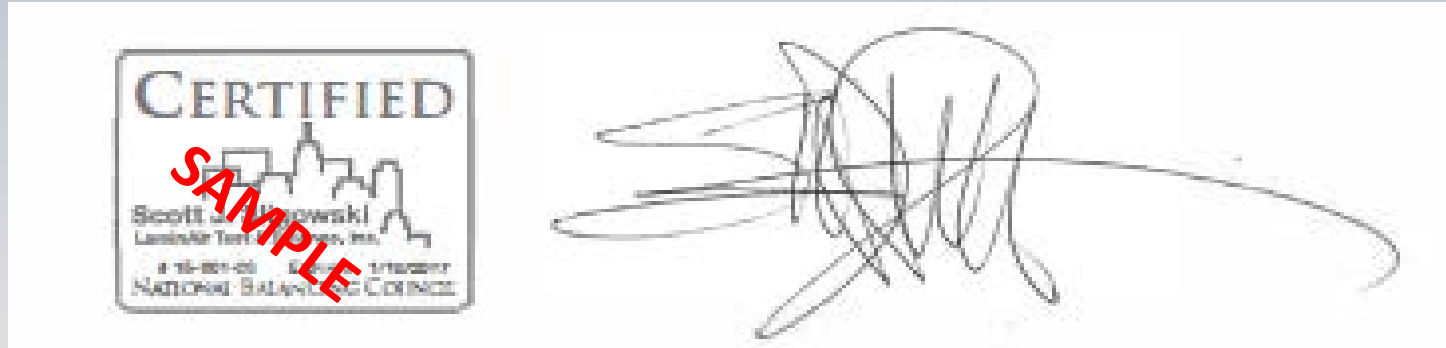
DR CHARLES LEGROW HEALTH CENTRE
HVAC TAB REPORT

R&R HVAC and Controls LTD
56 Swansea Street, NL
709-770-6737
r_r_hvac@hotmail.com

Direct Flow Balancing Inc.
NBC Certified professional TAB Firm
(709) 693- 0791
danadirectflow@gmail.com

Is It A Certified TAB report?

The report should bare the stamp of a certified TAB Supervisor.



T & B ENGINEER: Stephen K. Melink, PE

DATE 7/13/2011



Is It A Certified TAB report?

The report should bare the stamp of a certified TAB Supervisor.
The stamp should have the following information:

- 1) Certifying Organization
- 2) Name of Certified TAB Supervisor
- 3) Certification Number
- 4) Certification Expiration

How To Read & Interpret a TAB Report Certification

- All certifying organizations have standards and requirements as to what must appear in that report.
- Most specifying Engineers and design teams state what information they require in the TAB report.
- Many chain stores, corporations and other entities have specific requirements as to what they want to see included.
- The certification also provides recourse to the end user via the TAB professionals certifying organization.

Final TAB Report – Overall Professionalism

Project Legend		
	Supply	
	Return	
	Exhaust	
	Fresh Air	
	VAV Box	
	Diffuser Tag & ID No.	
	Balancing Damper	
	Supply Duct	
	Return Duct	
	Exhaust Duct	
	Fresh Air Duct	
	Centrifugal Supply/Return Fan	
	Motorized Damper	
	Air Flow Station	
	Heat Exchanger	
	Variable Speed Drive	
	Rectangular Traverse	
	Square Diffuser	
	3 Way Mixing Valve	
	3 Way Motorized diverting Valve	
	OA Outside Air	
	SA Supply Air	
	RA Return Air	
	EA Exhaust Air	
	CFM Cubic Feet Per Minute	
	l/s Liters per Second	
	GPM Gallons Per Minute	
	CU Condensing Unit	
	CC Cooling Coil	
	AHU Air Handling Unit	
	L Louver	
	VD Volume Damper	
	HP Horsepower	
	V Volts	
	FLA Full Load Amps	
	SF Service Factor	
	PF Power Factor	
	SP Static Pressure	
	BHP Break Horsepower	
	DNA Data Not Available	
	DNL Data Not Listed	
	UTM Unable to Measure	
	NA Not Accessible	
	NT Not Taken- no valid location	

DIRECT FLOW

**DIRECT FLOW
BALANCING INC**
Mt Pearl, NL
709 693 0791
danadirectflow@gmail.com

Project Name
Tucker Accura

Mechanical Contractor
Mechano Construction Ltd
18 Dundee Ave
Mount Pearl, NL A1N 4R7
709 781 0473
fwilliams@mechano.ca

Customer
Tucker Accura

Engineer
**Jewer Bailey
Consultants LTD.**
75 Tiffany Court
St Johns, NL A1A 0L1

General Contractor
J & T Construction Limited
58 Glencoe Drive
Mount Pearl, NL A1N 5S9
709-364-6708

Architect
**Woodford Sheppard
Architecture**

Owner
Tucker Accura
969 Topsail Road Mt Pearl, NL

TAB Supervisor
Dana Walsh

Date Tested
20-Jun-16

Project Number
JBC-C-13-04



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Air Balance Guarantee

We Guarantee Honesty In What We Do, As Well As Good Customer Service And Satisfaction On Each Job. If There Seems To Be An Error On Our Part, We Will Rectify The Situation At Our Expense.

Test & Balance On Your Project Is Guaranteed For One Year And / Or Per the Duration Of Time As Set Forth In The Project Documents.



935 Victoria Lane
Elk Grove Village, IL 60007
P 224.875.7220
F 847.593.3541
CFM@LaminAir-TAB.com
www.laminair-tab.com

Conditions of Warranty

WARRANTY OF TAB SERVICES

LaminAir Test & Balance, Inc. provides a one (1) year warranty for all Test, Adjust & Balance work associated with this project. The warranty period is one (1) year from the date on this report, or one (1) year from the last date of work performed on job site (whichever is earlier).

Voiding Warranty & Additional Charges:

In the event a warranty issue arises and it is discovered to be attributed to a control or maintenance related failure, any equipment / mechanical failure, or if it is found to be unrelated to any TAB work performed, the return trip will be subject to a trip fee, and any diagnostic charges related to troubleshooting will be assessed at the applicable hourly rate at time of service.

IMPORTANT (3rd party involvement voids warranty):

LaminAir Test & Balance, Inc. reserves the right of exclusivity (within the warranty period) to resolve or correct any issues, errors, or omissions related to or associated with all TAB work performed under this contract and all test data provided within this report. If any third party or competing agency (TAB, Mechanical, or Controls), including retro-commissioning (RCX) or commissioning (CX) performs any work on equipment in this report, tests, adjusts, balances, or modifies any equipment, controls, or fluid flows...



2018 AHREXPO

CHICAGO
JAN 22-24



Final TAB Report – Distribution List





It can be simple....

PROJECT:	Melink Corporation 1234
LOCATION:	5140 River Valley Road, Milford, OH 45150
ARCHITECT:	Architects LLC
MECH. ENGINEER:	David Smith
GEN. CONTRACTOR:	Diego Associates

<u>Project:</u> East Coast Wings and Grill 2637 East Stone Drive, Suite F Kingsport TN, 37660
<u>Architect/Engineer:</u> MBI (michael brady Inc.) 299 N. Weisgarber RD Knoxville, TN 37919 P: (865) 584-0999
<u>HVAC Contractor:</u> S.B. White Co., Inc. 226 East Market Street Johnson City, TN 37601 P: (423) 926-8127
<u>TAB Contractor:</u> Provision Environmental Systems & Testing LLC 1117 Dennis Lane Surgoinsville, TN 37873 P: (423) 754-3736

Final TAB Report – Distribution List

or it can be ornate and complicated, but it HAS to be there....

 <p>Marco Group Newfoundland • Nova Scotia • New Brunswick</p>	<p>Marco Group 75 O'Leary Avenue St. John's, NL (709) 754-3737</p>	<p>General Contractor</p>
	<p>Air-Tite Sheet Metal 138 Groves Rd St. John's NL (709) 726-7007 Norman Lucas GSC</p>	<p>Mechanical Engineer</p>
 <p>PHB GROUP architecture & interior design</p>	<p>PHB Group Inc. 99 Airport Road St. John's NL (709) 576-5612</p>	<p>Architect</p>
 <p>ST. JOHN'S TRANSPORTATION COMMISSION</p>	<p>City of St. John's St. John's Transportation Commission</p>	<p>Owner</p>

			
EXHAUST FAN NO	CA	EXHAUS LOCATION	BASEMENT
TEST DATE	15-6-2014	SERVED AREA	TOILETS

Corresponding Mechanical Drawings

Perhaps the number one complaint from design teams / end users is the lack of labeled mechanical drawings in the TAB report.

The drawings are the one document that pull all of the data together and provide a visual point of reference.

The drawings are one of the most practical elements in a TAB report.

Most commonly, the MEP drawings are numbered by the TAB professional and included in the final report.

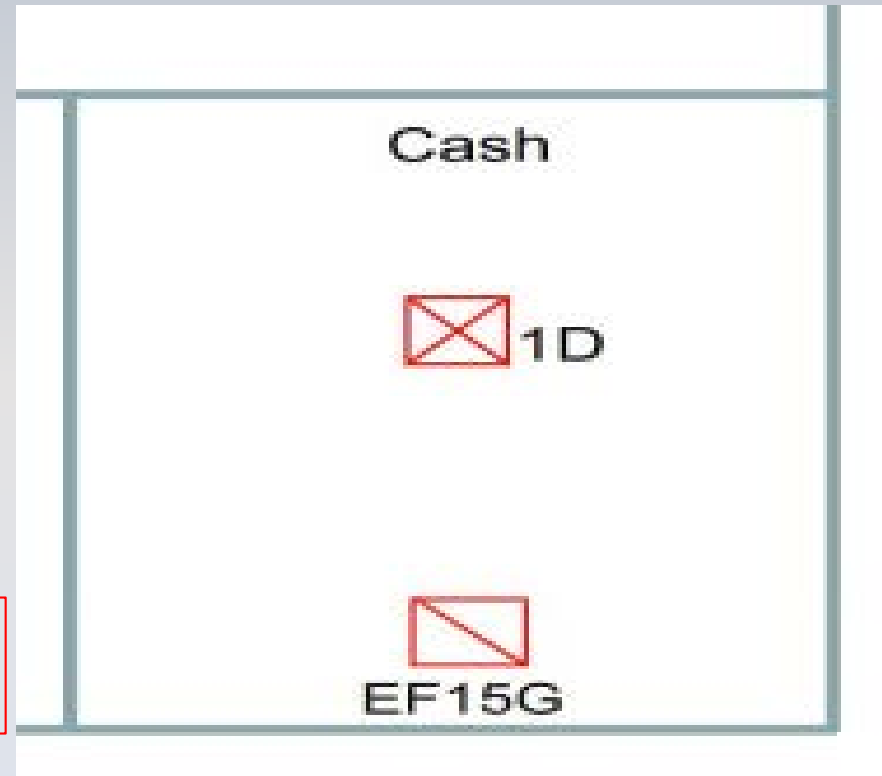
If the drawings are not available, or field conditions required multiple changes not reflected on the MEP drawings, the TAB professional has a variety of other options to fulfil this responsibility.

Final TAB Report - Corresponding Mechanical Drawings

Mechanical Drawings 101 – Without learning every symbol used on MEP drawings, the following two symbols are the most common and allow the owners or other end users not in the trades to better understand the drawings at a glance.

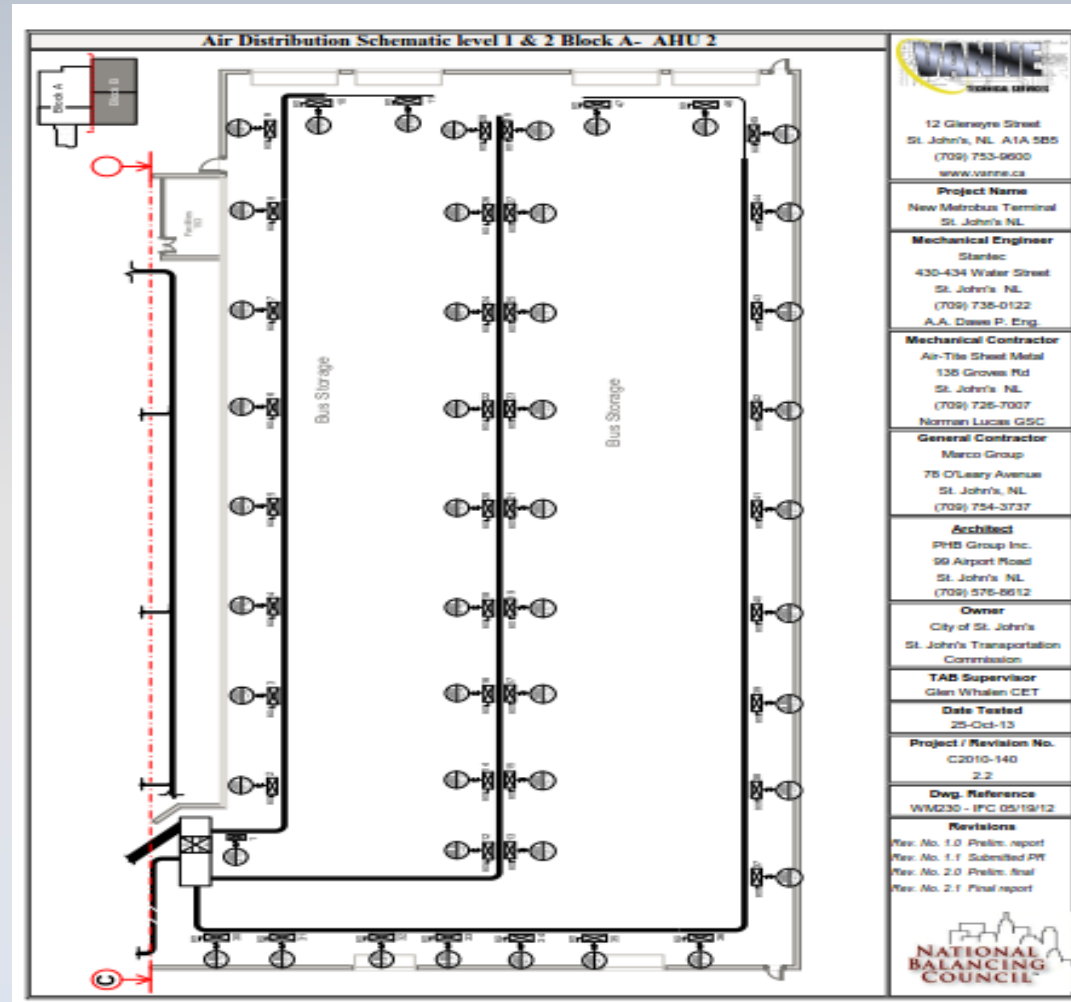
Supply Grille Register Diffuser
(Outlet)

Return / Exhaust GRD
(Inlet)

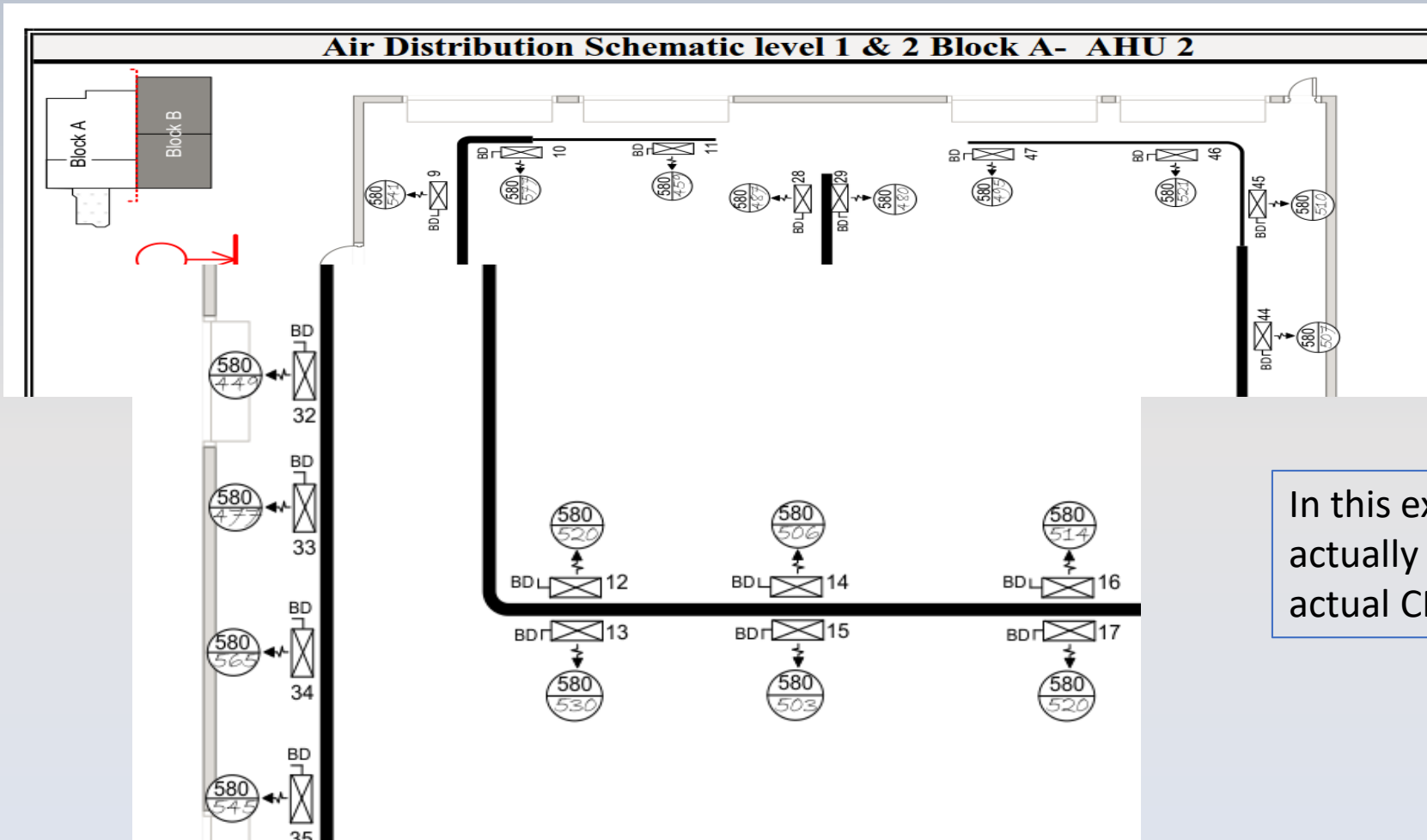


Corresponding Mechanical Drawings

Sample of Mechanical Drawings generated by the TAB Contractor.



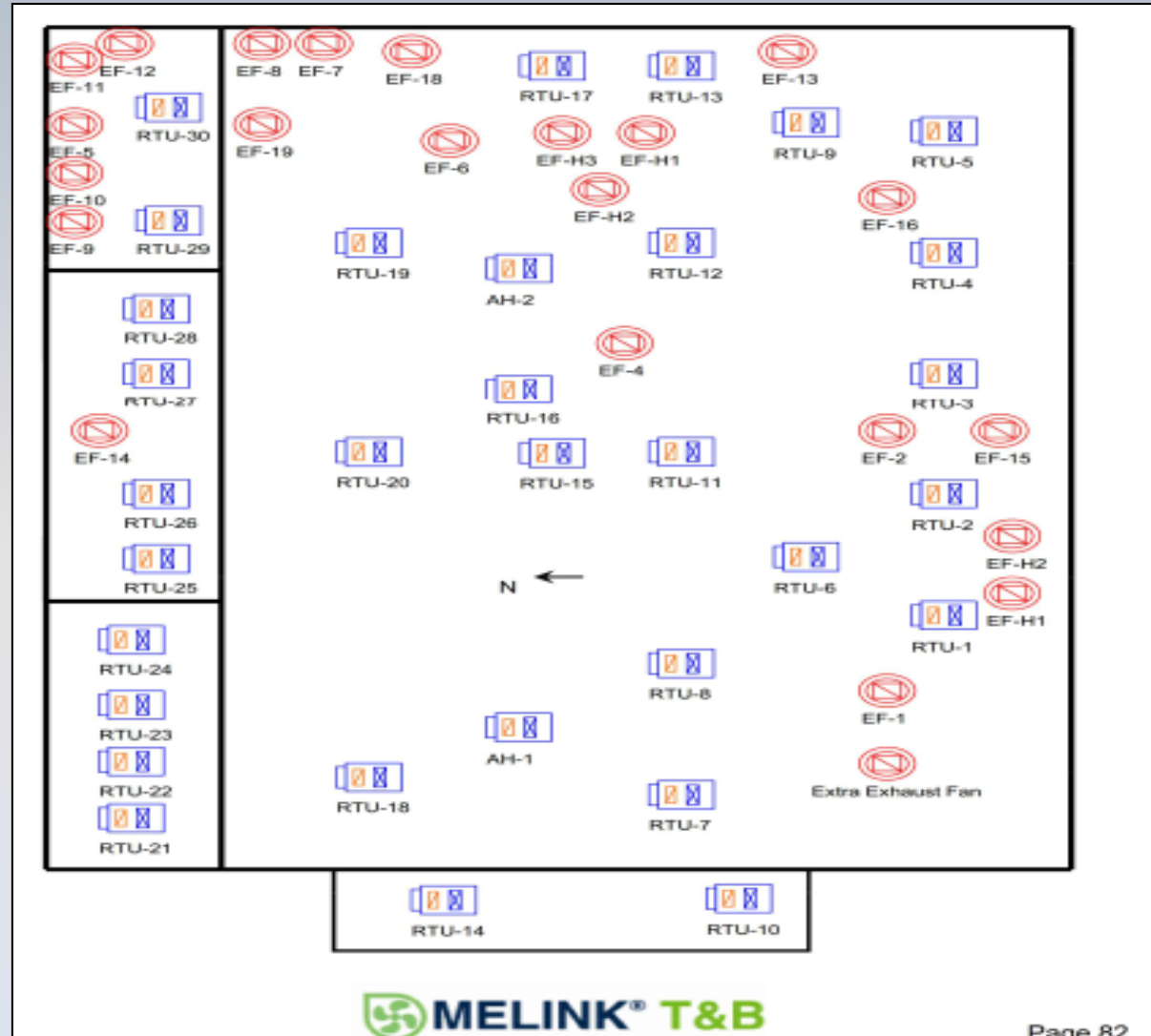
Corresponding Mechanical Drawings



In this example, the TAB contractor actually took the time to include the actual CFM by each device.

Must Include Mechanical Drawings

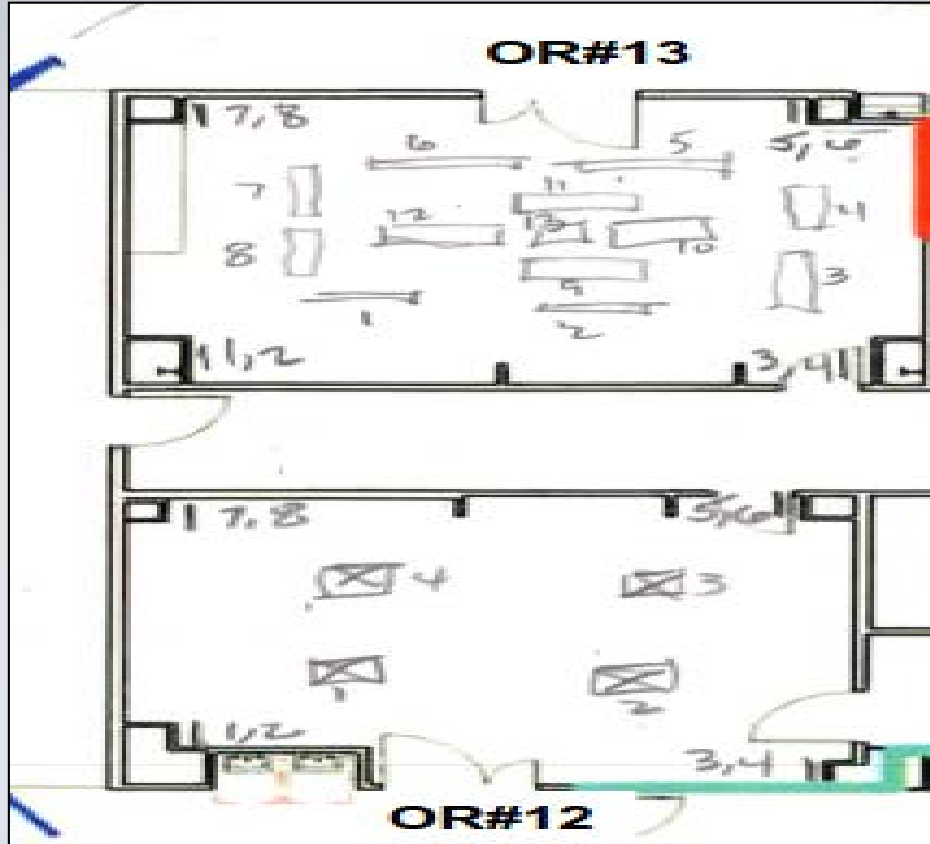
TAB contractor generated roof plan.



Final TAB Report – Corresponding Mechanical Drawings – Hand Drawn In Field



Final TAB Report – Corresponding Mechanical Drawings



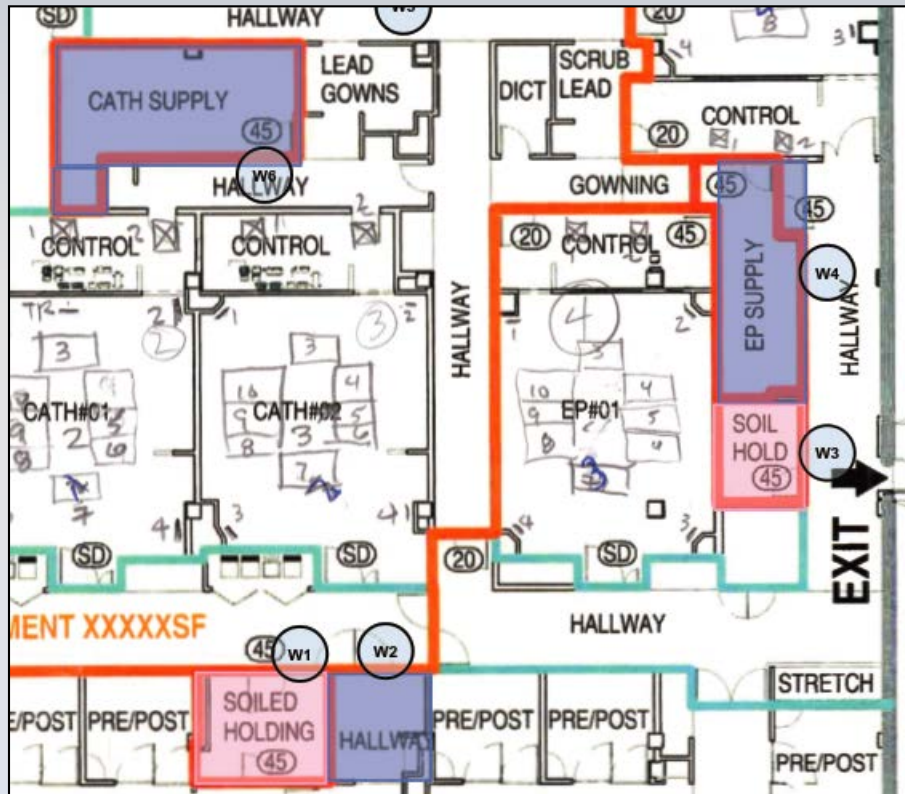
TAB contractor who submitted this is not currently certified as a TAB professional.

The hand drawn GRDs, (Grilles, Registers, Diffusers) could look better.

However 60% to 70% of TAB reports lack these drawings. The exact sizes were recorded on the data sheets.

The point of showing this is that it's better to have crude, hand-drawn illustrations that correspond to exact data, rather than have none at all.

Final TAB Report – Corresponding Mechanical Drawings



TAB Contractor identified individual grilles where scope of work called for it.

TAB Contractor also identified and labeled rooms where scope of work simple asked for ACH & pressurization.

Rejected TAB Report

NOTE:

Just because a TAB Report bears a stamp and is certified, that **DOES NOT** mean that every system on the project has been balanced to plus or minus 10%.

The certification stamp ensures that the project has been completed to the standards of the certifying organization, that calibrated instruments were used and that all data was recorded accurately and honestly.

It is a common misperception that a certified TAB report ensures all systems are completely balanced to within design parameters.

Rejected TAB Report

Reasons for rejected TAB report:

- 1) Missing information.
- 2) Poor Report review: TAB Firm– report didn't include specified or scheduled information.
- 3) Poor Report review: Design Team / Owner – report rejected because it didn't include specified information that wasn't scheduled or installed on project. Report is rejected because items had been earlier Value Engineered and removed or replace.
- 4) Unknown code compliance issues unique to a municipality, company, agency or institution.
- 5) Unresolved deficiencies or other outstanding issues.

Rejected TAB Report Professional Response

Line by line response detailing required information.

Remember, even if all your data is correct and repeatable, the job is not closed until the CO is issued and retention is released.

The TAB professional has the obligation to explain this.

Rejected Reports

Examples

Per specifications 230593, TAB firm is ABCD Certified, not XYZ as required. Hire XYZ Certified firm per specifications.

TAB Supervisor Response: ABCD approved by owner on 12.1.15, see attached email.

AHU-1, TAB report shows outside air to be “zero”, mechanical schedule requires 200 CFM outside air, rebalance & resubmit”.

TAB Supervisor Response: There is no outside air duct on mechanical plans dated 10.1.15 & none installed in field. Refer to notes on pages 1 & 13 of TAB report. See attached deficiencies from 12.23.15 & 1.13.16.”

Per specifications 230593, Paragraph 4.2, section A-Z, No boiler, pump, or hot water re-heat coil data is provided. Please revise and resubmit.

TAB Supervisor Response: Project had no hydronic systems scheduled, submitted or installed on this project. TAB report is accurate description of equipment operation as scheduled, submitted and installed. 4.2, A-Z do not apply to this project.



TAB Documentation – Conclusion

The TAB professional is not done until the final report is submitted, approved, the final Certificate of Occupancy is issued, and the owner has the building that they paid for.

From Estimate to Occupancy, a lot of simple mistakes occur that can hinder completion, occupancy, permits and payment come the end of the project.

It is the TAB contractors responsibility to request and present this documentation in a manner that reflects the level of their skills and abilities.

It is also responsibility of the contractors, design team and end user to provide the required documentation.

It is the hope that this presentation will make all parties more aware and understanding, as we are all working towards the same goal. Thank you.



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Scott Fielder scottf@nbctab.org

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