2025

ANNUAL TRAINING CONFERENCE

SEPTEMBER 22 – 26 | CHICAGO, IL

Fresh Perspectives in Weatherization from Crew to Program Leadership

"Amplifying Our Impact"

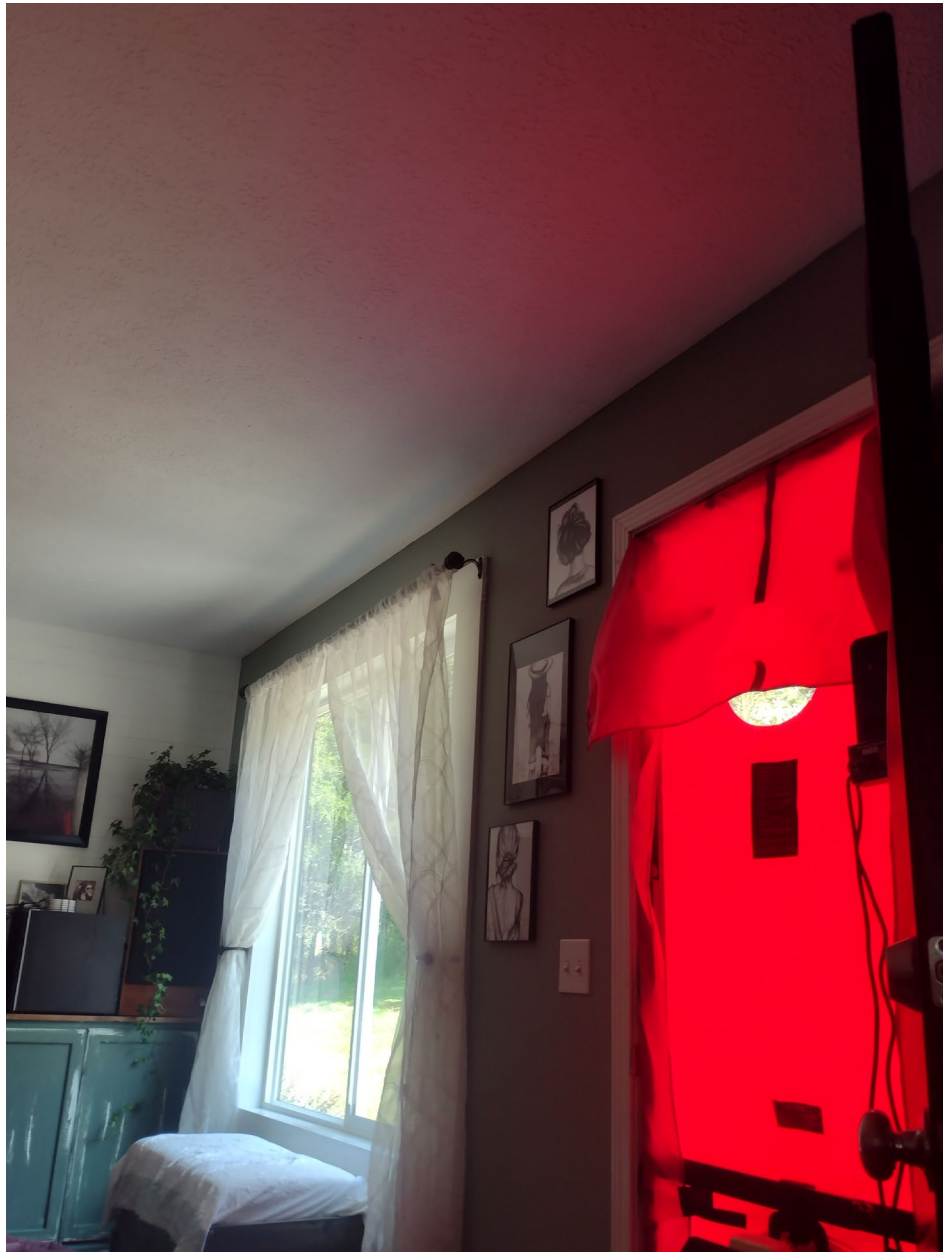
NASCSP

Ice breaker: Who's in the room?

- Auditors
- QCIs
- Crew Leaders / crewman
- Contractors
- Program Managers
- Intake Staff
- State Monitors

Audit

It all starts with a quality audit!



Quality Audit

A quality audit is the difference between a 3-day project and a 2-month project.

The difference between a confident and prepared contractor / crew and a defeated, frustrated contractor / crew.

Audit Workbook

- All collectable information

Name	Job#
Address	Audit date
County	Auditor
Phone#	Occupants

SQ'	Vol	Bldg Ht	Story Ht

Year Built: Electrical service size:

Smoke detectors	CO detectors

Walls

Siding Type	Ins Type	R Value
Soffit vents	Number	

N Shielding	%	S Shielding	%
E Shielding	%	W Shielding	%

Notes:

Roof

Condition	Color/Type
Chimney Type	Chimney Condition
Gutters Yes / No	Downspouts Yes / no

Notes:

Foundation C

Basement Crawlspace Conditioned Unintentionally

Perimeter	Joist Size	Height
SQ'	Existing Poly Y / N	Drain Loc.
Joist Ins Type	R-Value	Access
Wall Ins Type	R-Value	# open J-box
Floor Ins Type	R-Value	Spacing 16" 24"
Dryer Vent Y / N	Replace Y / N	Length
Hood Present Y / N	Replace Y / N	Insulate Y / N

Notes:

Heating System 1

System Type	Location	Area Cond.
Brand	Mod#	Ser#
BTU In Out	Age	Fuel type
Filter Size	Filter Cover Y / N	T-stat Prog Digital Dial
Gas Shut Off Y / N	Elect Shut Off Y / N	Condensate Y / N
Gas Leak Y / N	Number	Drain Loc.
Duct Ins Present Y / N	Ducts Sealed Y / N	Duct Loc.
SSE	CO	Draft

Notes:

Water Heater

Brand	Mod#	Ser#
NG Electric Propane	Location	Input
TPR Present Y / N	Elect Switch Pres Y / N	Gas Shut Off Y / N
Tank Ins Present Y / N	Type	Add Y / N
Pipe Ins Present Y / N	Add Y / N	Feet
Condition Good Fair Poor	CO	Draft

Notes:

Refrigerator

Brand	Mod#	Refrigerant
Color	Age	CU'
Space Ht	Space W	Space Depth

Notes:

Attic A

Open Floored Sloped Knee wall Collar

Location	SQ'	Rafter Spacing 16" 24"
Length	Width	Height
Existing Ins Type	R-Value	Access Y / N
Access Location	Boxed? Y / N	Hatch Ins Present Y / N
Soffit Vents Present Y / N	Attic Venting Y / N	Number
Type of Vents	Approx Net Free	K&T Present Y / N
K&T Live Y / N	J-box Uncovered	Can Lights
Chimney 1 Type	Chimney 2 Type	Ducts Present Y / N

Exhaust 1	Vented Y / N	Length	Termination
Exhaust 2	Vented Y / N	Length	Termination

Notes:

Audit Workbook

- Diagnostic Collection

CAZ Details

Client:	Job#
Auditor:	Date:
Outdoor temp:	Indoor temp:
Delta P:	

CAZ Details

Total BTU input of appliances (x .05)	A
Volume of CAZ	B
HT Length Width	If A > B , combustion air is needed
Gas leak:	Verified?
Electrical Hazards:	Fire hazards:
Liner needed?	Vent ¼" rise?
Furnace filter removed?	Dryer vent removed?
W/H type:	Furnace type:

CO & LEL

Ambient CO Ext	Ambient CO 1	Ambient CO 2	Ambient CO 3	Ambient CO 4
LEL <10%	LEL <10%	LEL <10%	LEL <10%	LEL <10%

CO 0-9 No action required

CAZ Test With Instructions

Set house to natural conditions, take baseline.
Turn on all exhaust (bath fans, range hood, dryer), close interior doors.
Smoke doors with fans behind them, start furthest from CAZ. Back to CAZ. Towards toes, door stays closed.
Open CAZ door and record pressure + / -
Close CAZ door + / -
Turn on air handler, recheck all doors
Open CAZ door and record pressure + / -
Close CAZ door + / -

Combustion Test Results

Appliance	Ambient CO	Flame Roll out	Spillage In first 2 minutes	Spillage After 2 minutes	CO ppm 5 minutes	CO ppm 5 minutes	SSE	Stack temp	Pass Or Fail
W/H					L	R			
Furnace									

Oven Results

Oven ppm	Burners clean?		Water temp 1	Water temp 2

<225 ppm

Blower Door Results

Blower door

CFM50	Depressurization / Pressurization	Location:
Open / A / B	Wind speed:	Volume:
Inside temp:	Outside temp:	ACH/50

ACH/50 = CFM50 x60 divide by volume

Duct Pan Results

Duct leakage

Register	1	2	3	4	5	6	7	8	9
Room									
PA									

Register	10	11	12	13	14	15	16	17	18
Room									
PA									

Zone Test Results

Zone tests

Zone:	Zone:	Zone:	Zone:

Duct Blaster Results

Duct Blaster

Leakage:	CFM	Configuration:

50% post WX reduction, 20% of system flow capacity, or more stringent local standards

Dominant Duct Leakage

Dominant Duct leakage

Natural conditions, PR/PR, Baseline, turn on air handler.

Negative pressure – dominant supply leaks Positive pressure – dominant return leaks

Room pressure results

Room Pressures

Room									
PA									

Exhaust Fan Results

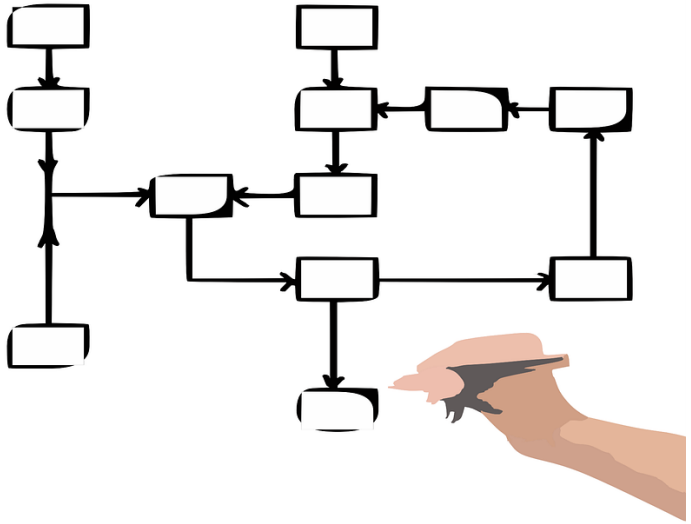
Fan tests

KIT	Window Y / N	Bath 1	Window Y / N	Bath 2	Window Y / N
Bath 3	Window Y / N	Dryer	Window Y / N	Other	Window Y / N

Consistency

- Muscle memory
- Follow the same pattern
- Less likely to miss things
- Faster / more efficient

Example



- This was my flow
- There isn’t a right or wrong way
- Do what works for you

Client Interview / Walkthrough

- Take your time
- Listen to what the client has to say
- It’s an opportunity to build trust

Client Interview

You can learn a lot from the client interview.

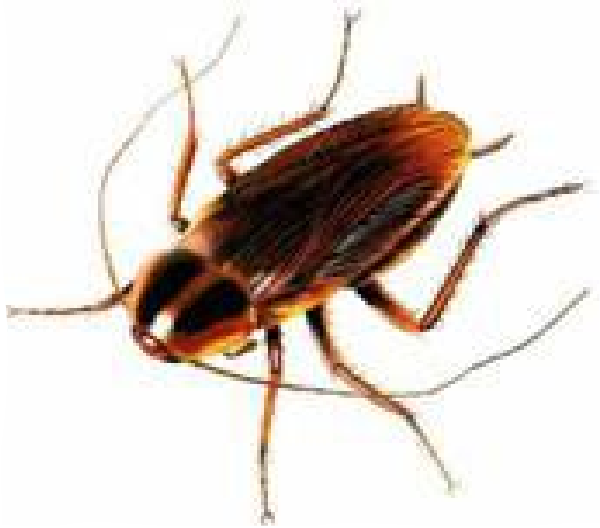
Comfort issues: Hot / cold rooms? Do they keep interior doors closed? Doors to unconditioned areas open?

Thermostat settings: Bill impact, do their settings significantly impact their consumption? Post WAP differences (fun to see if they set them different post WAP)

Service records: HVAC, water heater, etc. serviced regularly?

Mold & moisture issues: Do they use the exhaust ventilation for cooking and showering? If you see mold on an exterior wall, it's a good spot to scan with an IR Camera to check for insulation voids.

Walkthrough

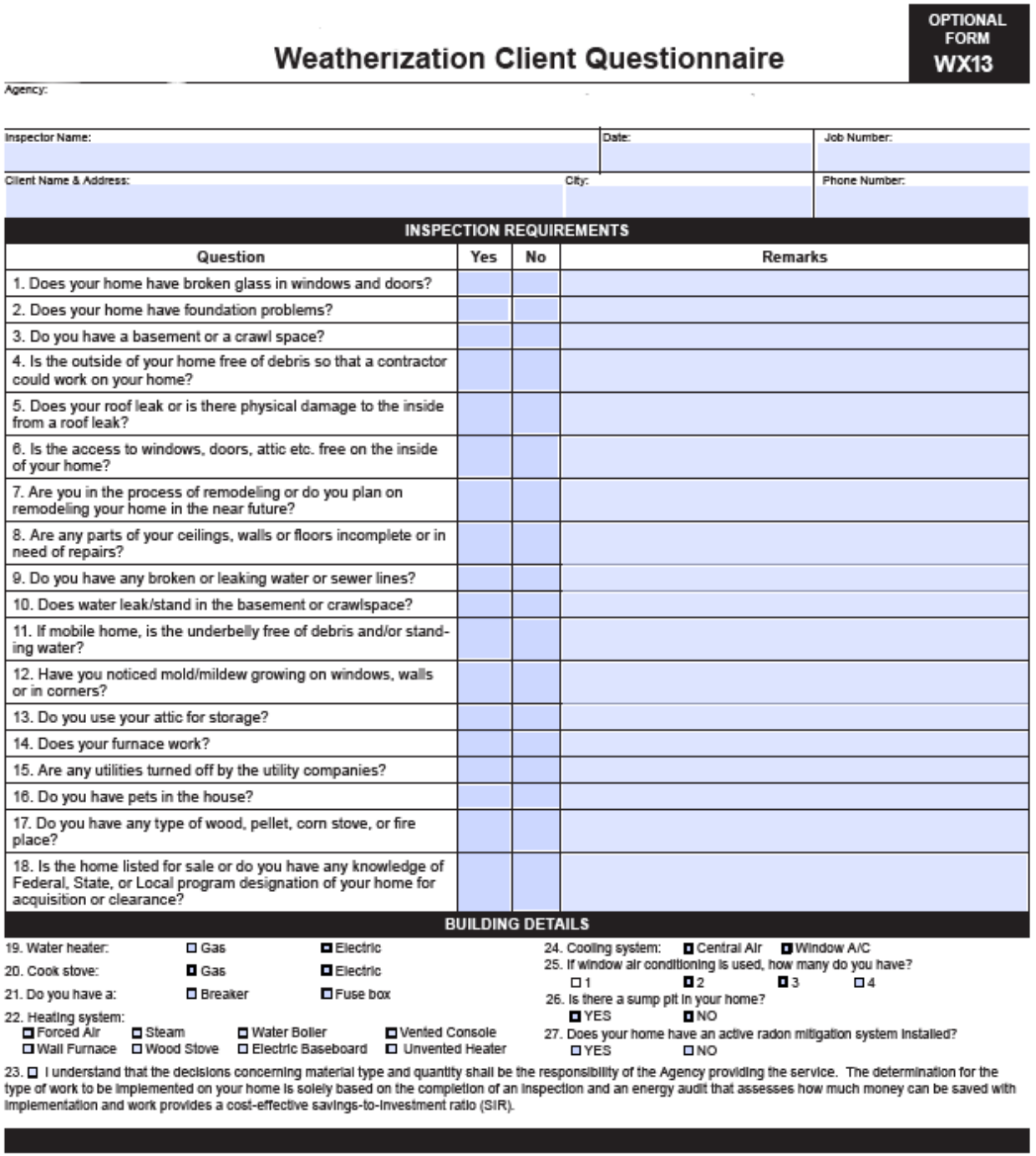


- Keep an eye out for deferral issues
- Assess if the issues can be addressed through alternate funding sources
- Communicate the issues and action plan with the client

Pre Audit Questionnaire

- If you have a high deferral rate, you may want to prescreen your clients with a questionnaire.
- This can be done with the application or on the audit scheduling phone call.

- Does anyone have a similar questionnaire?
- Are there any other examples of ways to prescreen?



OPTIONAL FORM WX13

Weatherization Client Questionnaire

Agency:

Inspector Name:	Date:	Job Number:

Client Name & Address:	City:	Phone Number:

INSPECTION REQUIREMENTS

Question	Yes	No	Remarks
1. Does your home have broken glass in windows and doors?			
2. Does your home have foundation problems?			
3. Do you have a basement or a crawl space?			
4. Is the outside of your home free of debris so that a contractor could work on your home?			
5. Does your roof leak or is there physical damage to the inside from a roof leak?			
6. Is the access to windows, doors, attic etc. free on the inside of your home?			
7. Are you in the process of remodeling or do you plan on remodeling your home in the near future?			
8. Are any parts of your ceilings, walls or floors incomplete or in need of repairs?			
9. Do you have any broken or leaking water or sewer lines?			
10. Does water leak/stand in the basement or crawlspace?			
11. If mobile home, is the underbelly free of debris and/or standing water?			
12. Have you noticed mold/mildew growing on windows, walls or in corners?			
13. Do you use your attic for storage?			
14. Does your furnace work?			
15. Are any utilities turned off by the utility companies?			
16. Do you have pets in the house?			
17. Do you have any type of wood, pellet, corn stove, or fire place?			
18. Is the home listed for sale or do you have any knowledge of Federal, State, or Local program designation of your home for acquisition or clearance?			

BUILDING DETAILS

19. Water heater: ☐ Gas ☐ Electric
20. Cook stove: ☐ Gas ☐ Electric
21. Do you have a: ☐ Breaker ☐ Fuse box
22. Heating system:
☐ Forced Air ☐ Steam ☐ Water Boiler ☐ Vented Console
☐ Wall Furnace ☐ Wood Stove ☐ Electric Baseboard ☐ Unvented Heater
24. Cooling system: ☐ Central Air ☐ Window A/C
25. If window air conditioning is used, how many do you have?
☐ 1 ☐ 2 ☐ 3 ☐ 4
26. Is there a sump pit in your home?
☐ YES ☐ NO
27. Does your home have an active radon mitigation system installed?
☐ YES ☐ NO

23. ☐ I understand that the decisions concerning material type and quantity shall be the responsibility of the Agency providing the service. The determination for the type of work to be implemented on your home is solely based on the completion of an inspection and an energy audit that assesses how much money can be saved with implementation and work provides a cost-effective savings-to-investment ratio (SIR).

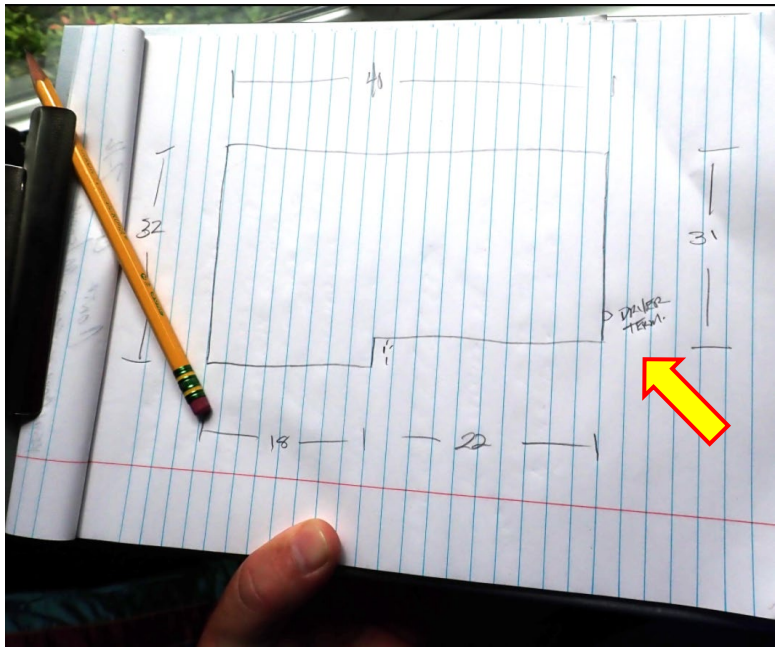
Exterior

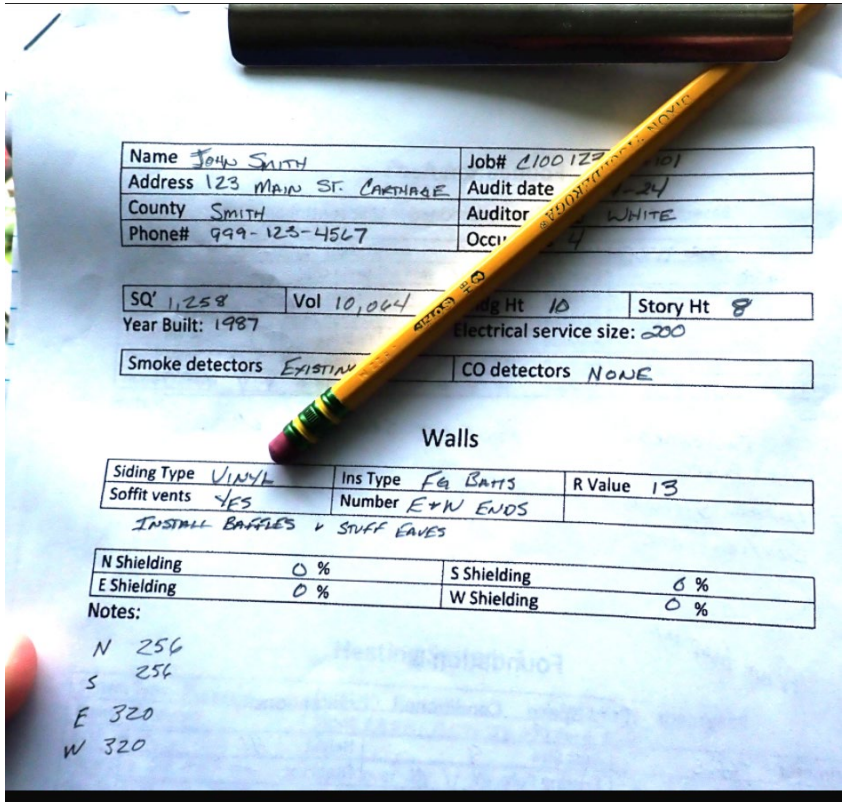
- Pictures of all sides of the home
- Damage
- Oddities: Bump outs, overhangs, cantilever floors




Exterior

- Measure footprint
- Start house sketch
- Include terminations
- Fill out audit workbook








Exterior

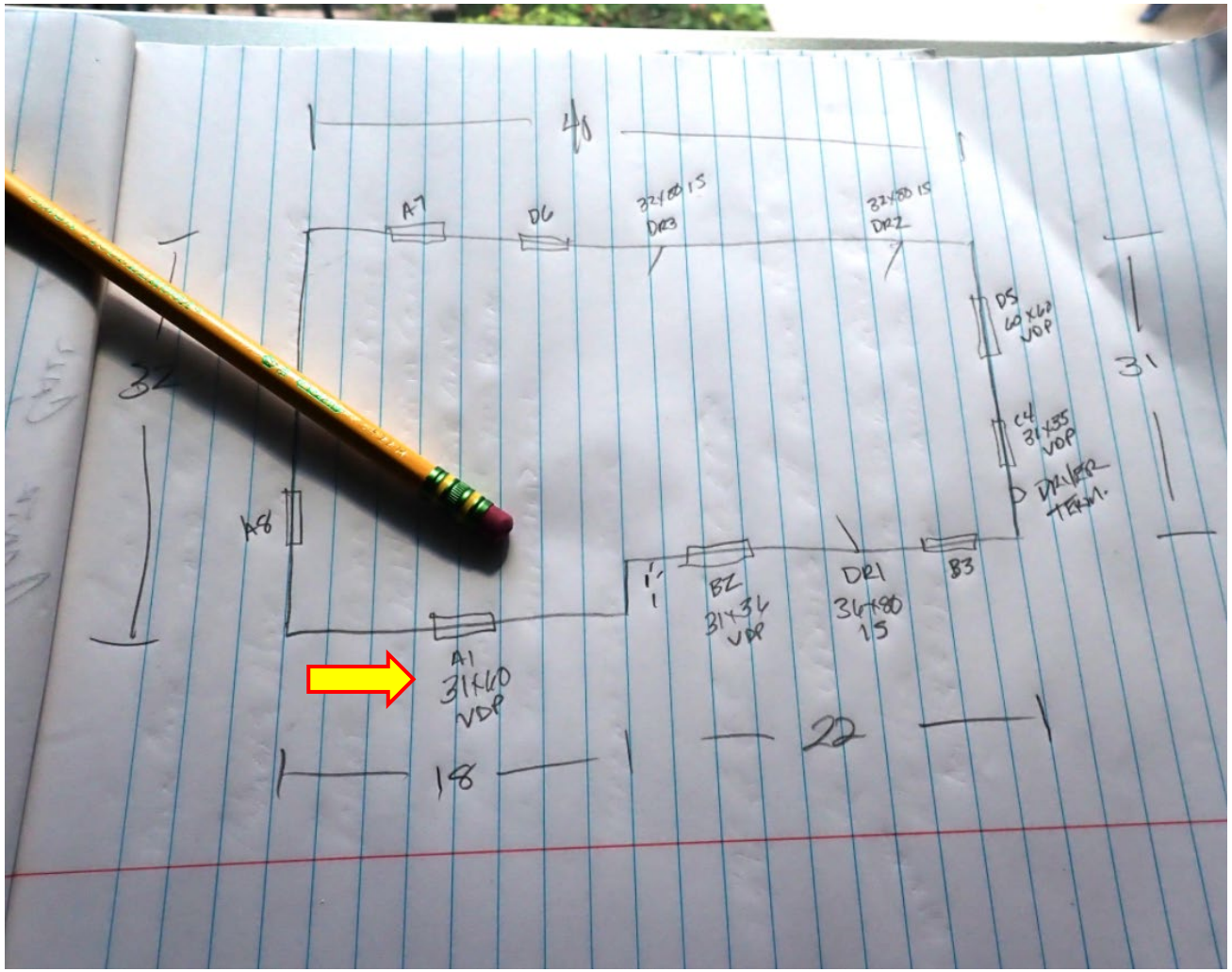
- Photo document all windows and doors
- Measure all windows and doors

Exterior

Add windows and doors to house sketch

Label them with measurements and types.

Add notes (missing panes, storms, water damage, biological growth)



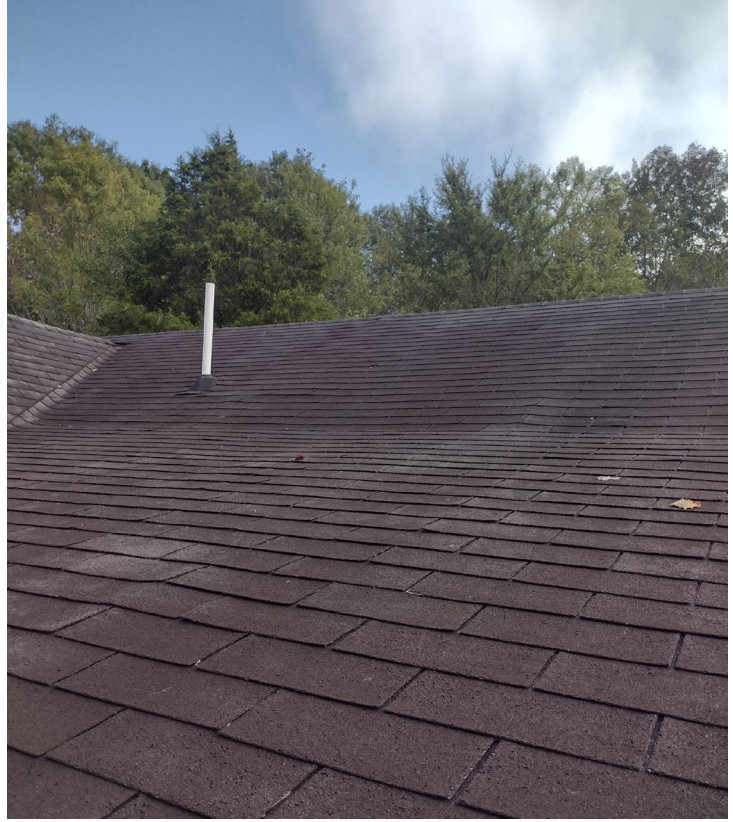
Exterior

- Photo document
- Gutters
- Downspouts / extensions
- Damage / issues

Exterior

Photo document the roof and any issues

Add notes to audit workbook



Exterior

Roof vents

Gable vents

Soffit venting

Crawlspace vents

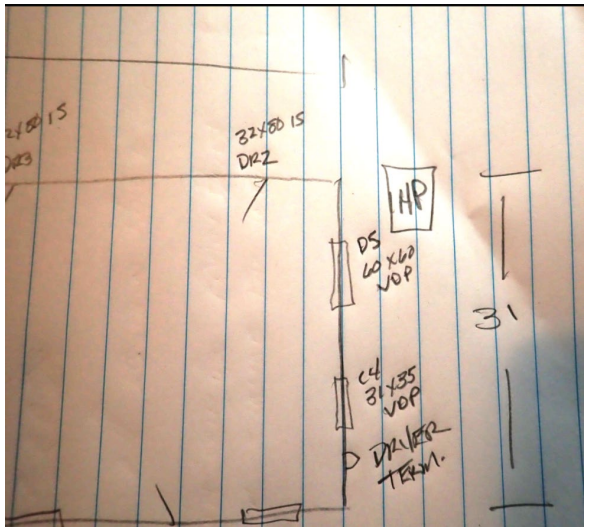
Damage

HVAC (if outside)

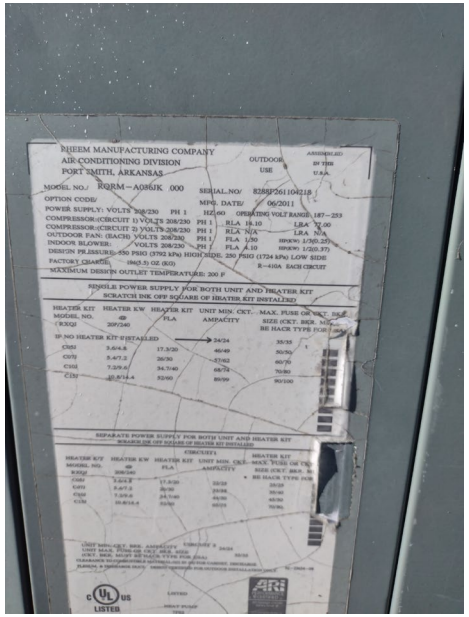
Photo documentation

Audit workbook

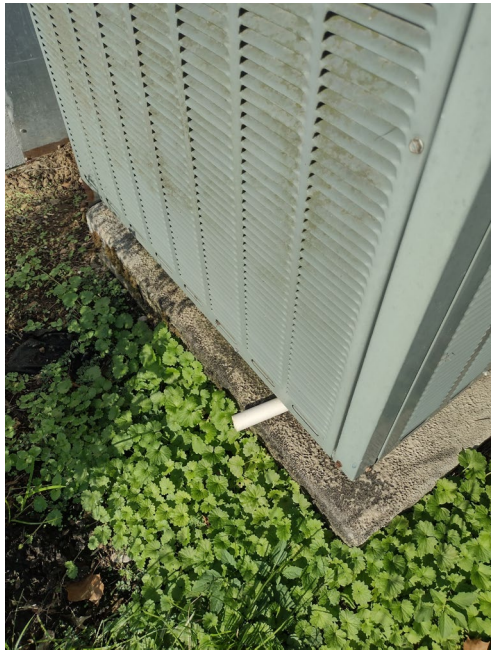
House sketch



Full picture

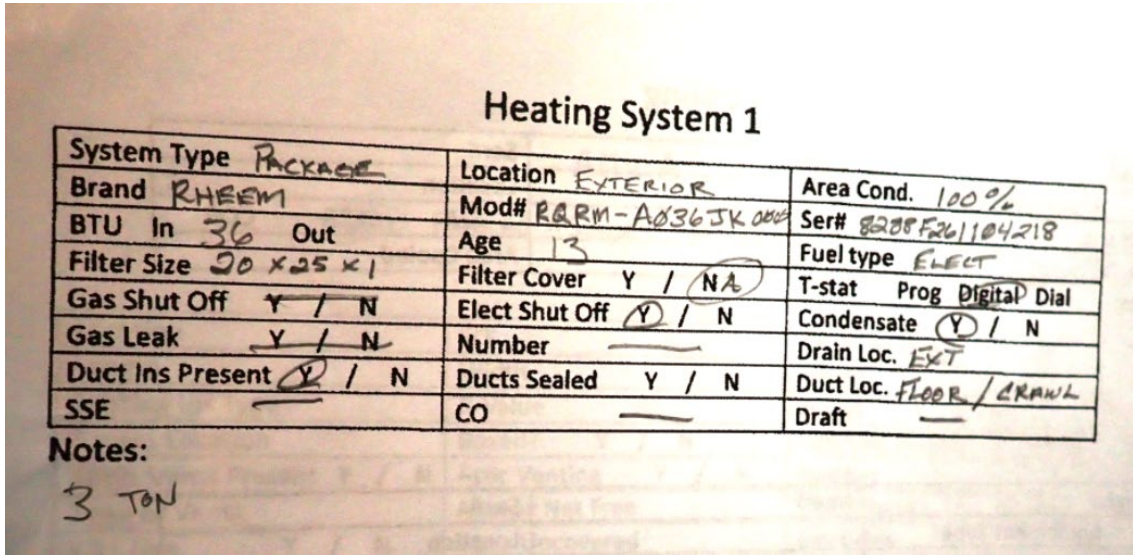


Tag



Condensate line / pump

Electrical shut off / issues



Heating System 1

System Type PACKAGE	Location EXTERIOR	Area Cond. 100%
Brand RHEEM	Mod# RQRM-A036JK 000	Ser# 8288F2611042 18
BTU In 36 Out	Age 13	Fuel type ELECT
Filter Size 20 x 25 x 1	Filter Cover Y / (NA)	T-stat Prog (Digital) Dial
Gas Shut Off ~~Y~~ / N	Elect Shut Off (Y) / N	Condensate (Y) / N
Gas Leak ~~Y~~ / ~~N~~	Number —	Drain Loc. EXT
Duct Ins Present (Y) / N	Ducts Sealed Y / N	Duct Loc. FLOOR / CRAWL
SSE —	CO —	Draft —

Notes:

3 TON

Crawlspace

Photo documentation

Insulation Values

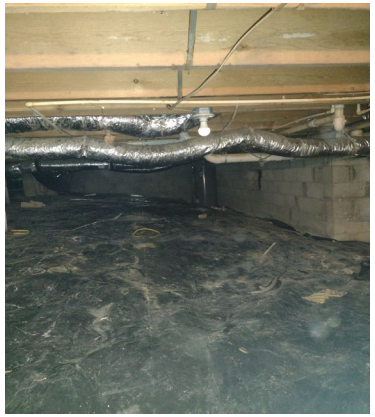
H&S Issues

Access

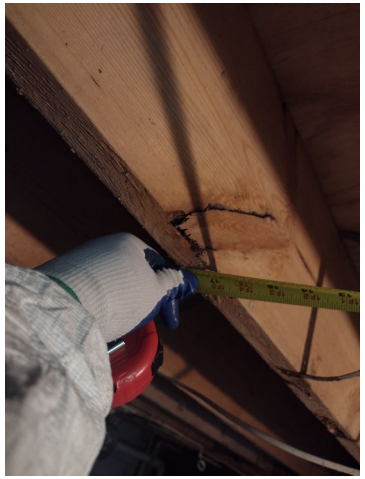
Floor insulation value

Wall insulation value

Access and issues

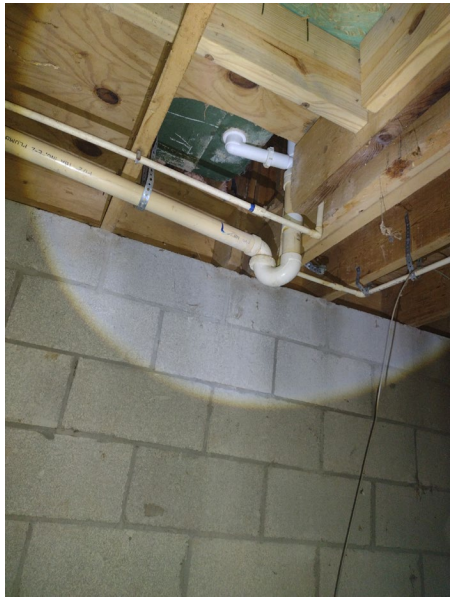


Document ducts and vapor barrier



Joist size and spacing

H&S issues

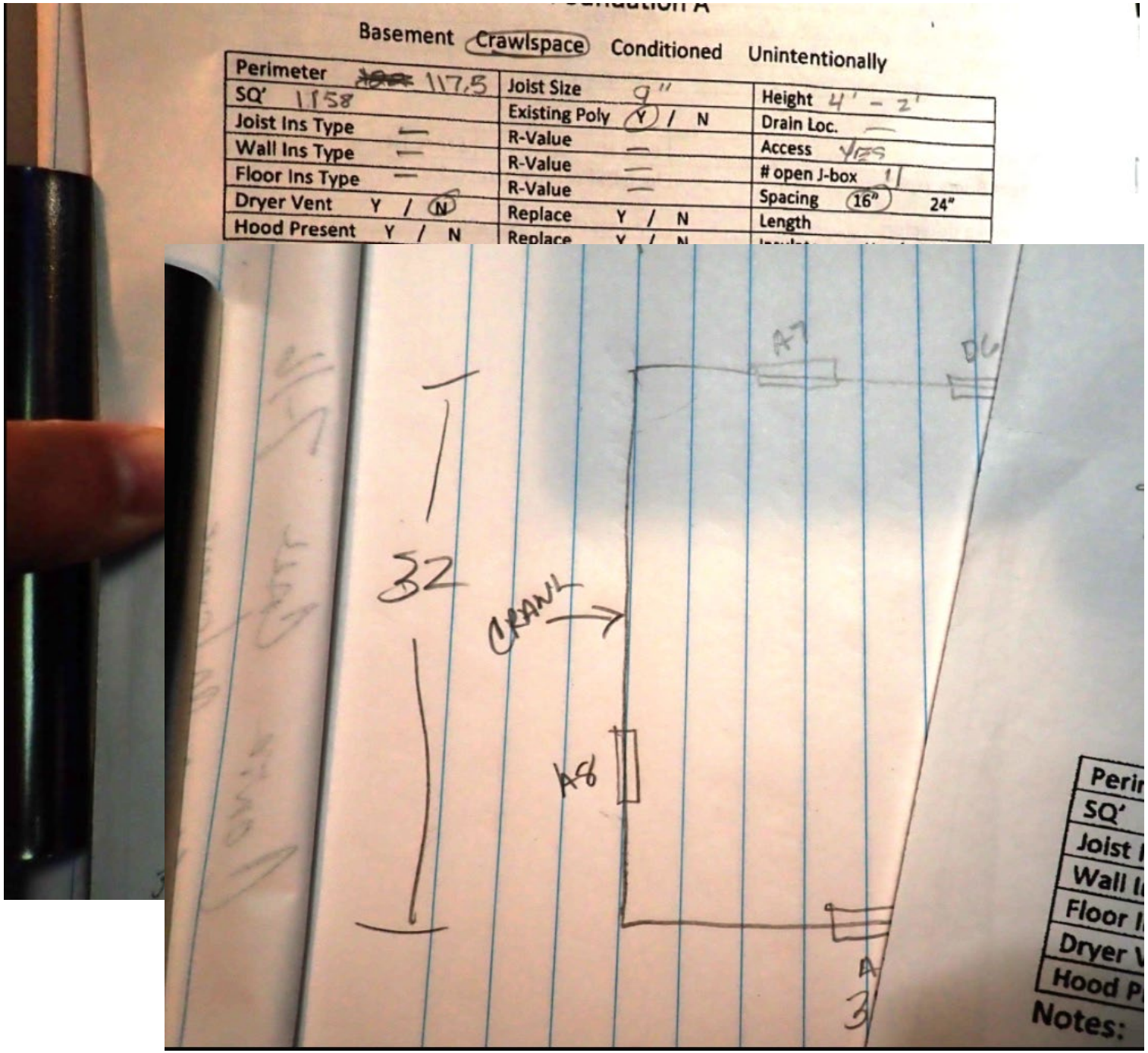


Bypasses and air sealing opportunities

Crawlspace

Add notes to audit workbook

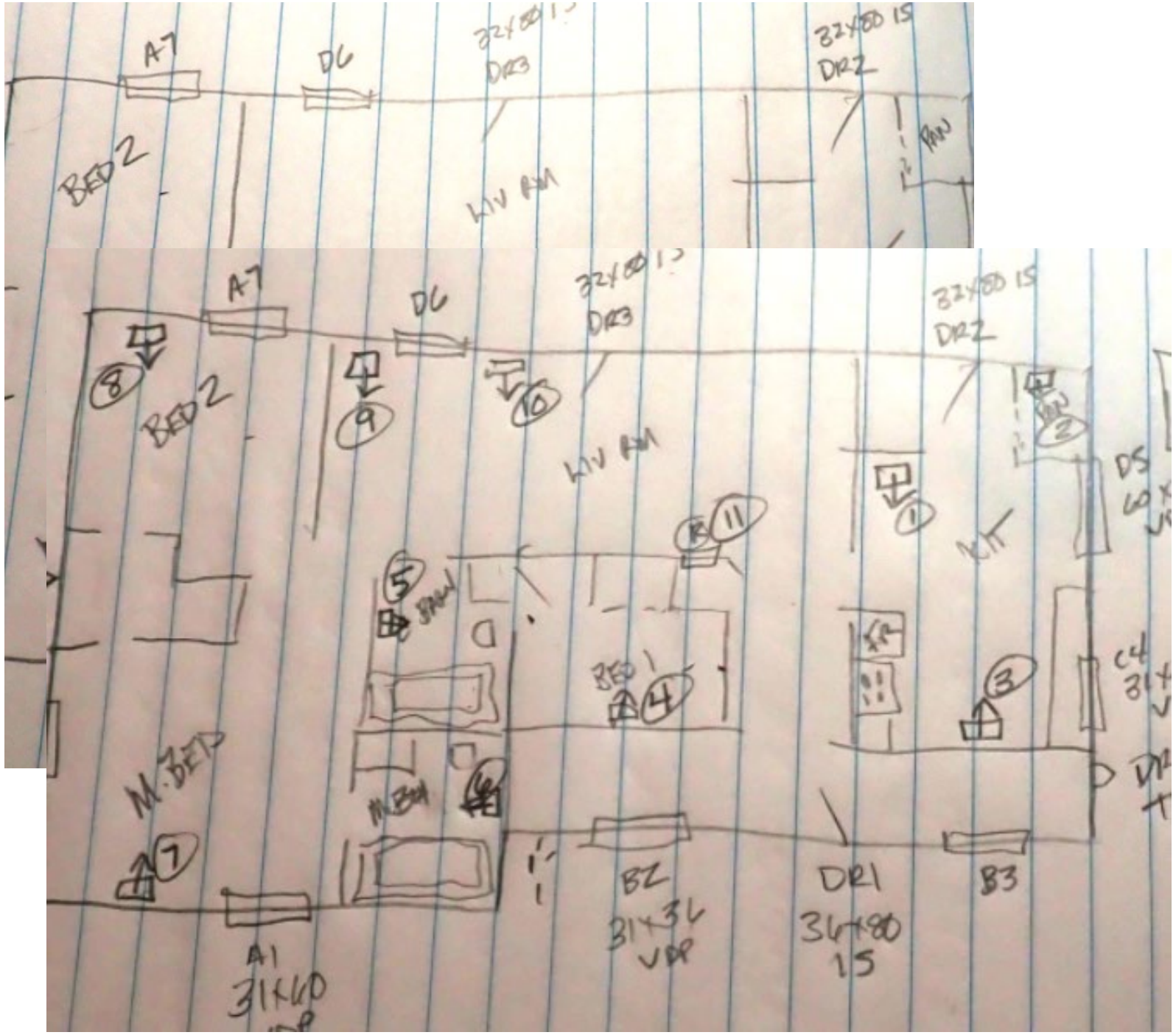
Add access point(s) to house sketch



Interior

Map out interior walls on house sketch

Add register locations to house sketch and label them



Water heater

Photo documentation

Add notes to workbook

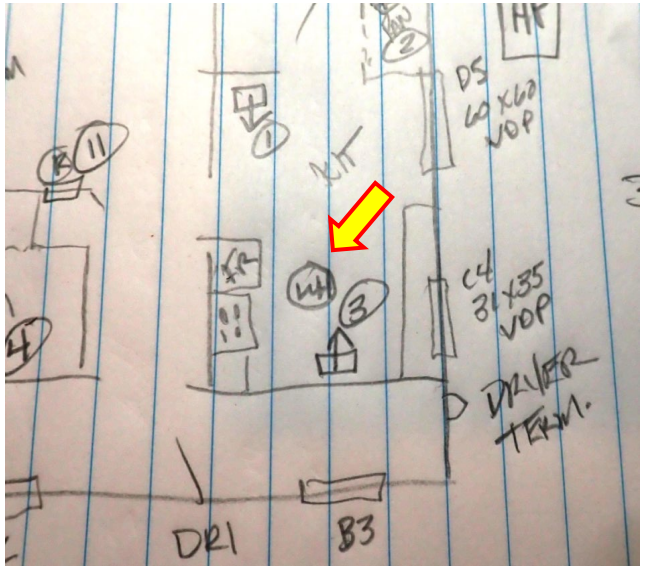
Add location to house sketch

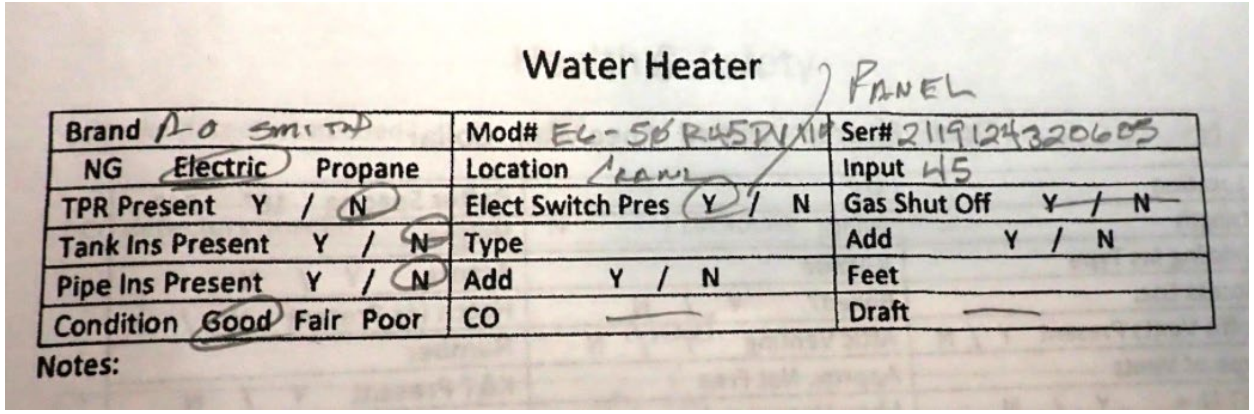
Tank and tank insulation

Information tag

Pipe insulation / issues

H&S issues





Water Heater

Brand A O SMITH	Mod# EG-50R45DV110	Ser# 2119124320605
NG Electric Propane	Location GARAGE	Input 45
TPR Present Y / N	Elect Switch Pres Y / N	Gas Shut Off Y / N
Tank Ins Present Y / N	Type	Add Y / N
Pipe Ins Present Y / N	Add Y / N	Feet
Condition Good Fair Poor	CO —	Draft —

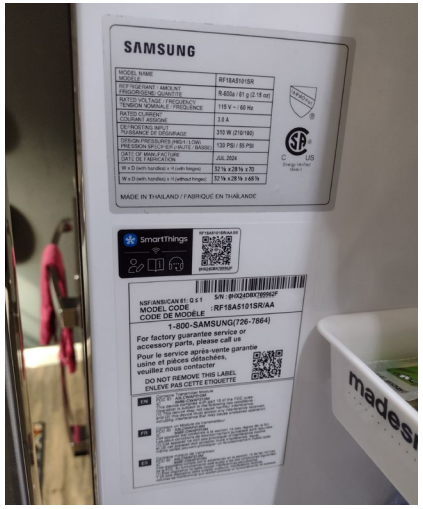
PANEL

Notes:

Appliances

Photo document the refrigerator

- Refrigerator info tag / seal issues
- Photo document stove type



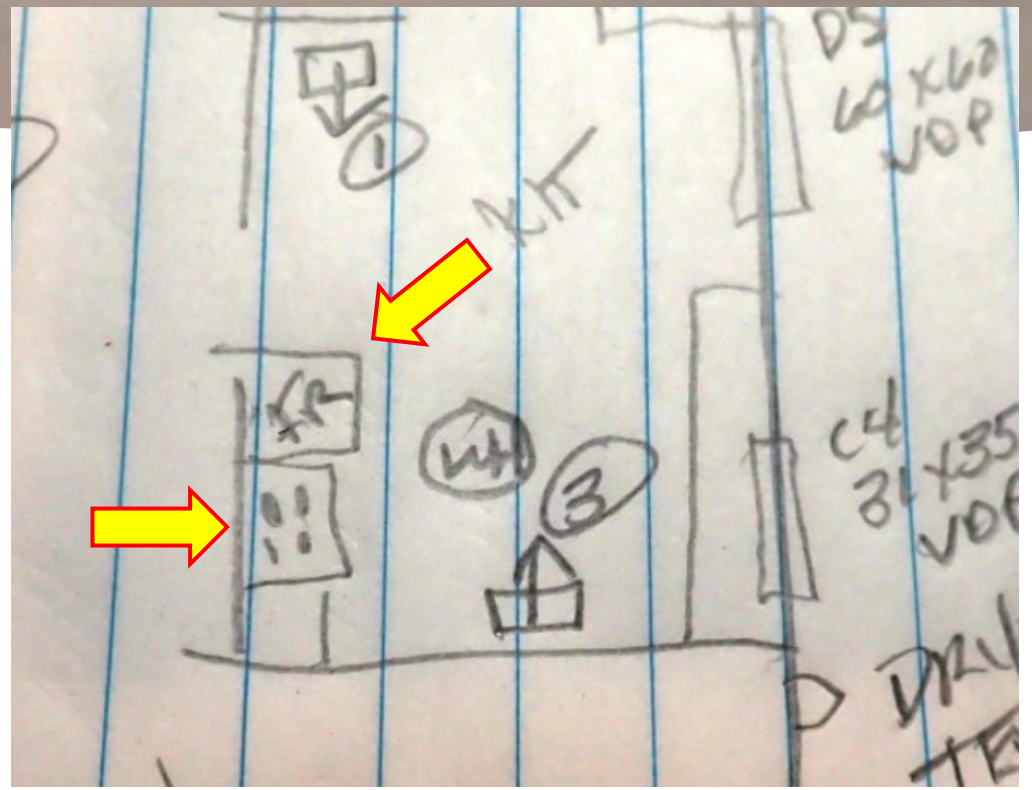
Refrigerator

Brand SAMSUNG	Mod# RF18A5101SR	Refrigerant R600-A
Color CHROME	Age 1 7-2021	CU' 18
Space Ht 70	Space W 32 1/8	Space Depth 28 3/4

otes:

Appliances

- Add notes to workbook
- Add location to house sketch



Appliances

Dryer

Photo document

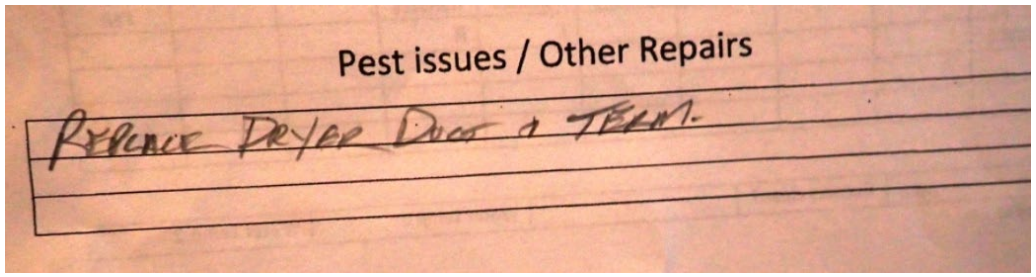
Vent duct

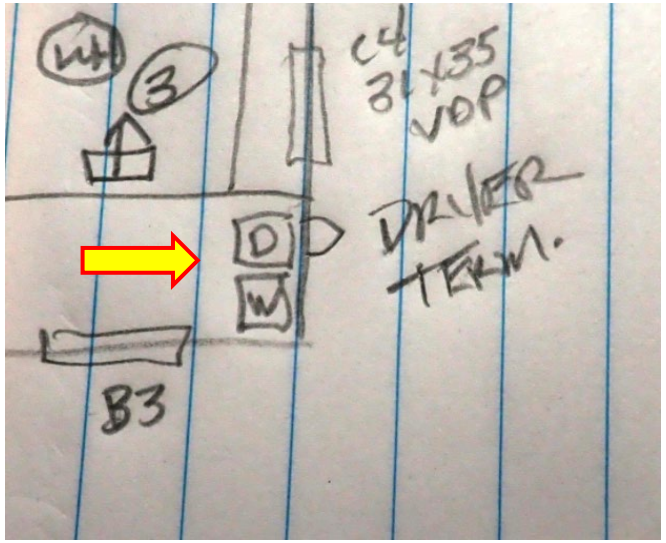
Termination

Issues

Add notes to audit workbook

Add location to house sketch





Attic

Photo documentation

Attic access

Dam

Lid insulation

Insulation depth

Ceiling joist size

Joist width

Attic

Whole attic pics

Wind-blown areas and depth variances

Unvented exhaust fans

Other issues:

Damming

Clutter

Pests

Plumbing

Bypasses and air sealing opportunities

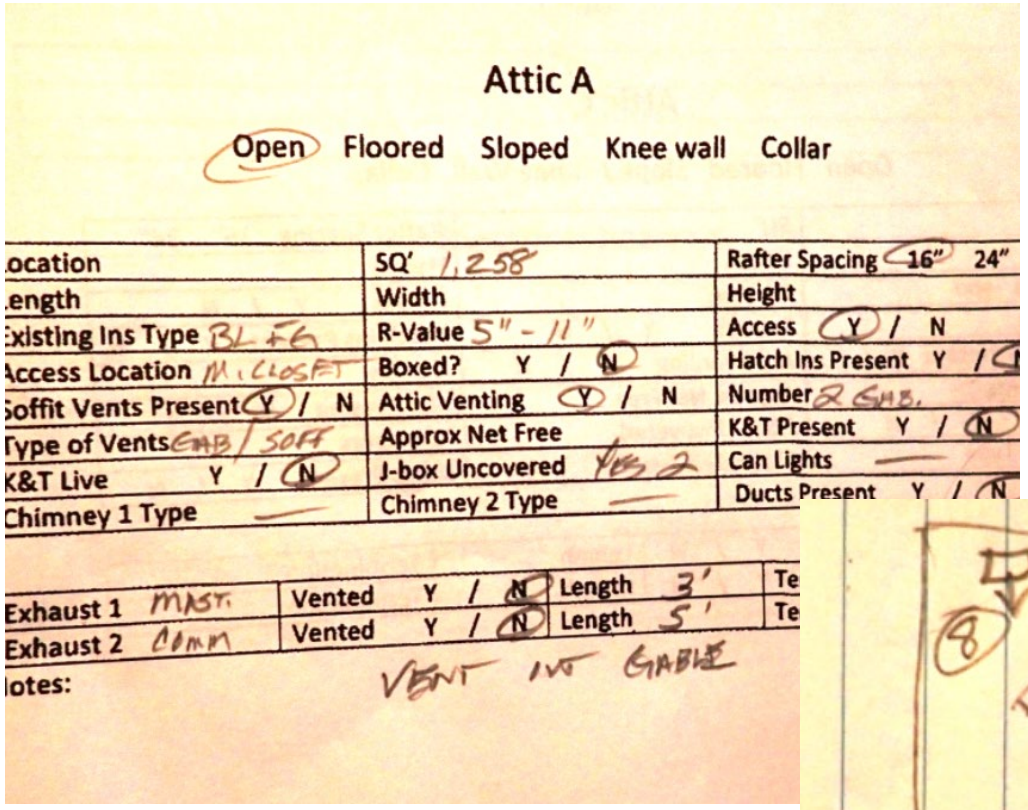
Electrical hazards

Roof leaks

Attic

Add notes to the audit workbook

Add access to the house sketch



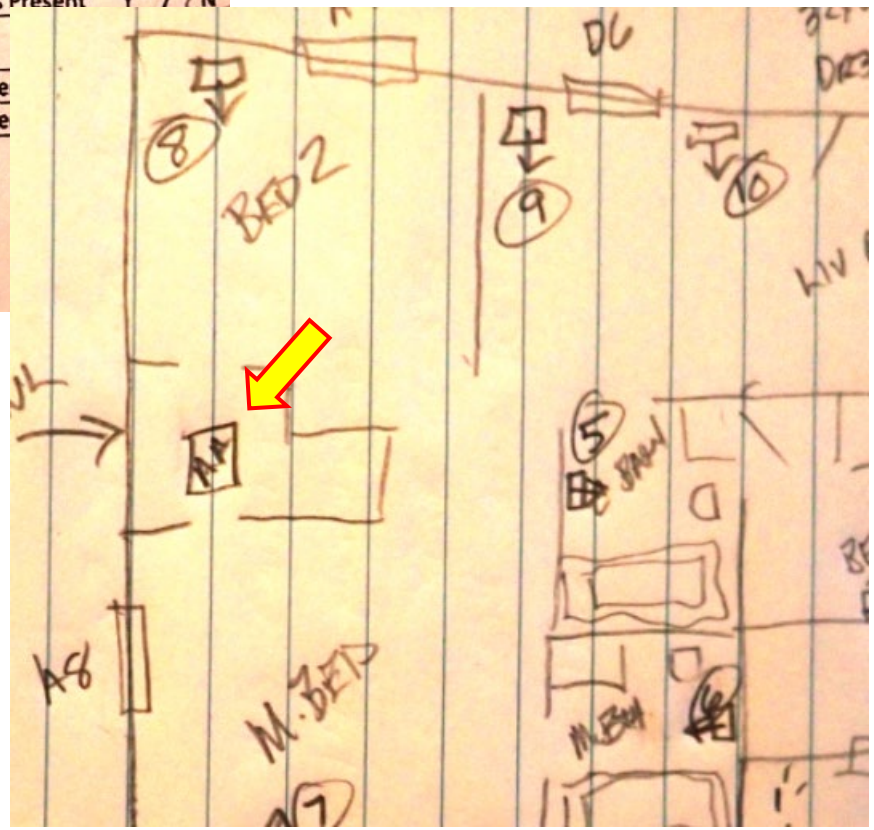
Attic A

Open Floored Sloped Knee wall Collar

ocation	SQ' 1,258	Rafter Spacing 16" 24"
ength	Width	Height
Existing Ins Type BL+FG	R-Value 5" - 11"	Access Y / N
Access Location M. CLOSET	Boxed? Y / N	Hatch Ins Present Y /
Soffit Vents Present Y / N	Attic Venting Y / N	Number 2 GAB.
Type of Vents GAB / SOFF	Approx Net Free	K&T Present Y / N
K&T Live Y / N	J-box Uncovered YES 2	Can Lights —
Chimney 1 Type —	Chimney 2 Type —	Ducts Present Y / N

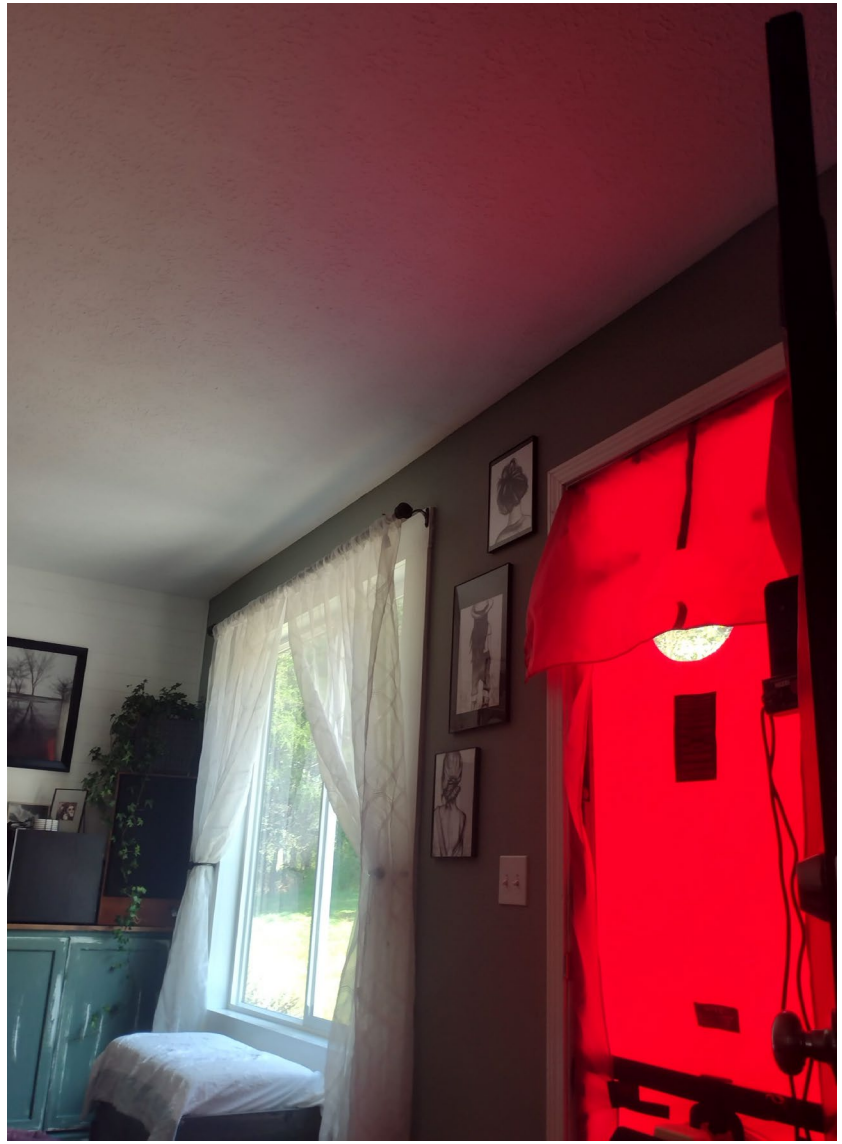
Exhaust 1 MAST.	Vented Y / N	Length 3'	Te
Exhaust 2 COMM	Vented Y / N	Length 5'	Te

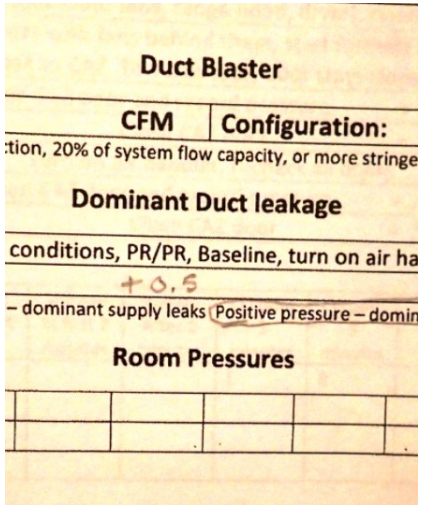
lotes: VENT INTO GABLE



Testing

- Set up my blower door
- Dominant duct leakage test
- Picture of thermostat
- Document results



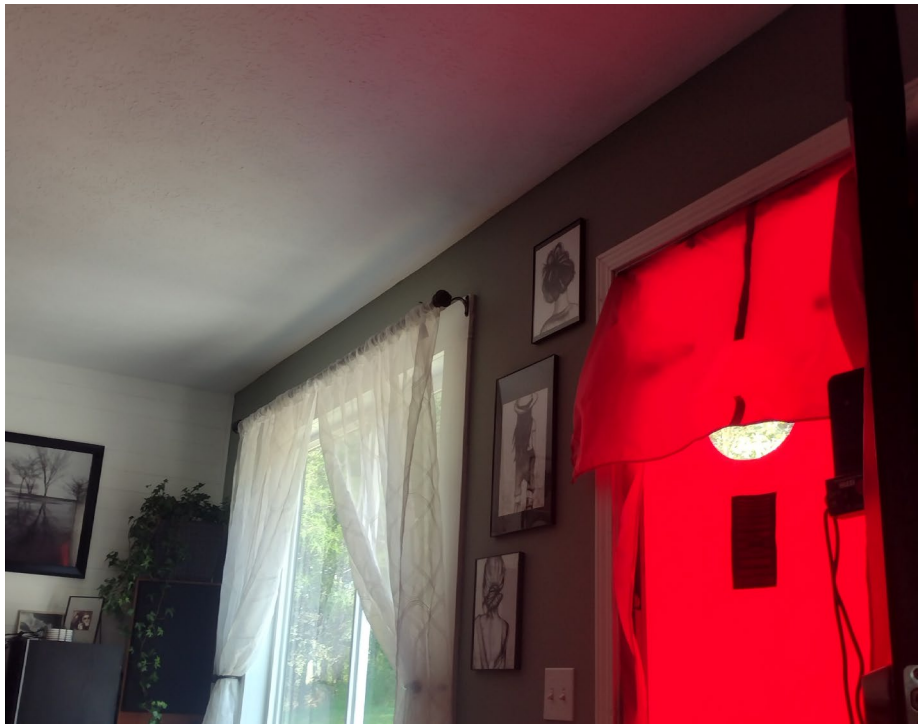


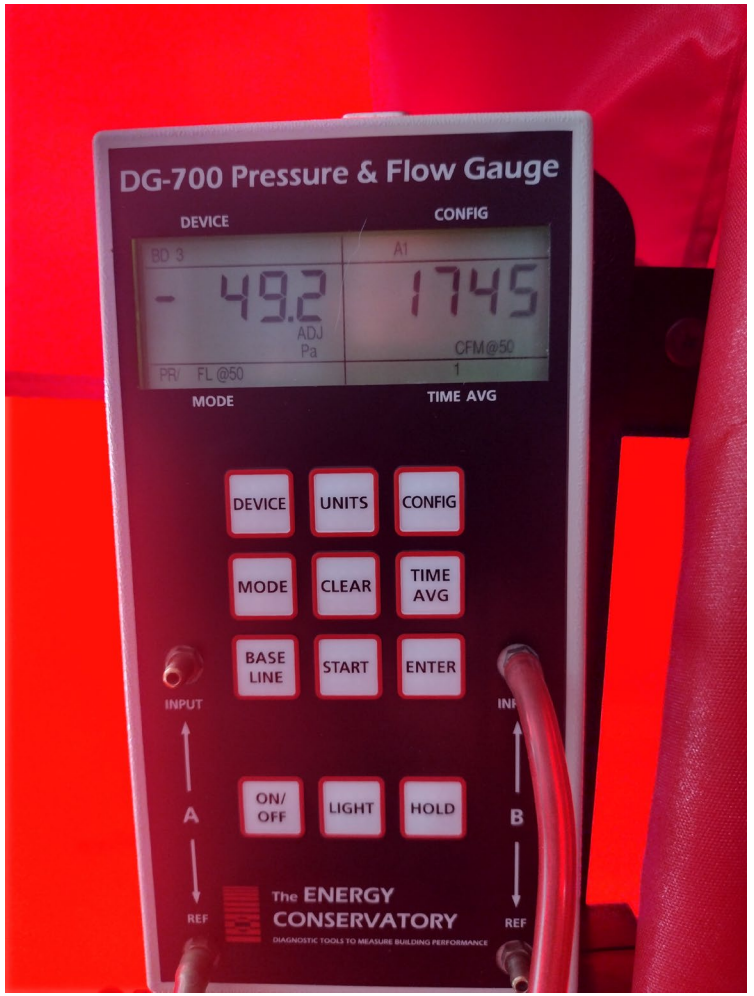
Blower door

Photo document results

Add notes to the workbook

Air change calculations





Blower door

CFM50 1745	Depressurization / Pressurization	Location: DR 3
Open / A / B	Wind speed: 0-5	Volume: 10,064
Inside temp: 75	Outside temp: 75	ACH/50 10.4

1258

ACH/50 = CFM50 x60 divide by volume

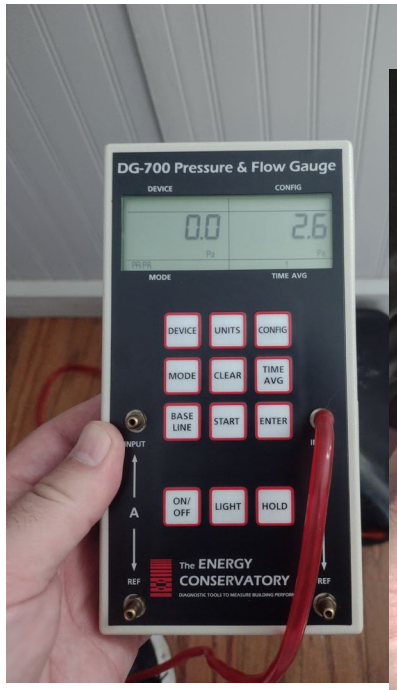
1258 / 7.5
1000 / 5.9
900 / 5.3

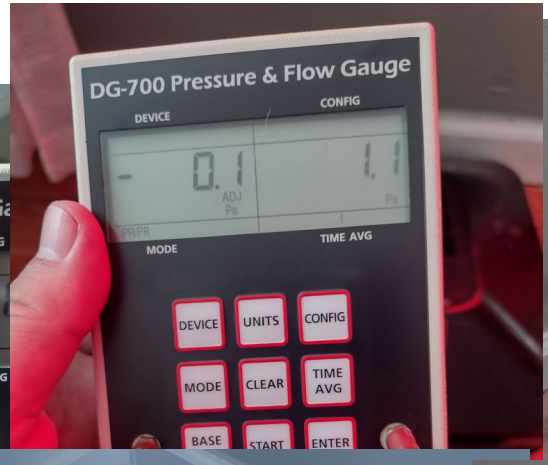
Duct Testing

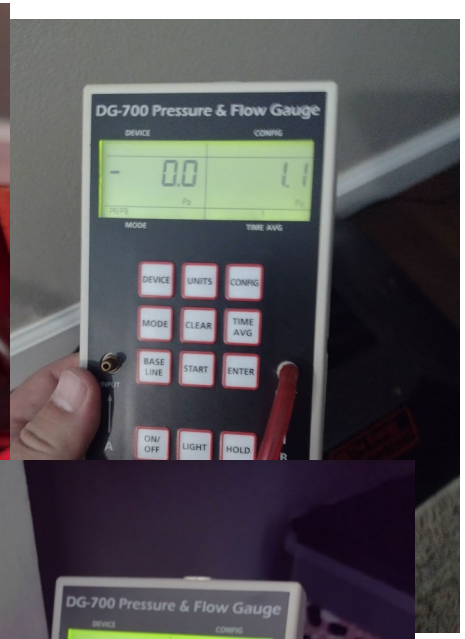
I use the pan method

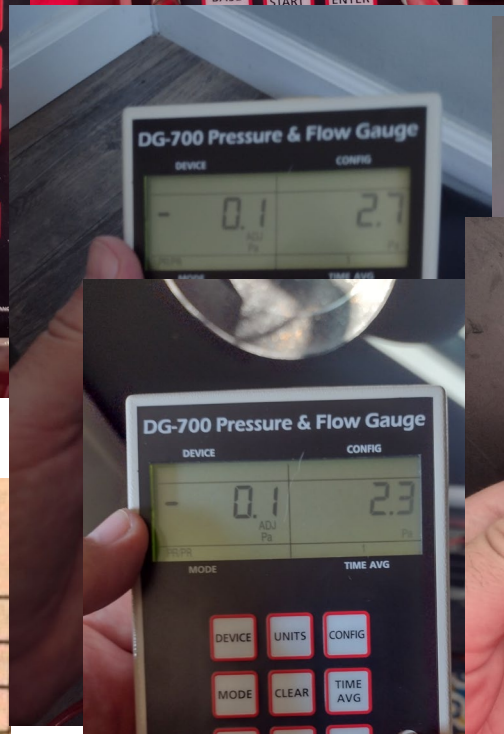
Photo document each register

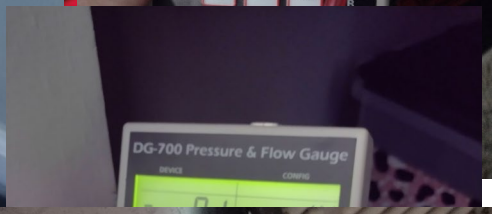
Document results in audit workbook

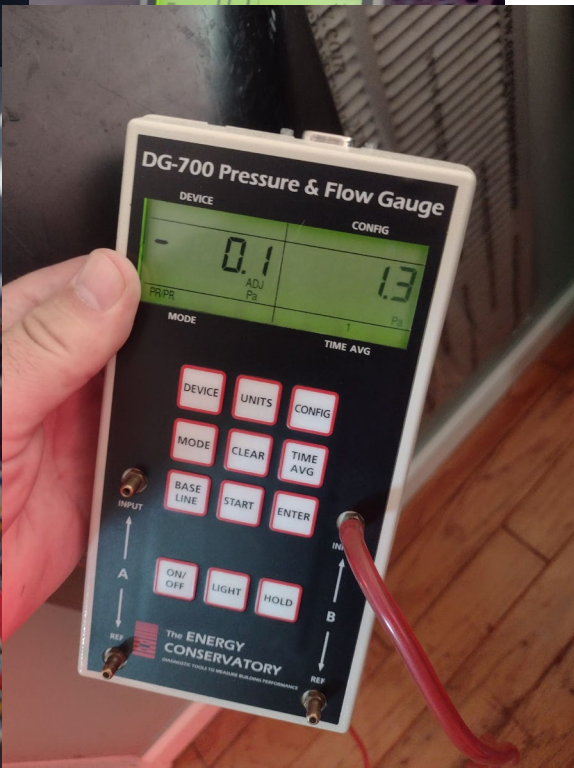












900/ 5.3

Duct leakage

Register	1	2	3	4	5	6	7	8	9
Room	DIN	PANTRY	KIT	BED 1	C. BATH	M. BDRM	M. BED	BED 2	LIV RM
PA	2.7	1.4	2.3	4.0	1.4	4.4	1.1	2.6	1.3

(R)

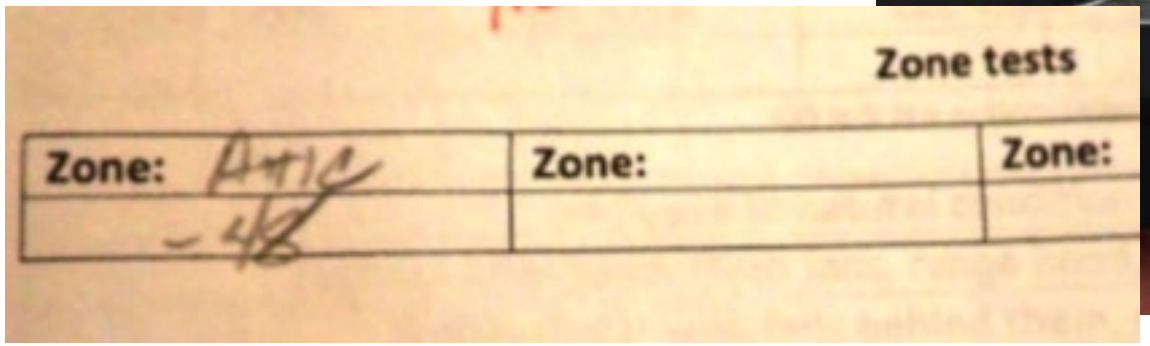
Register	10	11	12	13	14	15	16	17	18
Room	LIV RM	LIV RM							
PA	1.1	1.3							

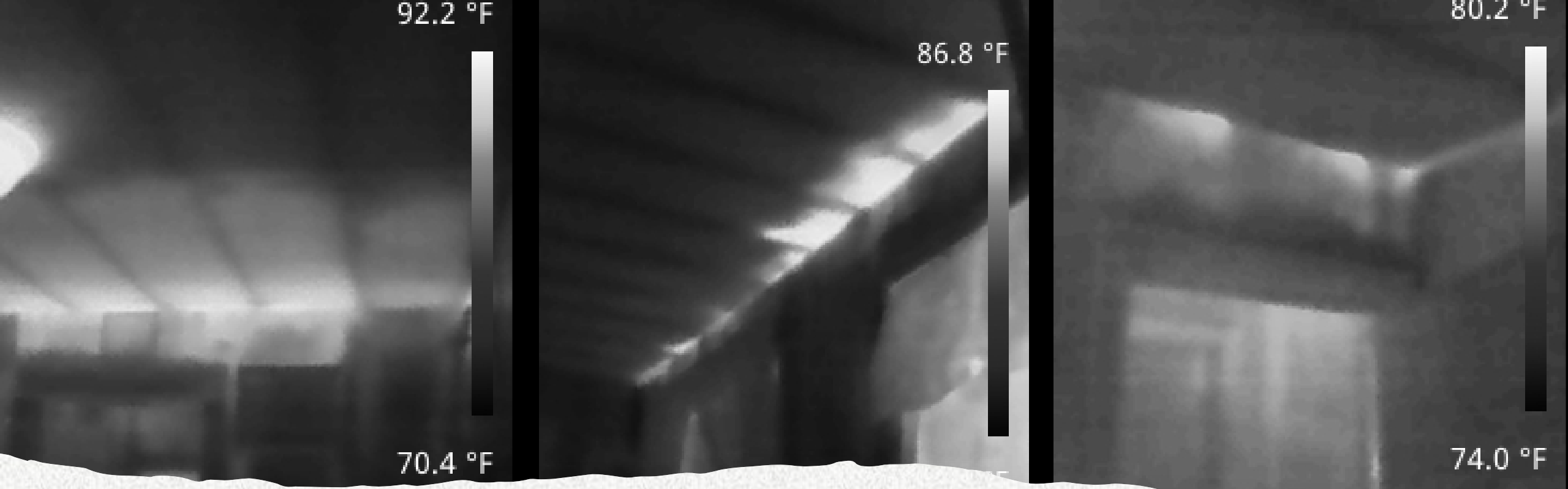
Zone Tests

Testing zones can tell you how much connection there is between conditioned and non-conditioned spaces.

Photo document results

Document results in auditor workbook



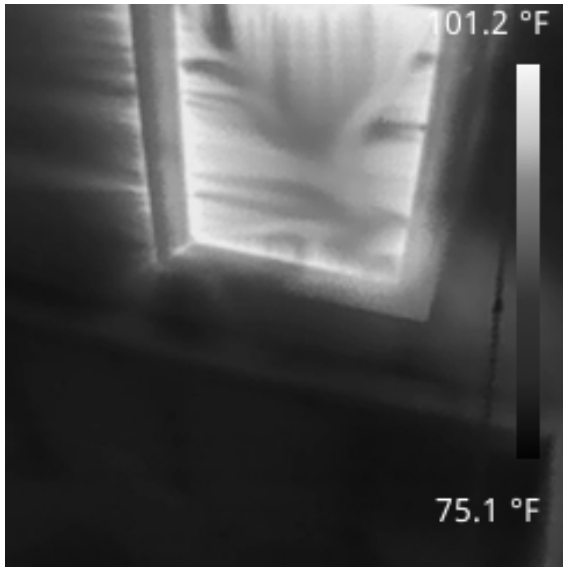


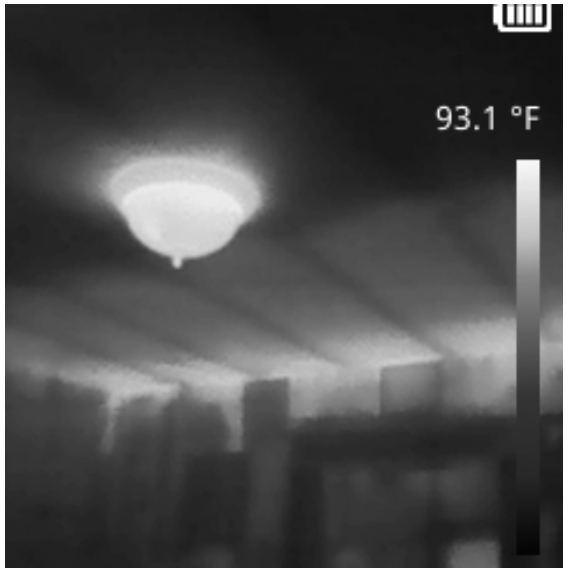
Infrared Scan

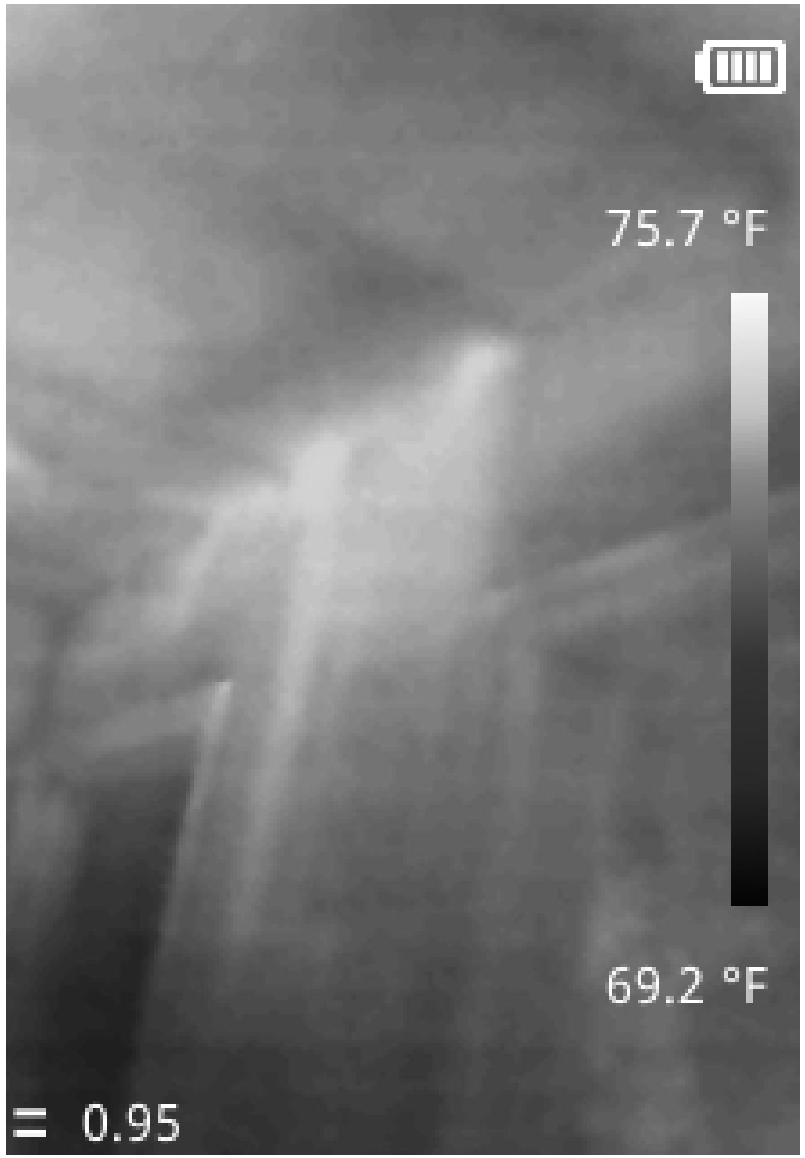
- Scan the home with an infrared camera
- Photo document results

Infrared Scan

- Watch for
- Insulation voids
- Bypasses
- Infiltration points
- Moisture issues





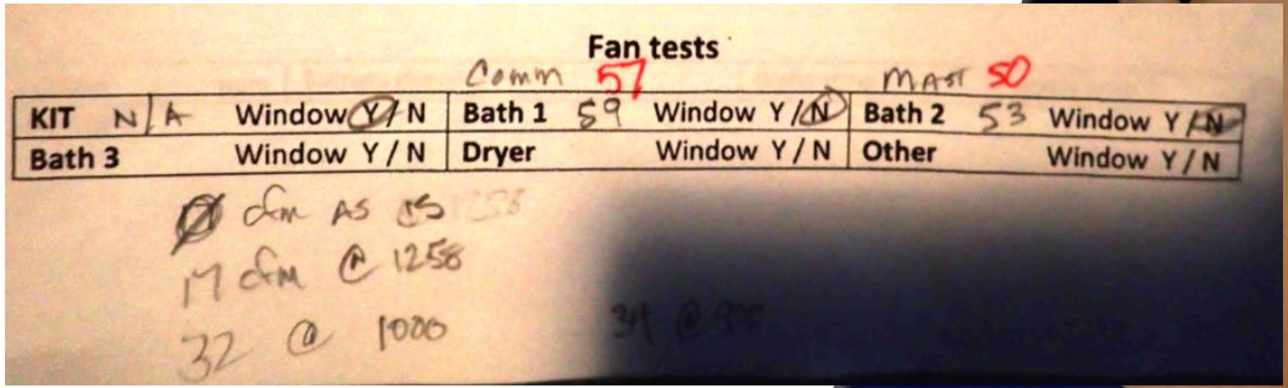


Show of hands

- How many auditors are using an Infra Red Camera on every audit?

Exhaust Fans

- Test all exhaust fans
- Photo document results
- Document results in auditor workbook


Fan tests

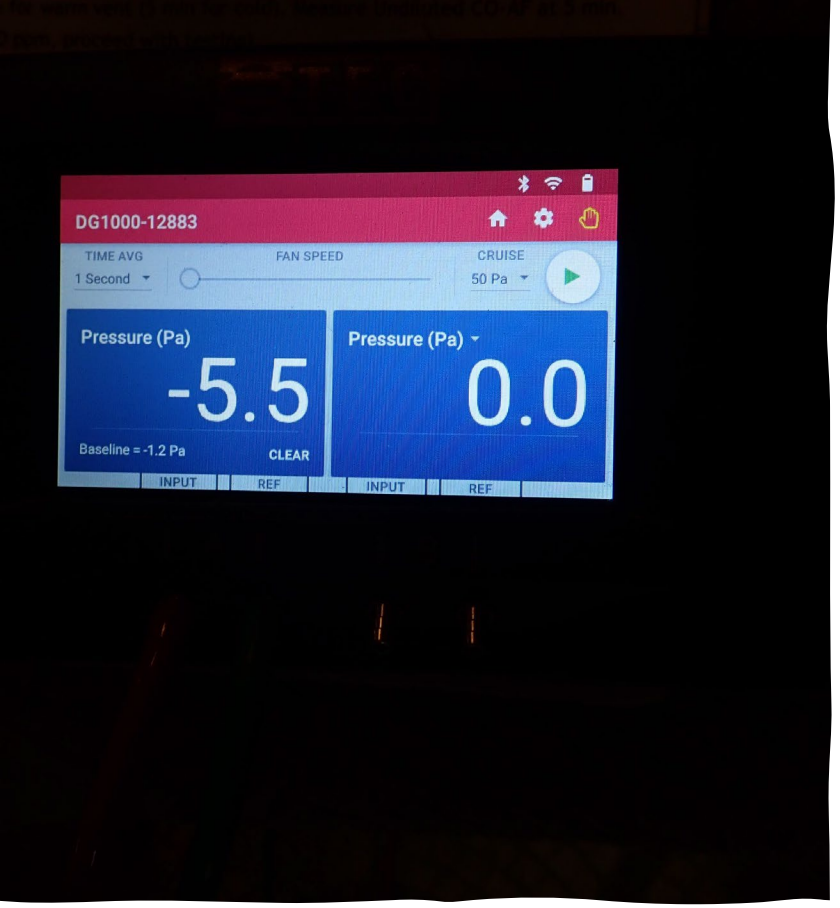
Comm 57 Mast 50

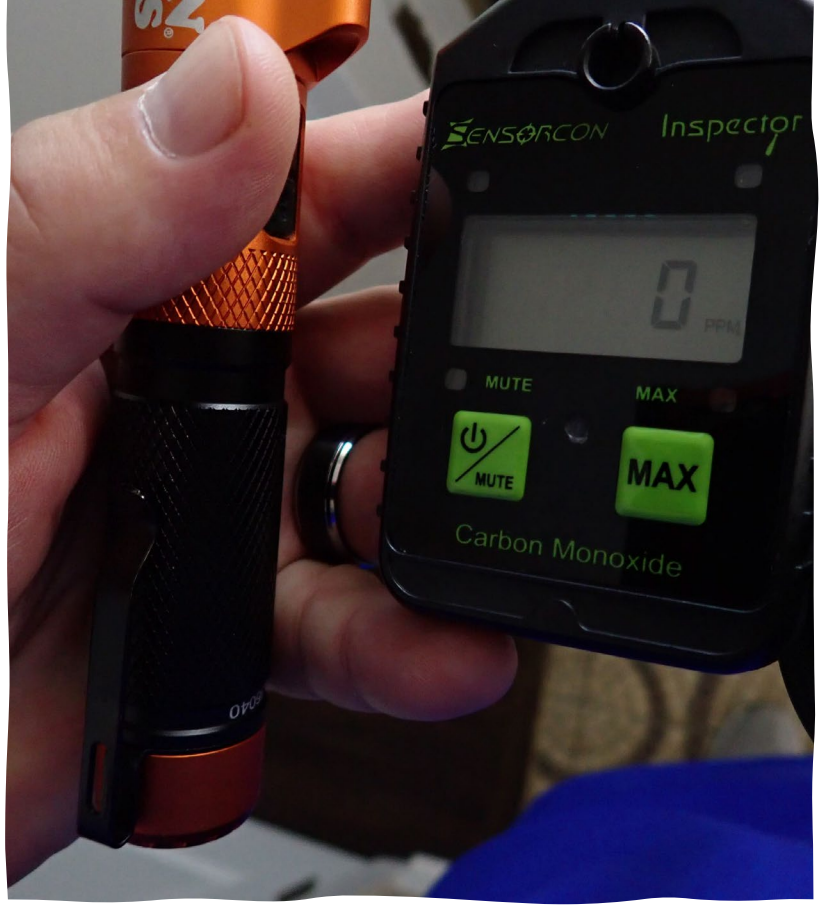
KIT	N/A	Window Y/N	Bath 1	59	Window Y/N	Bath 2	53	Window Y/N
Bath 3		Window Y/N	Dryer		Window Y/N	Other		Window Y/N

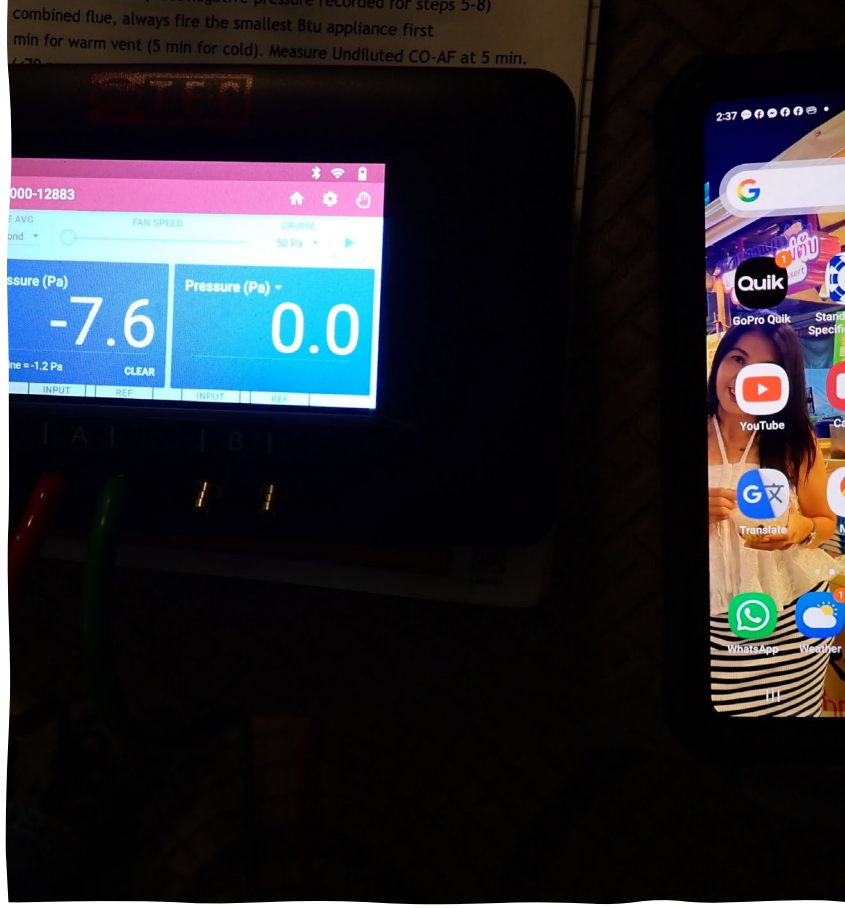
Ø cfm AS 55

17 cfm @ 1258

32 @ 1000





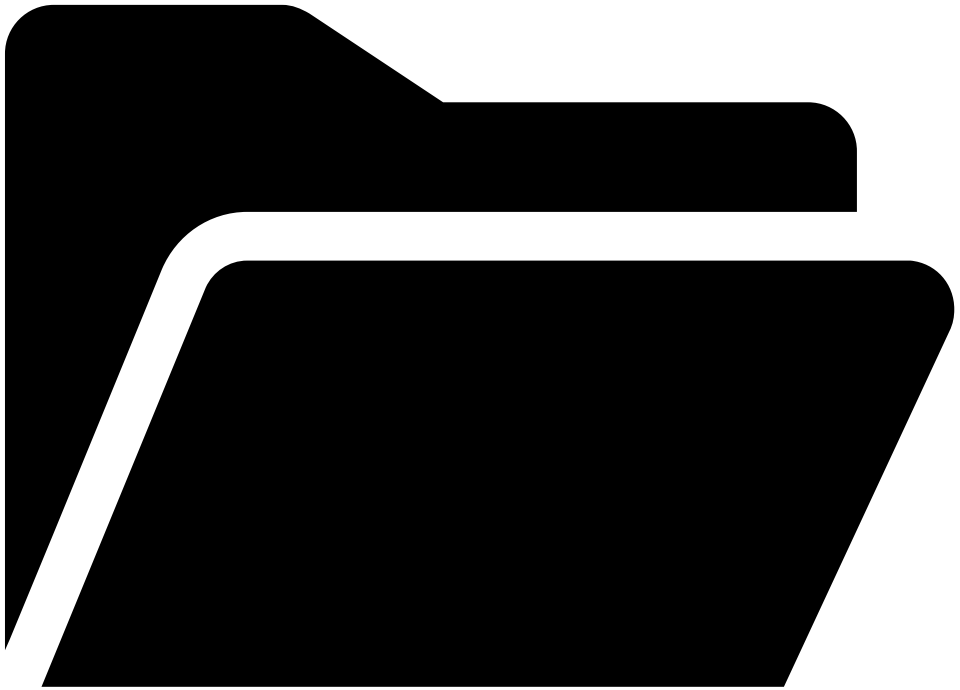


CAZ Testing

- Photo document all results
- Document results in auditor workbook

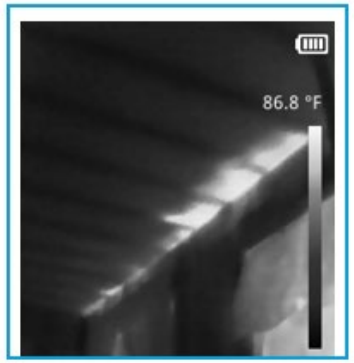
Office

- Job folder
- Picture folder for easy access
- Scan all documents
- Label everything clearly

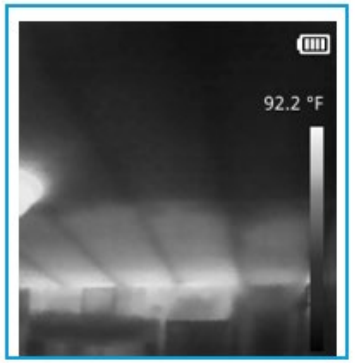


Picture document template

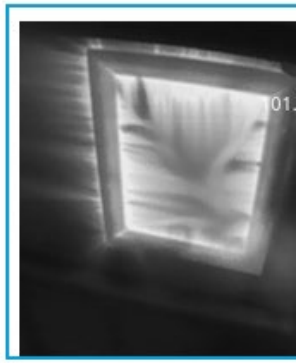
- Word document that you can quickly drag your pictures into and add notes
- These are great for your contractors to have a clear picture of the home and issues to accurately bid on the project
- They also give in-house crews the same insight before they arrive on site



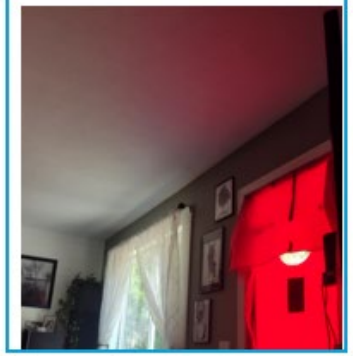
Wind-blown eaves



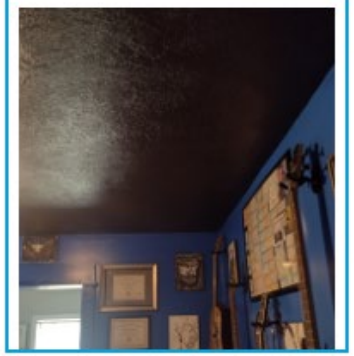
Insulation voids bed 1



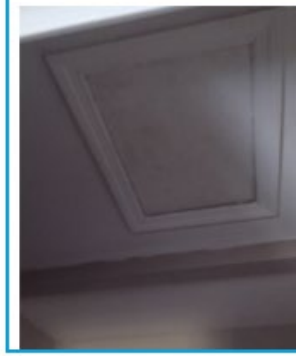
Attic access trim and li
infiltration



Living room east



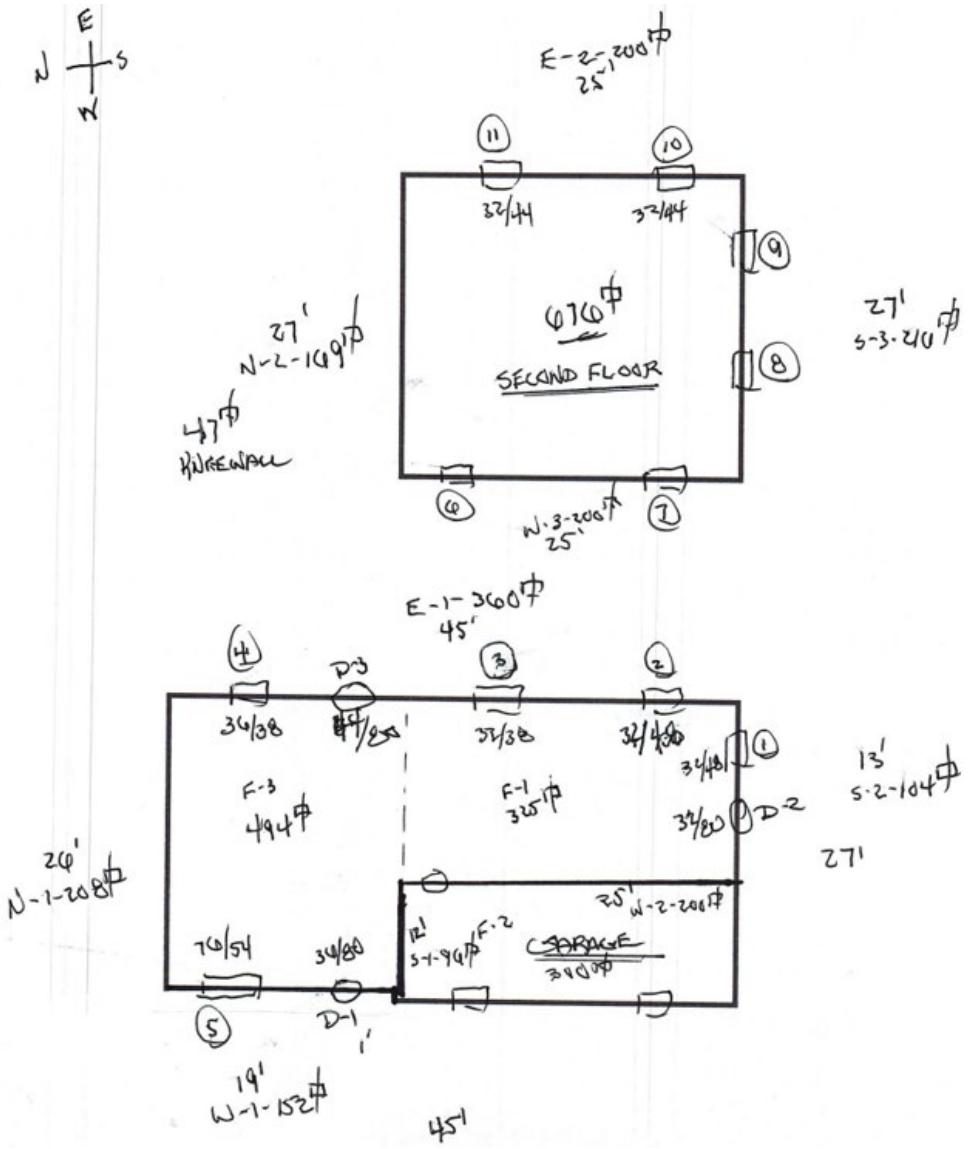
Bed 1

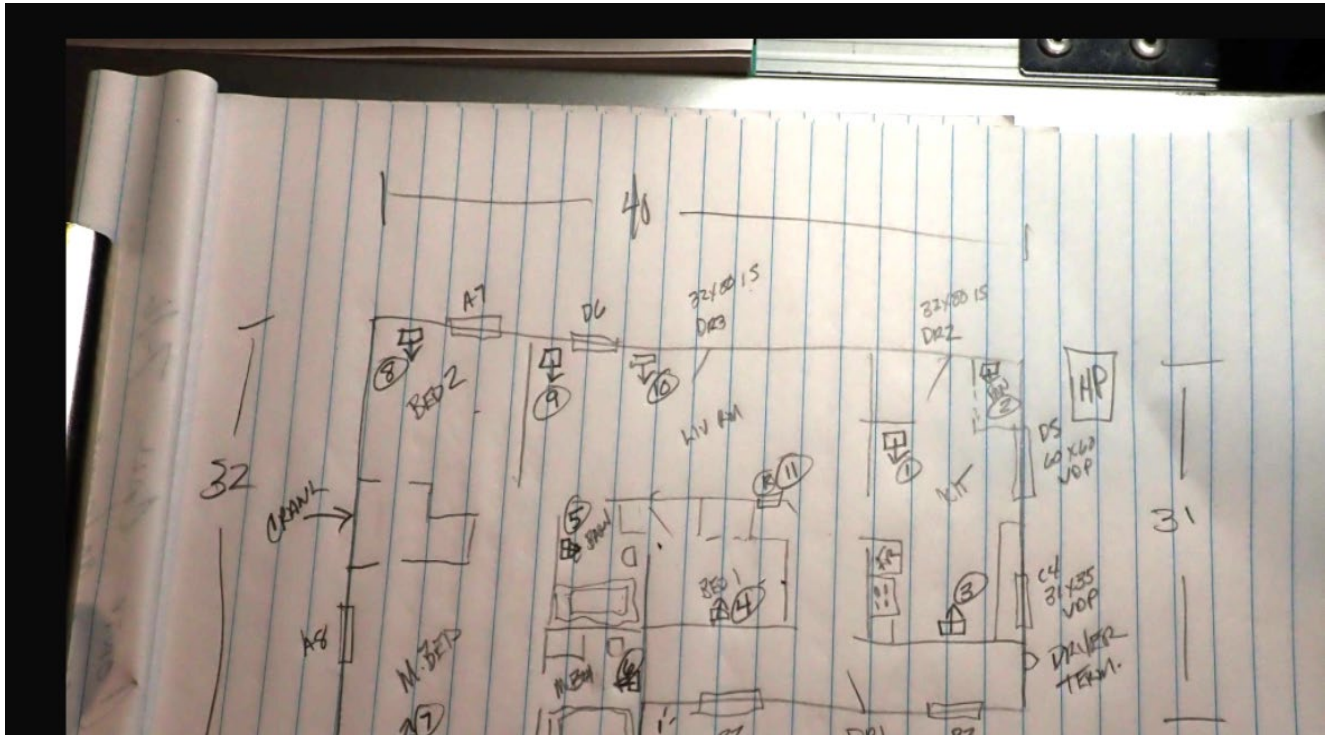


Attic access, master be

House sketch

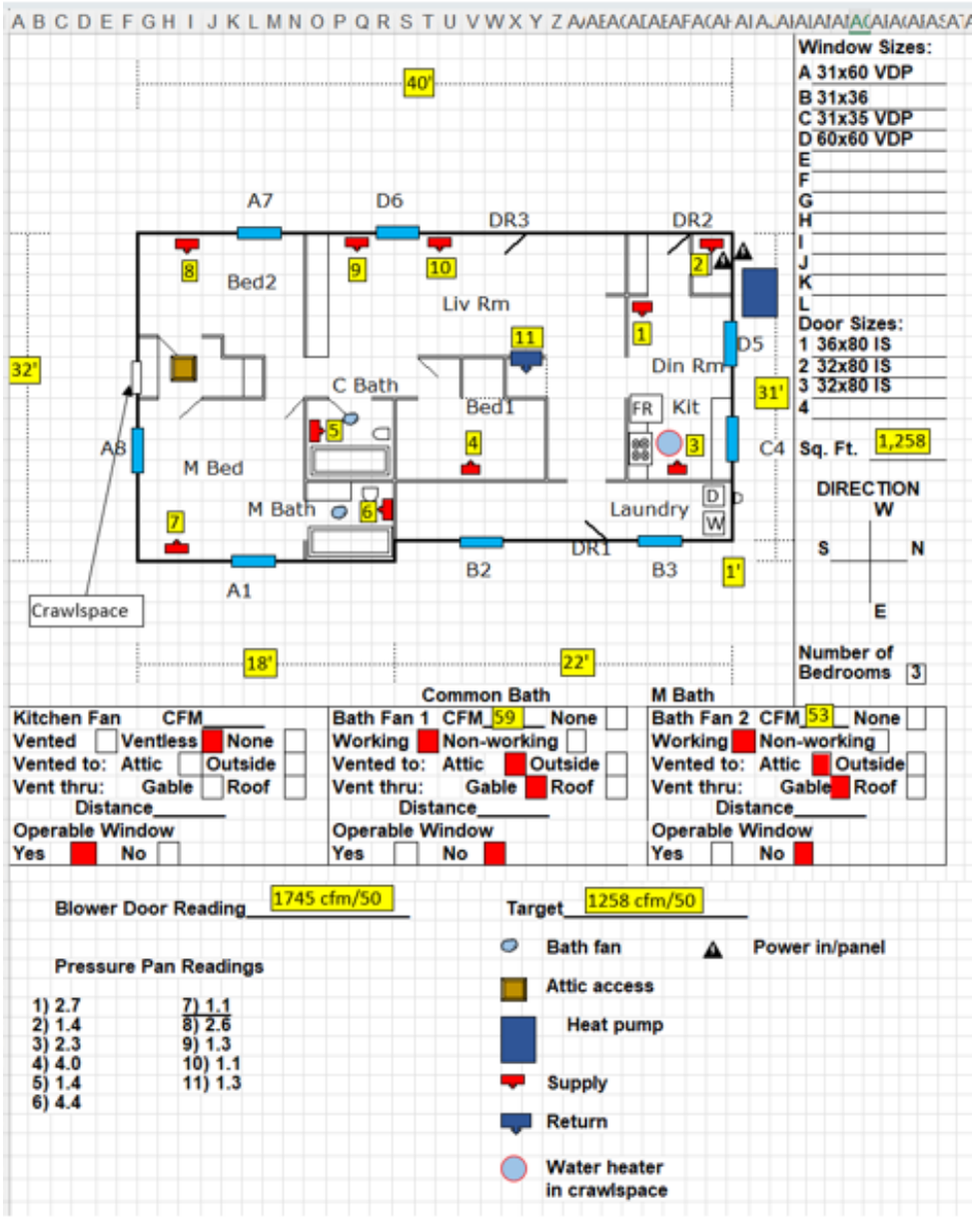
- Typical house sketch
- Not bad, some measurements and window / door locations
- Pretty tough to read though, right?





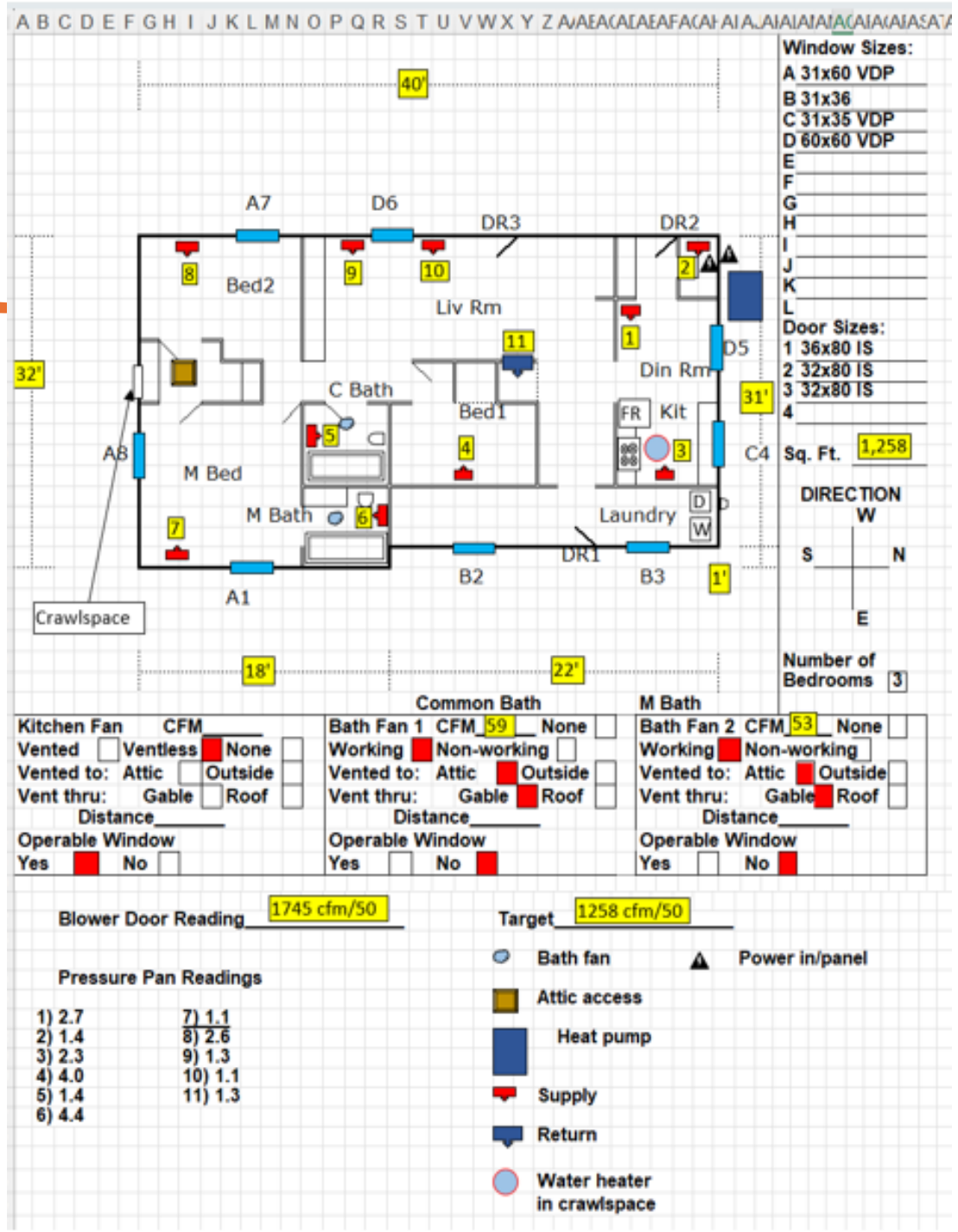
House sketch

- I like to turn this...
- Into this!



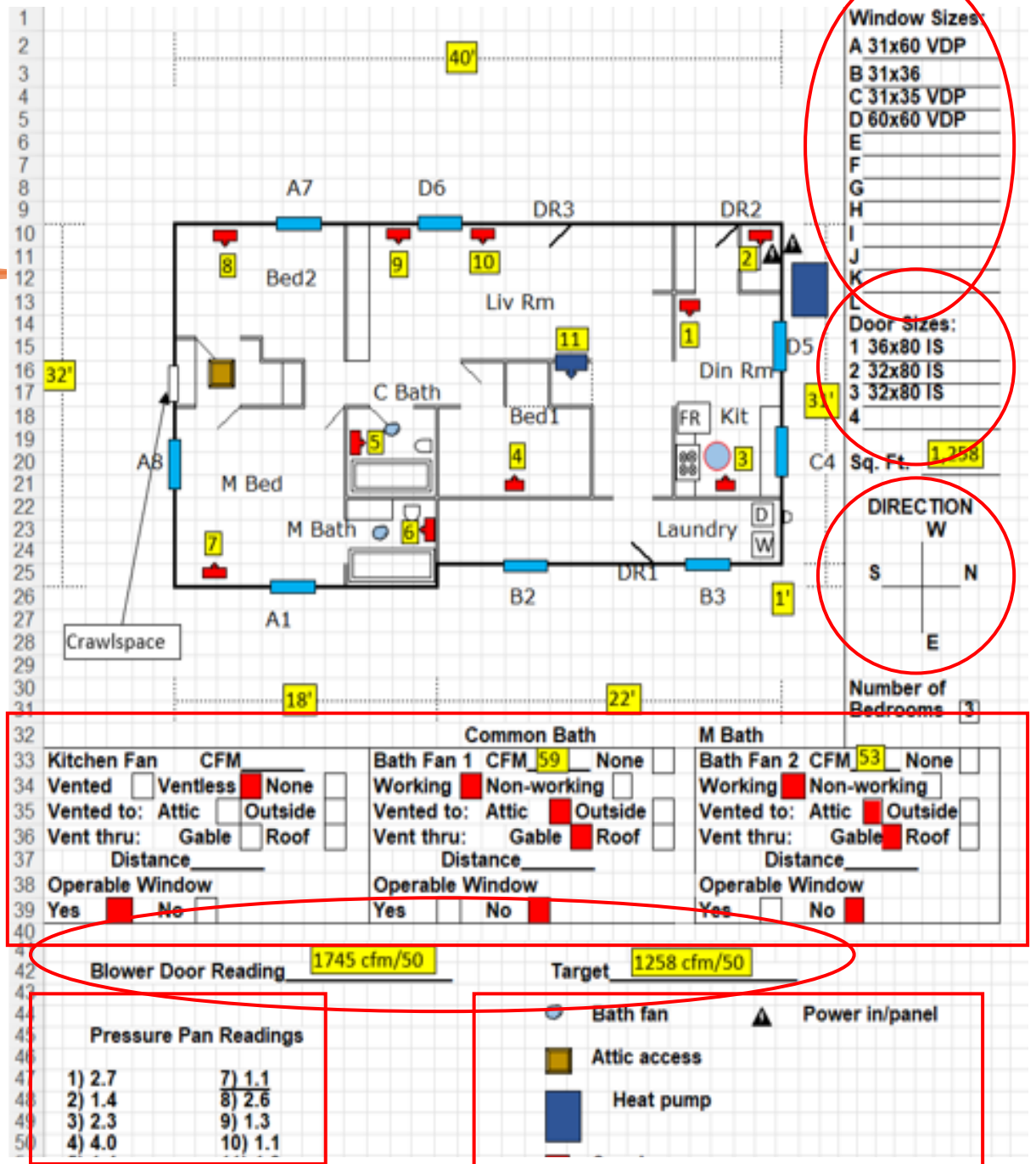
House sketch

- Cleaner and easier to read
- A ton of information
- Crew could use it as an attic air sealing map
- Crews and contractors get a much better view of the home



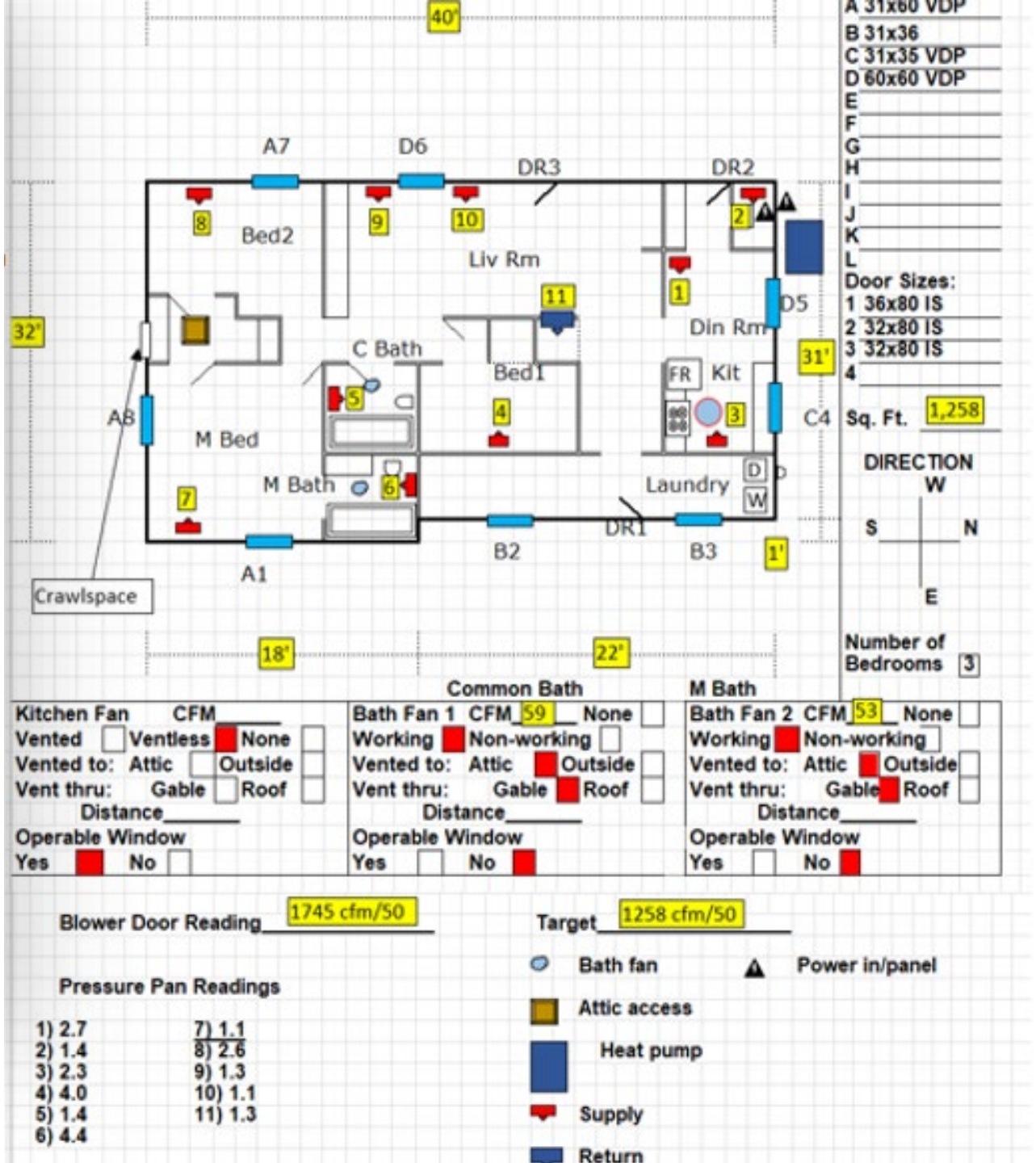
House sketch

- Window breakdown
- Door breakdown
- Compass
- Exhaust readings
- Blower door readings / target
- Duct testing results
- Key



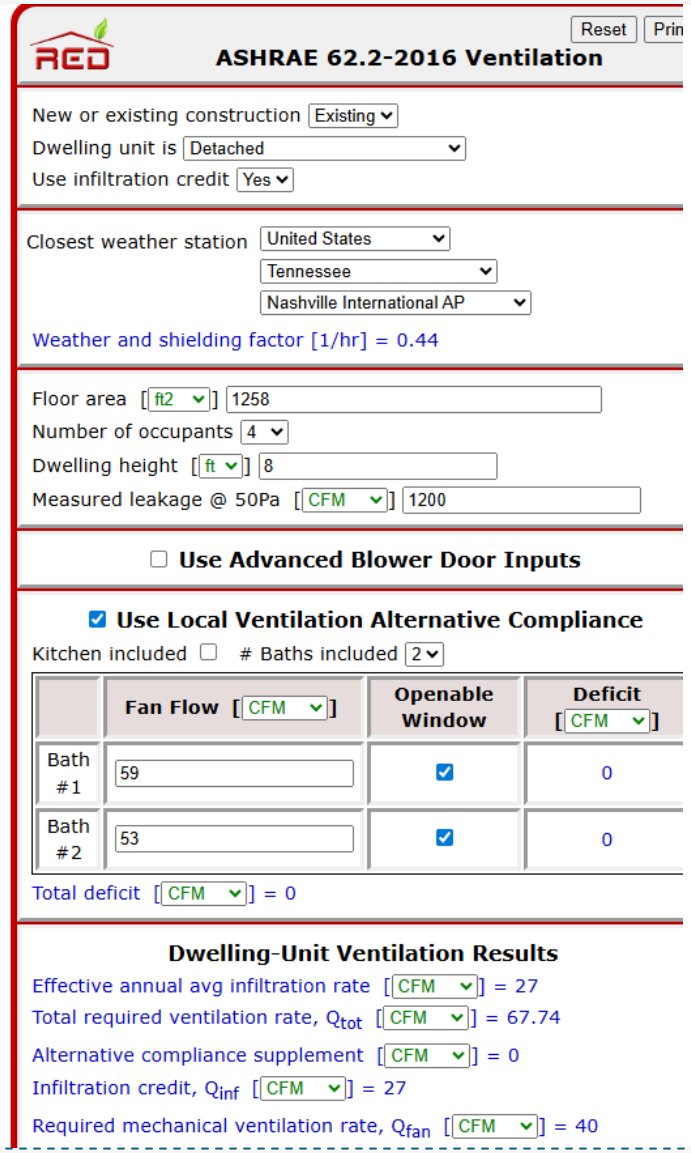
House sketch

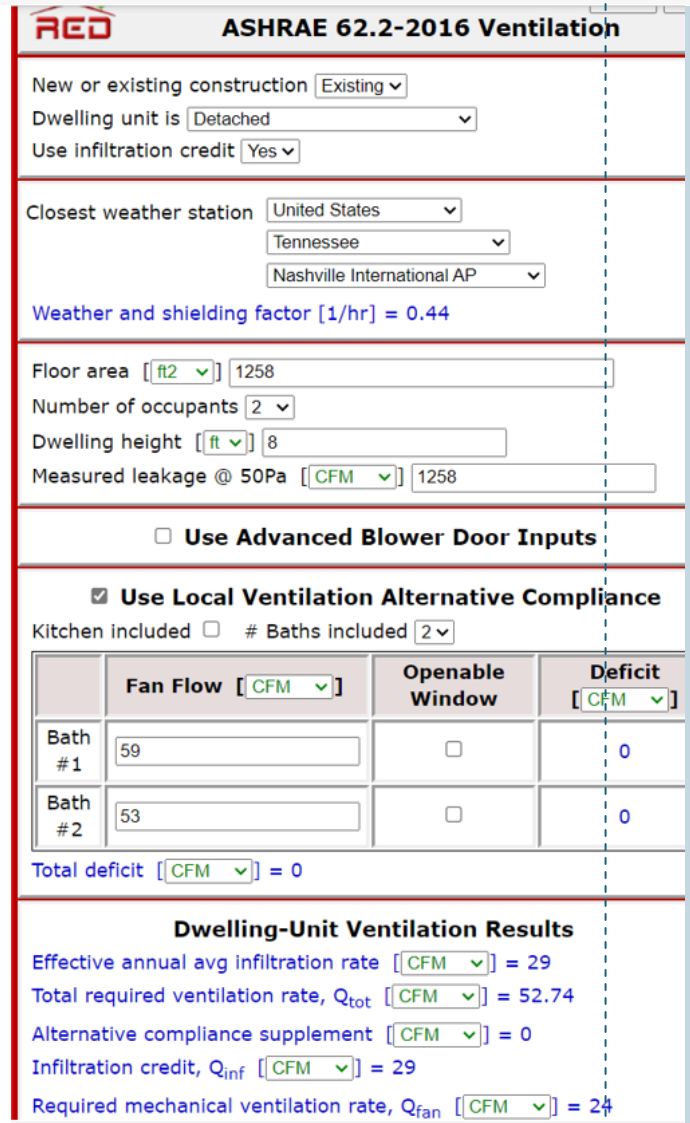
- If you'd like me to send you the excel sketch template – mkolb@thda.org
- Doesn't need to be extreme
- Ask your crews / contractors what they'd like to see
- Tailor it to suit their needs



Ashrae Calcs

- As is calculations
- Projected calculations
- Save both in your job file





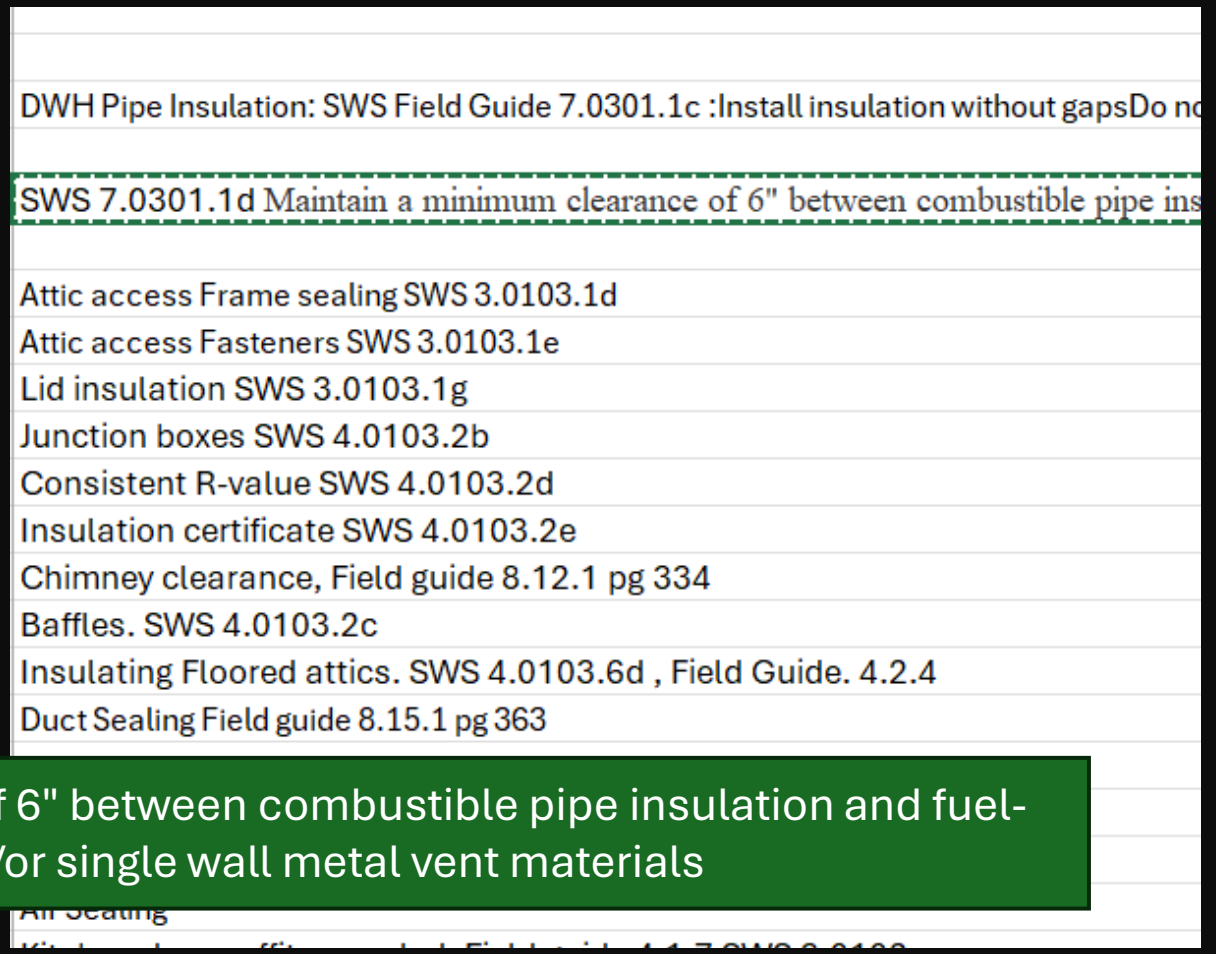
Run the Audit

- You have all of your information in the audit workbook
- All of your pictures and forms are in the job file for easy uploading to your audit software
- Be precise!

Work order

- Create an excel spreadsheet with the measures your State installs.

- Copy and paste descriptions and SWS language. Make adjustments that are specific to the job



SWS 7.0301.1d Maintain a minimum clearance of 6" between combustible pipe insulation and fuel-fired water heater draft hood and/or single wall metal vent materials

Work Order

- Which would you prefer if you were the contractor or crew?
- A?
- Or B?

Measure 3:

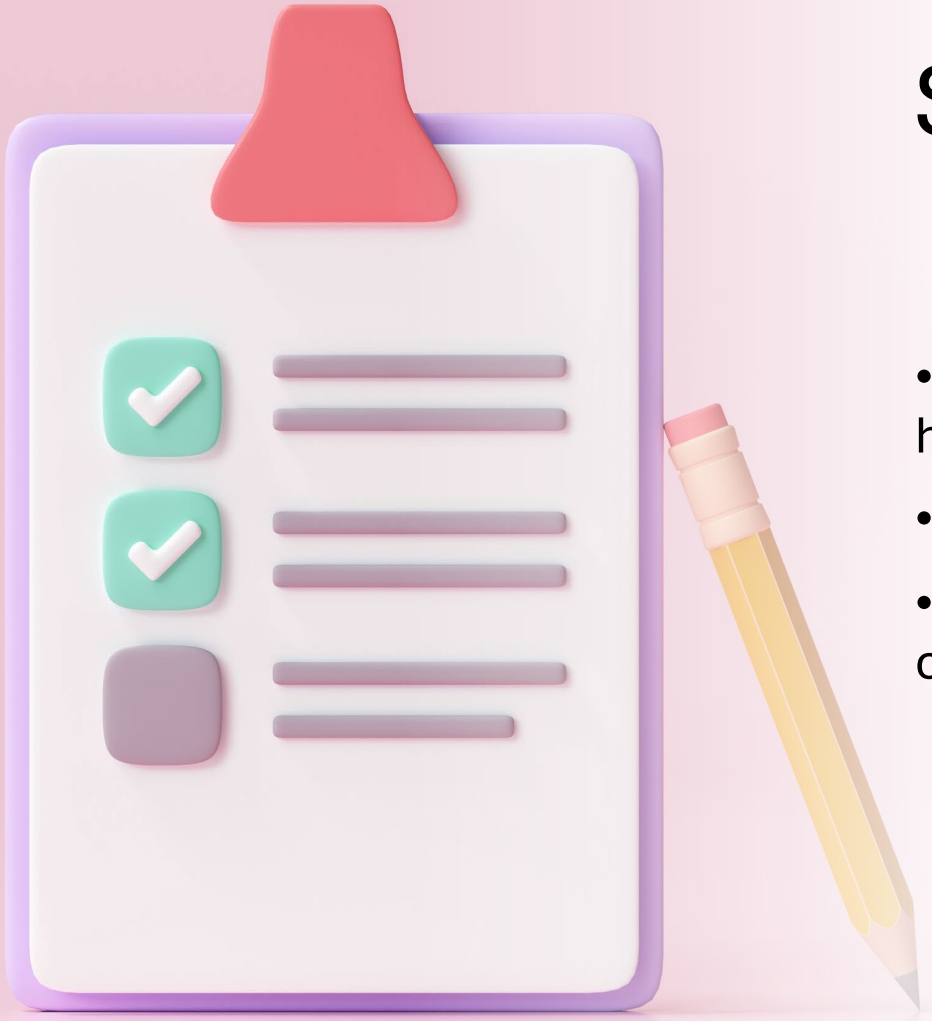
Insulate the attic to R-49 per TN-SWS

Measure 3:

Insulate 1,248 ft2 of attic to R-49 with blown fiberglass insulation.

Seal attic bypasses and key junctures (use high temp sealant around the chimney).
Install baffles and stuff eaves to prevent wind-washing.
Flag junction boxes that can be seen over installed insulation.
Install insulation rulers 1 for every 300 ft2 of attic space.
Dam the chimney with tin 3" higher than installed insulation depth.
Dam, insulate (with rigid insulation), weatherstrip, and secure the attic access.

Approx. 40 bags of blown fiberglass
5 cans of foam
2 high temp caulk
Junction box flags
4 insulation depth markers
Insulshield
1x12 pine
2" insulation board
Weatherstripping
Eye hooks



Show of Hands

- How many people use in-house crews?
- Contractors?
- Mix of in-house crews and contractors?

Bids

- Send as much information as you can to the contractors.

- Work order
- Pictures with descriptions / notes
- House sketch
- Specifics: Date bids are due. Bid opening date, time and location. Completion dates
- Be available

In Progress Visits

- Some contractors / crews prefer a starting day visit to go over the details of the project

- Some prefer you to wait a day or two until they have some measures complete and possible issues to arise

- Know your contractors

- Be available

New Contractors / Crews

- I like to be on-site more frequently with new contractors and crews.
- Catch issues early
- On-site training opportunities
- Clearly present expectations
- Answer questions

Desktop Review

- Evaluate the audit
- Do the audit pictures reflect what was modeled?
- Were the measures accurately modeled for upgrades?
- Were the Ashrae calculations run properly?
- Do you see missed opportunities reviewing the audit pictures and work order?

Workbook

Create a workbook that allows you to capture everything you need

Project information

Diagnostic results

Combustion Safety

Each measure listed

DIAGNOSTIC TESTING

Square Footage: 1,258

INSPECTION RESULTS

Measure: R-49 Attic Insulation Pass:_____ Fail:_____

Comments: Pass with Justification:_____ SWS:_____

Dam Lid Insulation WX-ing Fasteners

Depth markers J-box flags Baffles Level Certificate

Measure: DWH Tank Insulation (electric) Pass:_____ Fail:_____

Comments: Pass with Justification:_____ SWS:_____

Wrap Straps Access panels

Bed 2	2.6	1.0	
Liv Rm	1.3	1.0	
Liv Rm	1.1	1.0	
Liv Rm Ret	1.3	1.0	

House Pr. WRT Outside	Total				
	Outside				

QCI

- You are the last in line to advocate for the client, the contractor and the agency
- Be prepared
- Know the measures and Standard Work Specifications
- Listen to the client
- Communication is key

On Site

- Last day of work with contractor / crew

- By yourself

Last Day

- Pros
- Able to address issues and avoid call-backs
- Great for communicating standards
- They can explain issues

- Cons
- Can miss things
- Possible tension

By Yourself

- Pros
- You can stay focused
- No tension

- Cons
- Call backs
- Guessing / Assuming

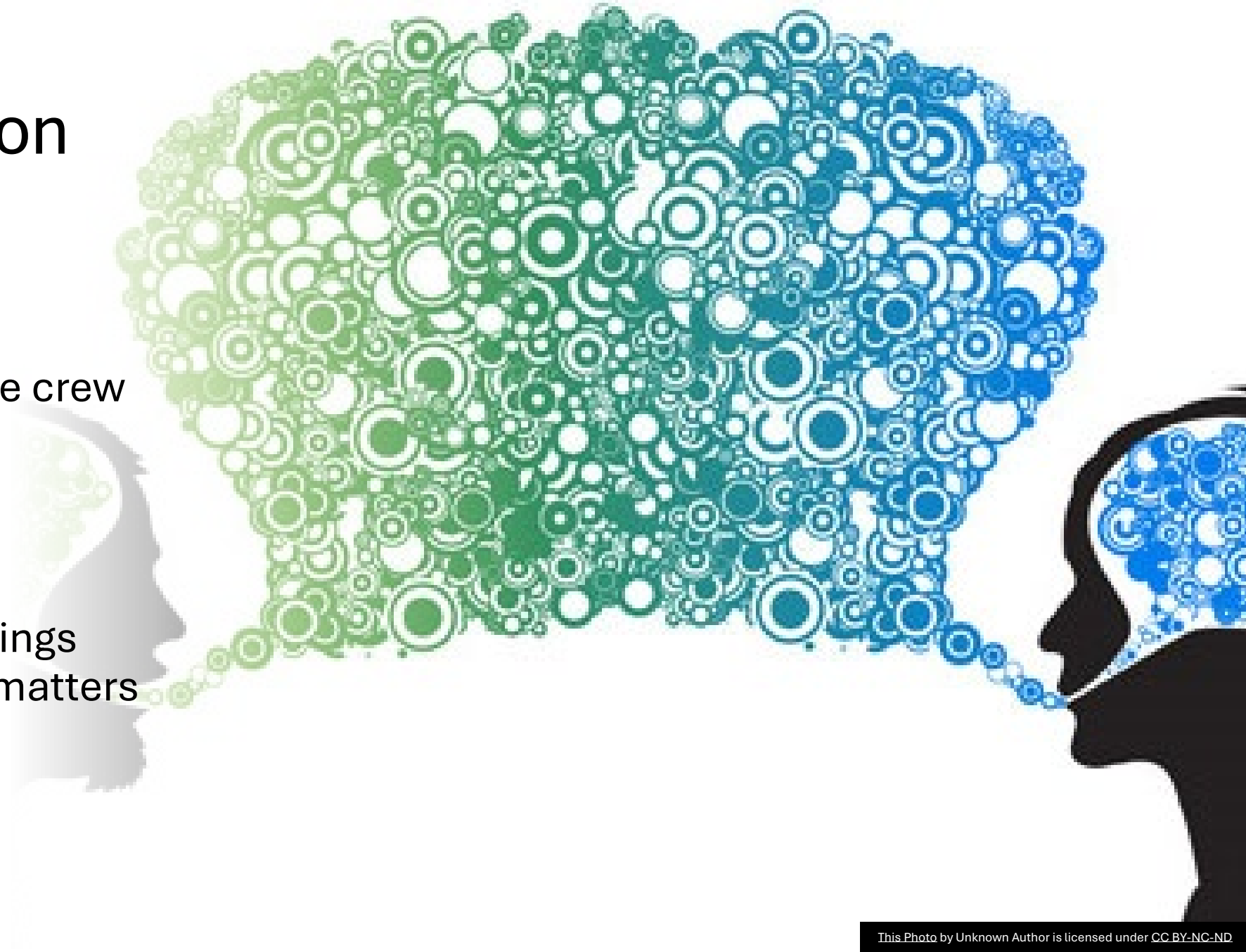
Documentation

- Photo document every measure
- Make detailed notes

Communication

- How you address the crew or contractor matters

- How you address things with the homeowner matters



Office

- Upload all pictures and documents into a job file
- Create detailed report with pictures and expectations for any call backs
- Email results to the contractor

Inspection Report

Make sure it's completely filled out

DIAGNOSTIC TESTING

Square Footage: 1,258

Blower Door

Test	Pre	Target	Post
BD CFM50	1745	1258	1215
Attic Zonal	48	x	
Floor Zonal		x	

ASHRAE 62.2 2016

Location	Pre	Operable Window	Post
Common			
Bath 1	59	No	57
Master			
Bath 2	53	No	50
Kitchen	Recircul	Yes	0

Duct Blower Measurements

Test	CFM		Pre	Target	Post
Fan Flow	Total				
	Outside				
At Duct Pressure	Total				
	Outside				
House Pr. WRT Outside	Total				
	Outside				

	0.9
	0.9
	1.6
	0.6
	0.6
	3.8
	0.8
	0.6
	0.6
	0.6
	1.0

INSPECTION RESULTS

Measure: R-49 Attic Insulation Pass: ____ Fail: X

Comments: Pass with Justification: ____ SWS: ____

Dam X Lid Insulation X WX-ing X Fasteners X

Depth markers F J-box flags F Baffles X Level X Certificate F

Measure: DWH Tank Insulation (electric) Pass: X Fail: ____

Comments: Pass with Justification: ____ SWS: ____

Wrap X Straps X Access panels X

Nice Job!

Picture Report

- I use a Word document
- Easy to drag the pictures in

Work order language

- Space for notes

Measure 8	Duct Sealing	Pass		Fail		P/C	

Comments:

SHOP-VAC AND PREPARE THE DUCT-WORK AS PER THE TN SWS. USE MASTIC OR APPROPRIATE MATERIAL TO SEAL THE DUCT-WORK AS PER THE THDA SWS. THE OBJECTIVE IS TO REDUCE THE PRESSURE PAN READINGS TO LESS THAN 1 OR AS TIGHT AS POSSIBLE.

PRESSURE PAN READINGS:

RETURN 7.0 LIVING ROOM 2.1, 5.8 KITCHEN 4.9 BEDROOM 4.7 BEDROOM 1.9 BATH ROOM 1.2 BEDROOM 1.9 BATH ROOM 1.4

Return was high

Minimal sealing

Missed opportunity

Email Contractor

- Include the job numbers
- List of measures that need corrections
- Clearly state what is expected
- Include some positives
- Attach reports and pictures

In It Together

- Monthly / Bi-Monthly Contractor Meetings
- Weekly Meetings In House
- Open Line Of Communication
- Be Available

Questions?

Thank You!

Please scan the QR code to fill out an evaluation for this session