

Cost-Effective Building Strategies and Guiding your Trades' Priorities to Earn the 45L and 179D Tax Credits, and to be Eligible for HUD 221(d)(4) Loans!

Mitch Richardson, Scott Doyle and Billy Giblin



Agenda

Learning Objectives:

1. Learn about the 45L Tax Credits for builders of single family and multifamily homes, and the 179D Tax Credits and HUD 221(d)(4) Loans for builders of multifamily homes.
2. Identify what your trades may have to do differently to help your homes earn ENERGY STAR and ZERH certifications. Learn which trades are responsible for which items, and when to address each of these items.
3. Understand the many cost-effective strategies to earn ENERGY STAR and ZERH certification.
4. Learn how HERS Raters can be your resource to earn the 45L and 179D Tax Credits and to be eligible for HUD 221(d)(4) Loans.

4 piles of money

- \$2500-\$5000 for 45L federal tax credit (one time per unit)
- \$2.50-\$5 per sq.ft. 179D Deduction (one time per building)
- \$500-\$900 per unit per year HUD 223f/221d4
- Utility Rebates:
 - rebates dependent on region and utility

45L Tax Credit: \$2500 ESTAR; \$5,000 ZERH

- \$2,500 tax credit for homes certified to meet the EPA's ENERGY STAR Single Family New Homes Program. (ESTAR)

- <https://www.energystar.gov/newhomes>



- \$5,000 tax credit for homes certified to meet the DOE's Zero Energy Ready Home Program (ZERH)

- <https://www.energy.gov/eere/buildings/doe-zero-energy-ready-home-program-requirements>

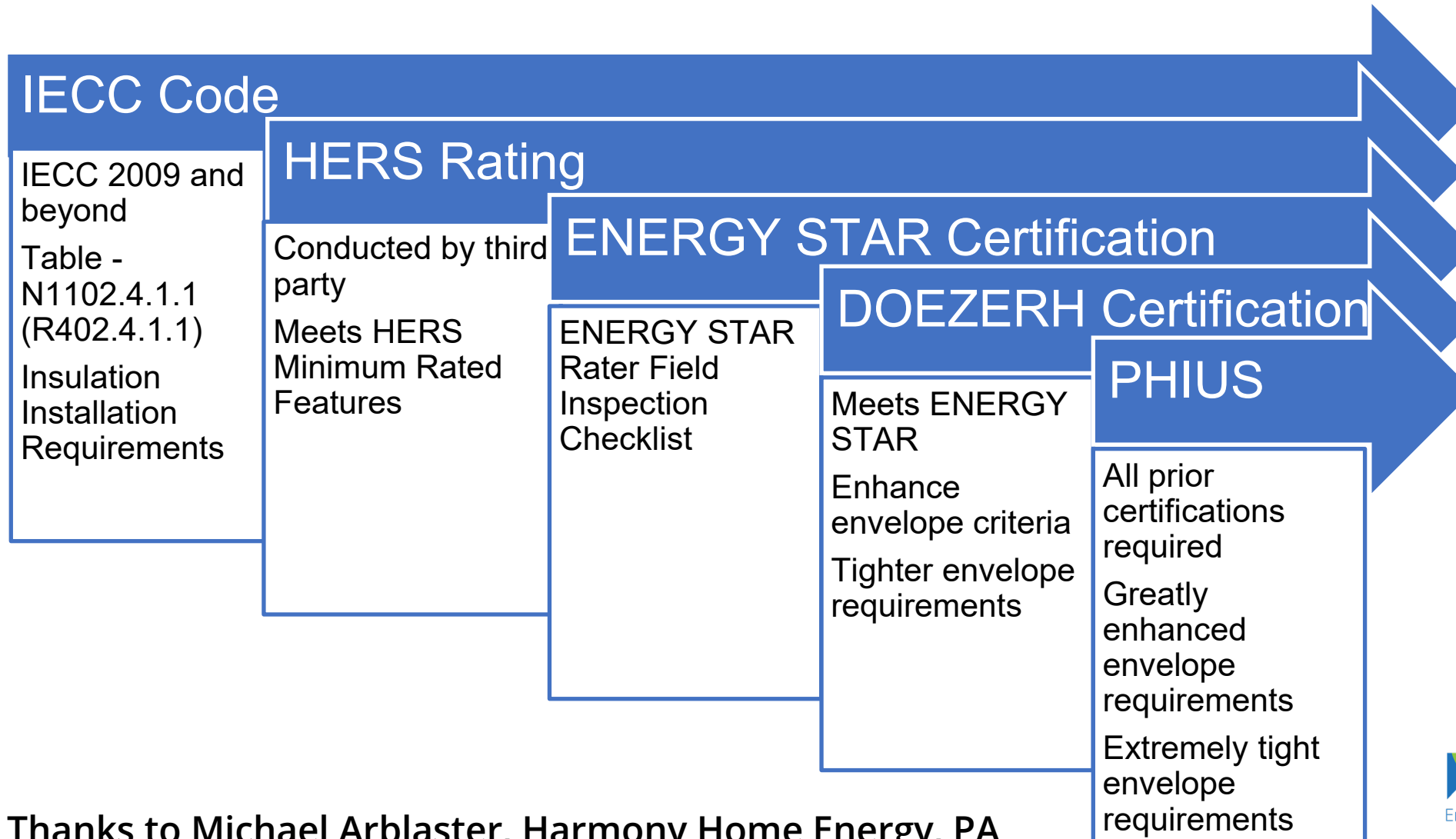
- Keep ESTAR/ZERH certificates. Use IRS Form 8908 to claim tax credits.



- Work with Energy Rater from design to finish
- Meet specifications in preliminary energy model
- DETAILS on HVAC install, air sealing, testing, etc.



Compliance and Certification Pathways



* Thanks to Michael Arblaster, Harmony Home Energy, PA

45L: Walk Before You Run

ESTAR before ZERH:

- Code minimum to ENERGY STAR:
 - 20% jump in performance
 - initially, lots of details to manage.
- Code to ESTAR may be a significant step.
- ESTAR to ZERH a smaller step. Much more Cost Effective!
- Once passing ESTAR reliably, THEN attempt ZERH



45L: ENERGY STAR MF v1.1 vs v1.2

- Version 1.1 is relatively easy going.
- Version 1.2 requires higher spec levels.
- Design process for large MF can be 1½ -2 yrs.
- Projects closing (acquisition date) in 2027 will need to be v1.2
- Projects you start (design stage) in 2025, you will need to do an analysis for v1.2



45L Prevailing Wage Report (MF only)

M

- NOT DAVIS-BACON LEVEL DOCUMENTATION
- Same Tables as Davis-Bacon; otherwise different and EASIER
- No apprenticeship requirements
- For \$2500-\$5000 45L tax credits MF only
- No reports required for SF



<https://sam.gov/wage-determination/UT20230034/0>

Wage Tracking Solutions

<https://emarsinc.com/> Has some 45L and 179D only options

- If project is Davis-Bacon, as required by some HUD loans or other reasons, your project will be pretty much ready to go
- BUT you need to discuss beforehand with the Tracking provider that you will need reports
- The reports will have all you need.
- Remember: 45L/179D is not Davis-Bacon, but is similar to it in many ways



45L Prevailing Wages - Examples (MF only)

https://sam.gov/wage-determination/UT20230034/0	Rates	Fringes
PLUMBER (Excluding HVAC Pipe Installation).....	\$ 30.60	10.85
TRUCK DRIVER (Concrete Pumping).....	\$ 25.02	13.05
BRICKLAYER.....	\$ 17.92	0.00
CARPENTER, Includes Metal Stud & Siding (Excludes Drywall Hanging).....	\$ 14.61 **	0.00
CEMENT MASON/CONCRETE FINISHER.....	\$ 13.50 **	2.91
DRYWALL FINISHER/TAPER.....	\$ 17.90	1.96
DRYWALL HANGER, Excludes Metal Stud Installation.....	\$ 18.82	0.00
ELECTRICIAN.....	\$ 16.06 **	1.97
LABORER: Common or General.....	\$ 11.31 **	4.90
PAINTER: Brush, Roller and Spray, Excludes Drywall Finishing/Taping.....	\$ 11.23 **	0.00
ROOFER.....	\$ 17.14	0.00
SHEET METAL WORKER, Includes HVAC Duct, Pipe and Unit Installation.....	\$ 15.31 **	0.00

- Most trades report that they are already meeting these wage levels

45L Prevailing Wage Report (MF only)

Prevailing Wage Reporting Spreadsheet.

(Only Required for Multi Family projects)

<https://sam.gov/wage-determination/UT20230034/0>

<https://www.federalregister.gov/documents/2022/11/30/2022-26108/prevailing-wage-and-apprenticeship-initial-guidance-under-section-45b6bii-and-other-substantially>

Project	City Flats Apartments	Address	1234 Street, Salt Lake, UT 840000
Labor Start Date	5/1/2022	Labor Fin Date	3/3/2023
Owner	Generic Name Development LLC	County	Salt Lake
General	Big Builder Contracting	Dwelling Units	105
Subcontractor	Franks Framing	Subcontractor Address	333 Road, Provo, UT 840000
DOL Classification	Framer/carpenter	Subcontractor Phone	801-123-4567
Prepared by:	Payroll manager of Franks Framing	Prepared date:	2/2/2023

DOL class/title	DOL Code	Prevailing Wage	Rate Paid	Hours Worked	Worker Name
Carpenter	SUUT2008-049	\$14.61	\$16.00	540	Mike Johnson
Carpenter	SUUT2008-049	\$14.61	\$22.00	600	Jose Gonzales
Carpenter	SUUT2008-049	\$14.61	\$26.00	520	Jack Jackson
Carpenter	SUUT2008-049	\$14.61	\$17.00	300	Mik Odulle
Carpenter	SUUT2008-049	\$14.61	\$16.00	456	Mario Italy

The above is all the documentation you are required to collect and all that anyone has to provide to the IRS for the 45L.

Examples of more DOL classes and wages..... (see sam.gov/wage-determination/)

Mechanic	ENGI0003-052	\$27.55			
Blade Grader	ENGI0003-052	\$25.89			



45L Prevailing Wage Report (MF only)

Project Name	First Name	Last Name	Address	Contractor Name	Contract or Address	Payroll Number	Payroll Revision No	Work Class	Apprentice Level	Apprentice Percent	Week Ending	STHours	STRate	STCash Fringe	STGross	OTHours	Total Pay This Project	other Deduction1	deduction Type1	total Deductions	Fringe Description 1
Reliable Demonstration	Four	Four	PO Box 18985	Buddy Mech(sub of Sam's Service)	111 first	1		2Bricklayer			5/24/2014	16	50	16	1056	0	1056	0	None	248.83	
Reliable Demonstration	Michael	One	648 Anchors Street	Sam's Service(sub of Reliable Const.)	123 second	1	1	Carpenter			2/8/2014	22	35	0	770	0	770	20	Union Dues	493	Health & Welfare
Reliable Demonstration	Rodger	Pink	648 Anchors Street	Sam's Service(sub of Reliable Const.)	123 second	1	1	Bricklayer			2/8/2014	32	32	0	1024	0	1024	0	None	309	Health & Welfare
Reliable Demonstration	Tommy	Bahama	na	Sam's Service(sub of Reliable Const.)	123 second	3	1	Carpenter			2/22/2014	24	38	0	912	0	912	77	Child Support	211	Insurance Life
Reliable Demonstration	Tommy	Bahama	na	Sam's Service(sub of Reliable Const.)	123 second	4		Drywall Hanger			3/1/2014	24	22	0	528	0	528	77	AFLAC	287	Dental
Reliable Demonstration	Michael	One	648 Anchors Street	Sam's Service(sub of Reliable Const.)	123 second	5		Carpenter			3/8/2014	22	35	0	770	0	770	20	Union Dues	493	Health & Welfare
Reliable Demonstration	Rodger	Pink	648 Anchors Street	Sam's Service(sub of Reliable Const.)	123 second	5		Bricklayer			3/8/2014	32	32	0	1024	0	1024	0	None	309	Health & Welfare
Reliable Demonstration	Michael	One	648 Anchors Street	Sam's Service(sub of Reliable Const.)	123 second	6		Carpenter			3/15/2014	22	35	0	770	0	770	20	Union Dues	493	Health & Welfare
Reliable Demonstration	Rodger	Pink	648 Anchors Street	Sam's Service(sub of Reliable Const.)	123 second	6		Bricklayer			3/15/2014	32	32	0	1024	0	1024	0	None	309	Health & Welfare
Reliable Demonstration	Michael	One	648 Anchors Street	Sam's Service(sub of Reliable Const.)	123 second	11		Carpenter			4/19/2014	22	35	0	770	0	770	20	Union Dues	493	Health & Welfare
Reliable Demonstration	Rodger	Pink	648 Anchors Street	Sam's Service(sub of Reliable Const.)	123 second	11		Bricklayer			4/19/2014	32	32	0	1024	0	1024	0	None	309	Health & Welfare
Reliable Demonstration	Michael	One	648 Anchors Street	Sam's Service(sub of Reliable Const.)	123 second	12		Carpenter			4/26/2014	22	35	0	770	0	770	20	Union Dues	493	Health & Welfare
Reliable Demonstration	Rodger	Pink	648 Anchors Street	Sam's Service(sub of Reliable Const.)	123 second	12		Bricklayer			4/26/2014	32	32	0	1024	0	1024	0	None	309	Health & Welfare
Reliable Demonstration	Michael	One	648 Anchors Street	Sam's Service(sub of Reliable Const.)	123 second	17		Carpenter			5/31/2014	22	35	0	770	0	770	20	Union Dues	493	Health & Welfare
Reliable Demonstration	Rodger	Pink	648 Anchors Street	Sam's Service(sub of Reliable Const.)	123 second	17		Bricklayer			5/31/2014	32	32	0	1024	0	1024	0	None	309	Health & Welfare
Reliable Demonstration	Michael	One	648 Anchors Street	Sam's Service(sub of Reliable Const.)	123 second	18		Carpenter			6/7/2014	22	35	0	770	0	770	20	Union Dues	493	Health & Welfare
Reliable Demonstration	Rodger	Pink	648 Anchors Street	Sam's Service(sub of Reliable Const.)	123 second	18		Bricklayer			6/7/2014	32	32	0	1024	0	1024	0	None	309	Health & Welfare

Fringe Rate 1	Fringe Amount 1	Fringe Description 2	Fringe Rate 2	Fringe Amount 2	Fringe Description 3	Fringe Rate 3	Fringe Amount 3	Fringe Description 4	Fringe Rate 4	Fringe Amount 4	Fringe Description 5	Fringe Rate 5	Fringe Amount 5
0	0		0	0		0	0		0	0		0	0
5.5	121	Insurance Life	3	66	Pension	4.75	104.5		0	0	0	3	66
10	320		0	0	Unity Action Dues	8	256		0	0		0	0
3	72	Dental	4	96	Annuity	8	192		0	0		0	0
5	120	Health Insurance	5	120		0	0		0	0		0	0
5.5	121	Insurance Life	3	66	Pension	4.75	104.5		0	0	0	3	66
10	320		0	0	Unity Action Dues	8	256		0	0		0	0

45L Prevailing Wage Reporting (MF only)

- EMarsInc.com Payroll tracking/compliance with 45L experience
- When signing up, state that needed for 45L (and/or 179D)
- There are competitors, this isn't the only option.
- NO apprenticeship requirements for 45L; JUST prevailing wages
- Fees are either \$80 per month per contractor (will have 25-30 trades)
- Or Fees based on value of project (typically more economical path) $.0008 \times \text{value of project}$. (goes down to $.00048$ for 50 mil plus)



45L Prevailing Wage Reporting (MF only)

- Collect PW payroll reports quarterly (for each MF project) (either spreadsheet, or paychex type reports, keep on file)
- Contracts with trades/subs must include language requiring them to pay Prevailing Wage. (Keep a copy on file)
- Post prevailing wage tables at jobsite (photodocument these)
- Paying BiWeekly OK



179D Federal Deduction (MF only)

- ESTAR performance level ~ \$2.50-\$5.36 per square foot
- Requires separate building energy modeling
 - eQUEST, EnergyPlus or similar
- Best when combined with Cost Segregation Study
 - turbo your savings
 - talk with your CPA

- Can be used with 45L on same building
- For buildings 4 stories or higher only. (No 3 stories)
- Buildings smaller than 30k sf might not have enough deduction to make it worth all the work.
- Energy Raters without this experience/qualifications, partner with an engineering firm.



179D Federal Deduction (MF only)

- ESTAR performance level ~\$2.50-\$5.36 per square foot
 - cash value estimate is ~33 cents on the dollar
- Must do payroll tracking or value is 1/5 listed above.
- Apprenticeship requirements are tracked
 - Journeyman to apprentice ratio - 15% of hours
 - If more than 4 workers, one must be apprentice
- Documenting unavailability of approved apprentices:
 - Send Certified letter to trade school or union shop
 - 5 days no reply = 120 days you don't have to send letter again

179D Federal Deduction (MF only)

Statement of Apprentices/Journeymen Participation	
Firm Name and Address	Project Name
Reliable Const.(prime) 123 Ukelele Street Waipahu HI 96797	Reliable Demonstration
Reporting Period from 1/1/2000 to 6/13/2024	
Apprentice to Journeyman Ratio: 7.81%	
Carpenter	33.86%

Apprentice Summary

Craft or Trade	Name	Cert Number	Contractor Name	Ethic Code	Male	Female	Total Number	Total Hours
Carpenter	Joe Jul	az11N88888	Sam's Service				1	2144
	Jose Julio	hi 12345	Reliable Const.				1	1520
	Craft/Trade Totals							
Apprentice Total Hours:								3664

Journeymen Summary

Craft or Trade	Name	Cert Number	Contractor Name	Ethic Code	Male	Female	Total Number	Total Hours
Bricklayer	Rodger Pink		Sam's Service				1	224
	Jon Jan		Sam's Service				1	4368
	Joe Feb		Sam's Service				1	2688
	Pete Mar		Sam's Service				1	3828
	Frank Apr		Sam's Service				1	5200
	Stanley May		Sam's Service				1	2088
	Jon Jun		Sam's Service				1	3828
	Four Four		Buddy Mech				1	16
	Drew Porter		Logging Company				1	448
	Craft/Trade Totals							
Carpenter	Tommy Bahama		Sam's Service				1	24
	Michael One		Sam's Service				1	154
	Pete Aug		Sam's Service				1	4892
	Frank Sep		Sam's Service				1	5638.5
	Cristobal NINE		Edwards Services Orig				1	11
	Jose Julio		Reliable Const.				1	24
	Gregory Aug		Reliable Const.				1	7
	Frank Apr		Sam's Service				1	8
	Joe Jul		Sam's Service				1	32
	Joe Feb		Reliable Const.				1	32
Craft/Trade Totals								10822.5

HUD 223f / 221D4 (Multi-Family) MIP reduction

- Works for Market rate or affordable
- Pay 58% less mortgage insurance (\$500-\$900 savings per unit every year)
- Pay MIP on 25 basis points instead of 60
- Must Be ENERGY STAR, NGBS or LEED (ESTAR also for 45L)
 - Many MF builders are already doing ESTAR for this program.
 - \$2500 for 45L is gravy.



HUD 223f / 221D4 (Multi-Family) MIP reduction

M

Two parts to certification for HUD loans

Part 1: Use “ENERGY STAR Portfolio Manager”

- SEDI = Statement of Energy Design Intent
- “SEDI” Score 75 or higher (Reality is 80 or higher to get in)

Part 2: Build/certify to a Green Standard (builders choice)

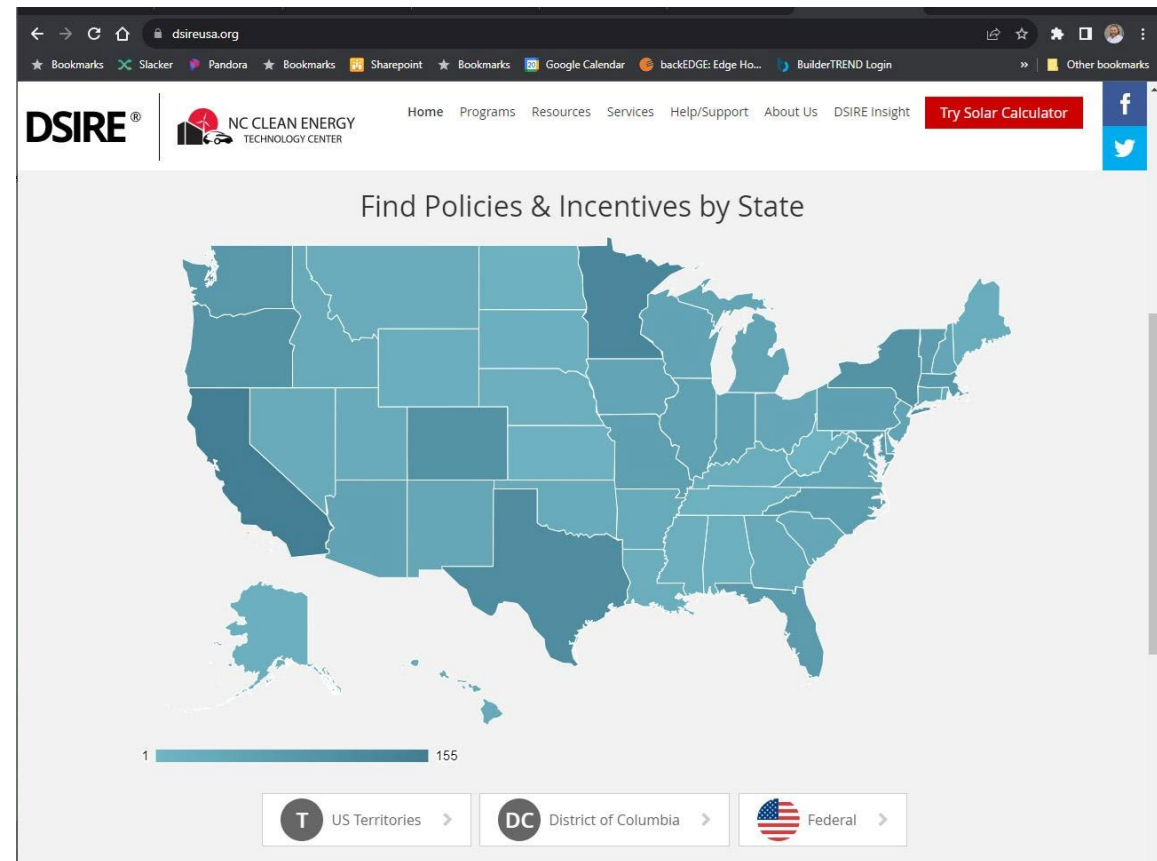
- ENERGY STAR Star MF, LEED, NGBS (and a couple others)
- Most choose ENERGY STAR for the 45L tax incentives



Utility Rebates: www.dsireusa.org

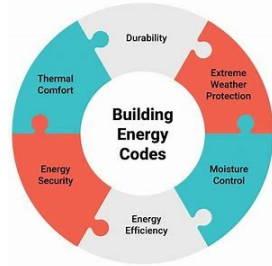
- DSIRE
 - www.dsireusa.org
- Ask Local Energy Rater
 - Utah MF (typical)
 - \$400 Power
 - \$800 Gas

 - Utah SF
 - \$400 Power
 - \$1,000 Gas



GAP: Code Min : ESTAR v3.1 : ESTAR v3.2 : ZERH

- What specifications required to build to a program?
- Core energy specs covered on next slide
- Some mandatory features are not listed on Gap analysis
- Gap between your local code minimum and ENERGY STAR can be highly variable. Do NOT assume that because local code says “2021” it is the full code. In many states, IECC has been amended significantly to stay rather equivalent to the previous energy codes.
- Side note: Cities get higher insurance rates if their adopted code is 5 years or more out of date (nominally). That is why we are starting to see “new 2021” codes get adopted, though many have been amended significantly to reduce energy code requirements.



CZ5 GAP: Code Min : ESTAR v3.1 : ESTAR v3.2 : ZERH

Plan Name	Taho CZ5 code min	Taho CZ5 3.1	Taho CZ5 Estar 3.2	Taho CZ5 Estar 3.2	Taho CZ5 ZERH!	Taho 3.2 2 st, bsmt, narrow
SqFt	2737	2737	2737	2737	2737	2737
% ducts OUTSIDE	40%	40%	40% outside	all inside	zero (60+8)	zero (60+8)
Basement wall R-	11	11	R19	11	R19	18.8
AGWall R-	15	19	23	23	23	23
Rim R-	15	19	23	23	23	30
Ceiling/attic R-	38	38	38	38	R60	60
Door R-	3	3	5	5	5	5
Window U	0.34	0.32	0.25	0.25	0.25	0.28
Window SHGC	0.35	0.32	0.3	0.3	0.3	0.38
Furnace AFUE	95	96	96	96	96	0
AC SEER	14	14	17	17	17	0
Hpump HSPF	0	0	0	0	0	9.8 HSPF2
Hpump SEER	0	0	0	0	0	21.8 SEER2
Water Heater Electric	0	0	0	0	0	4.07 UEF heat pump
Water heater Gas	.68 EF 50 gal	.68 EF 50 gal	96 ef tankless	96 ef tankless	96 ef tankless	0
HVAC grading used for points?	no	no	GRADE 1 (yes)	GRADE 1 (yes)	GRADE 1 (yes)	yes
Mech Ventilation, Exh or Supply	none	exhaust	exhaust	exhaust	ERV	exhaust
ACH level used for points	5	3.5	3ACH	3ACH	2.8ACH	
worst case orientation?	worst	worst	worst	worst	worst	WORST
HERS target/achieved	69	63/62	51/51	51/51	46/46	51/48
annual energy bill	\$1,953	\$1,712	\$1,473	\$1,480	\$1,447	\$1,792

CZ3 GAP: Code Min : ESTAR v3.1 : ESTAR 3.2 : ZERH

Plan Name	Taho CZ3 code min	Taho CZ3 3.1	Taho CZ3 Estar 3.2	Taho CZ3 ZERH!
SqFt	2737		2737	2737
% ducts OUTSIDE	40%	40%	40%	40%
Cantelever/Above Garage	30	30	30	30
Basement wall R-	11	11	11	11
AGWall R-	15	15	<u>19</u>	19
Rim R-	15	15	<u>19</u>	19
Ceiling/attic R-	38	38	38	38
Door R-	3	3	3	5
Window U	0.34	<u>0.30</u>	<u>0.28</u>	0.28
Window SHGC	0.35	<u>0.30</u>	<u>0.25</u>	0.25
Furnace AFUE	95	80	95	<u>96</u>
AC SEER	14	14	<u>16</u>	<u>17</u>
Hpump HSPF	0	0	0	0
Hpump SEER	0	0	0	0
Water Heater Electric	0	0	0	0
Water heater Gas	.68 EF 50 gal	.62 EF 50 gal	.69 EF 50 gal	.96 Tankless
HVAC grading used for points?	no	no	no	no
Mech Ventilation, Exh or Supply	none	exhaust	exhaust	exhaust
ACH level used for points	5	<u>4</u>	4	<u>3.5</u>
worst case orientation?	worst	worst	worst	worst
HERS target/achieved	52	53/52	43/43	41/41
annual energy bill	\$1,923	\$1,803	\$1,589	\$1,567

Choosing Energy Rater for Multifamily Project

Tip #1:

- Ask for a Portfolio
 - Do they have experience in the appropriate climate zone?
 - Better yet, experience in this municipality?
 - What certs issued on those projects?: ENERGY STAR? ZERH? 45L? 179D? EGC 2020? HUD221d4?
 - Ask for examples of reports
- NOT all multifamily experiences are created equal.
 - For the Rater, big leap to testing and inspecting larger buildings with stacked dwelling units compared to townhomes.
 - Big difference between market rate and income-qualified housing



Choosing Energy Rater for Multifamily Project

Tip #2:

- Find out their capacity
 - Be upfront and specific about the:
 - expected pace of construction
 - volume of inspections
 - Ensure the rating company you select has adequate staffing.



Choosing Energy Rater for Multifamily Project

Tip #3:

- Training and Consulting Services
 - Does their bid include up front and ongoing trades training?



Choosing Energy Rater for Multifamily Project

Tip #4:

- Whole Building Modeling Experience



Choosing Energy Rater for Multifamily Project

Tip #5:

- Beware the (Way Too) Low Bidder!



Choosing Energy Rater for MF - Pitfalls

Bonus Questions:

- How to insulate between garage and living space above?
- How to handle resilient channel on interior unit walls?
- MF air sealing, compartment test, most cost effective ways?
- What gypcrete assemblies will air seal the floor joint?
- How to handle penetrations through walls in drop downs?
- Where is sound control complementary to air sealing? When is it redundant?
- Inspection schedule. When is best time to duct test?
- Do they require preliminary/design checklists?



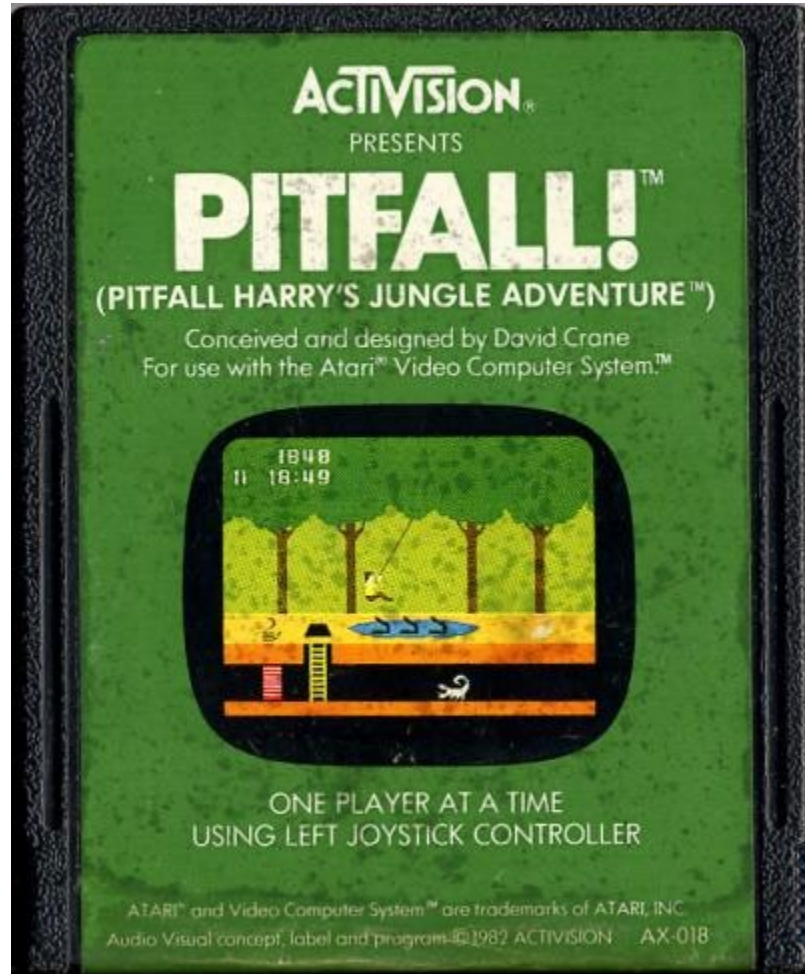
HERS Rater – Practical path to MF expertise

Get certified for MF, take the classes:

- Get good at SF. Then tackle Townhomes. Try certifying as MF
- After mastery of SF and Townhomes, Try 3-story stacked flats with breezeways
- DON'T jump straight into apartment buildings with elevators.
- Partner with another experienced firm. Do the field work, have them do office work. Have them direct you.
- Work closely with your MRO
- Do all the preliminary pre-construction checklists.

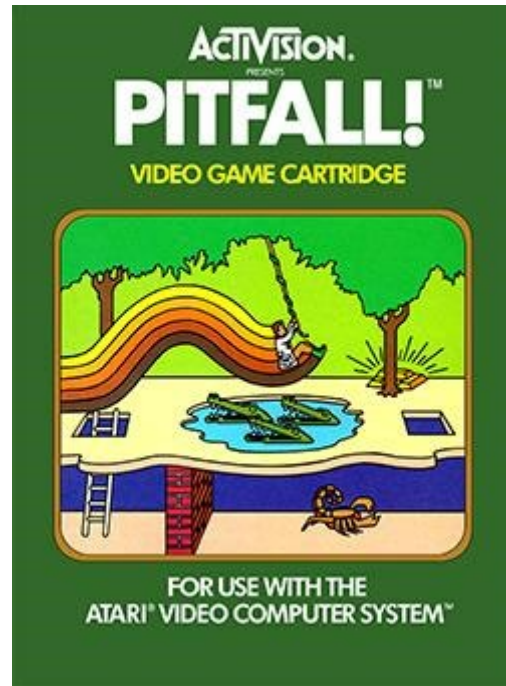
- Get specs and ENERGY STAR checklists on the prints/plans
- Special list for required specs that can not be changed can help on new project
- Always be on lookout for the “Value Engineer” boogeyman. – He may erase your required specs.

PITFALLS !! - Where do Builders fall down?



- Changing specs (Value engineering)
- Air sealing
- Duct tightness
- Waiting till Drywall to involve Rater
- Forgetting to schedule Rater inspections
- Kitchen and Mech Ventilation to outside
- Scopes of work for trades before bid

PITFALLS !! - Where do Builders fall down?



- Office staff does not give supers the specs, scopes or power they need to fix problems.
- New supers not instructed on ENERGY STAR details to look for
- New supers don't know to schedule Raters

Spec Lists: (Don't value engineer these away)

- Don't change energy specs without running it through rater and computer model.
- Ensure all purchasing and supervisory agents know not to change this list without consulting with Energy Rater
- List as follows..... Air Sealing, Insulation, Windows, HVAC, Water Heating, etc.

Spec Lists: DON'T CHANGE WITHOUT CONSULTATION

Core efficiency Items	Variation 1	Variation 2	Variation 3	Estar MF 1.1 prescriptive	all Electric	Q25 electric	Climate Zone 3
Basement Wall.....	R11 (drape) R19 finished	R11 drape		11 19 (15 if finished)		na	na
Slab edge (if applicable).....		10 na	na		10	10	10
Cantilever (if applicable).....	R30	30	30		30	30	30
Rim Joist.....	R19 (sometimes 30)	30	19		21	21	21 na
Above Grade Walls.....	R21 (16 oc)	21	21		21	21	21
Windows.....	.32 U .32 SHGC	32 32	32 32	.27 .3	.32 .32	.32 .32	28 27
exterior doors.....	R5	R5	R5	R-6	R5	R5	
attic.....	R38		49	38	49	49	49
Furnace AFUE.....		96	96	96	95		
Compressor SEER.....		14	13	13	14		
Heat Pump HSPF (if applicable).....	8.5 (Sometimes 9.1)	na	na		9.25	9.25	8.5 na
Heat pump compressor SEER (if applicable)	14 (sometimes 16)	na	na		15	15	14 na
Water Heater.....	.62 EF 50 Galon (.70 some times)	.70 ef 50 gal	.62 ef 50 gal	.61 ef gas .93 ef electric	.93 ef elec	.93 ef elec	.63 50 gal
Blower Door leak limit.....	3 ACH	3 ACH	3 ACH	3 (in model)		3 5 ACH	3 ACH
Duct Leakage limit at Rough.....	4% (6% if >3 returns)	4% (6% if >3 returns)	4% (6% if >3 returns)		4	4	4 4 or 6
Mechanical Ventilation ASHRAE 62... kitchen range mech vent to outside >100cfm when on	1 estar bath fan		1	1	1	1	1
R21 to inside wall, (Raised heel truss)							?
energy star pass fail method	Passes MF 1.1	Passes MF 1.1	passes MF 1.1	passes MF 1.1	passes MF 1.1	passes MF 1.1	

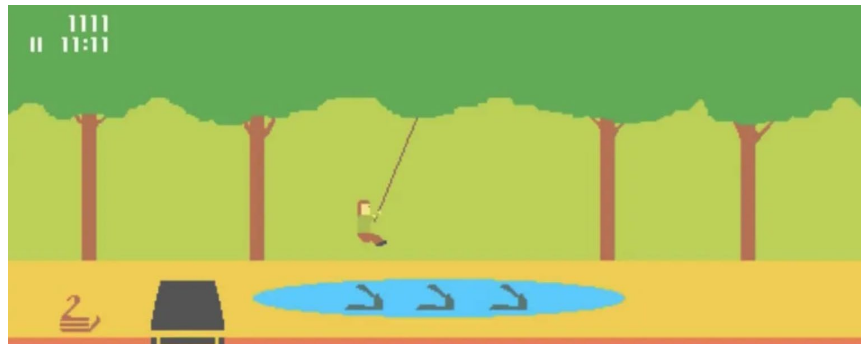


There is more to being energy star than this spreadsheet. This sheet is only intended to cover the most expensive/important decisions and items that must be settled first.

Trade Coordination - Pitfalls

Scopes of work:

- Framers: Optimized/advanced framing
- Air Sealing - who does which air sealing measures when?
 - penetrations, drywall gaskets, HVAC boots to drywall, etc.
- Plumber & sparky ruin duct tightness: who checks on that?
- Drywall crew ruins drywall gasket
 - educate to lift the panel; don't slide it
- Penetrations get overlooked
- Rater not notified to do framing/pre-drywall inspection



Optimized Framing

<https://www.apawood.org/advanced-framing>

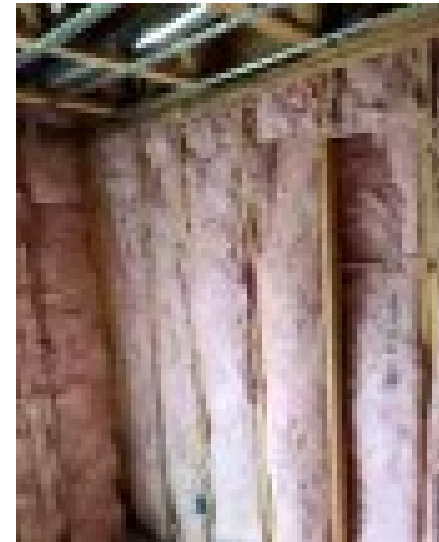
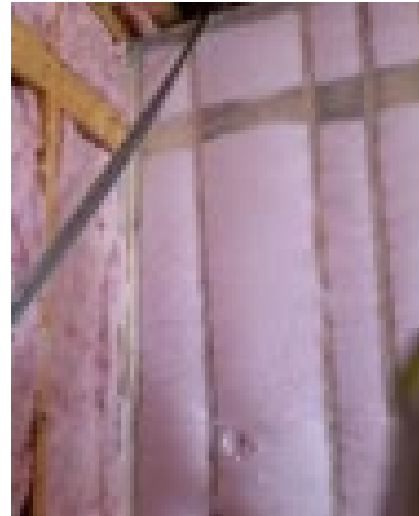
The table below highlights the differences between conventional framing and advanced framing techniques.

CONVENTIONAL FRAMING	ADVANCED FRAMING
2x4 or 2x6 wood framing spaced 16 inches on center	2x6 wood framing spaced 24 inches on center
Double top plates	Single top plate
Three-stud corners	Two-stud corners
Multiple jack studs	Minimal jack studs
Double or triple headers	Single headers
Multiple cripple studs	Minimal cripple studs

Insulation Grading



Image Source: HERS Standards Appendix A



Air Sealing

- Air Sealing is required by:
 - IECC
 - Energy Efficiency Programs (EEPs)
- Different areas/assemblies can be verified at different times
- Energy Rater can be your trades liaison:
 - Educate the trades with their roles in air sealing
 - Independent 3rd Party held accountable by their HCO



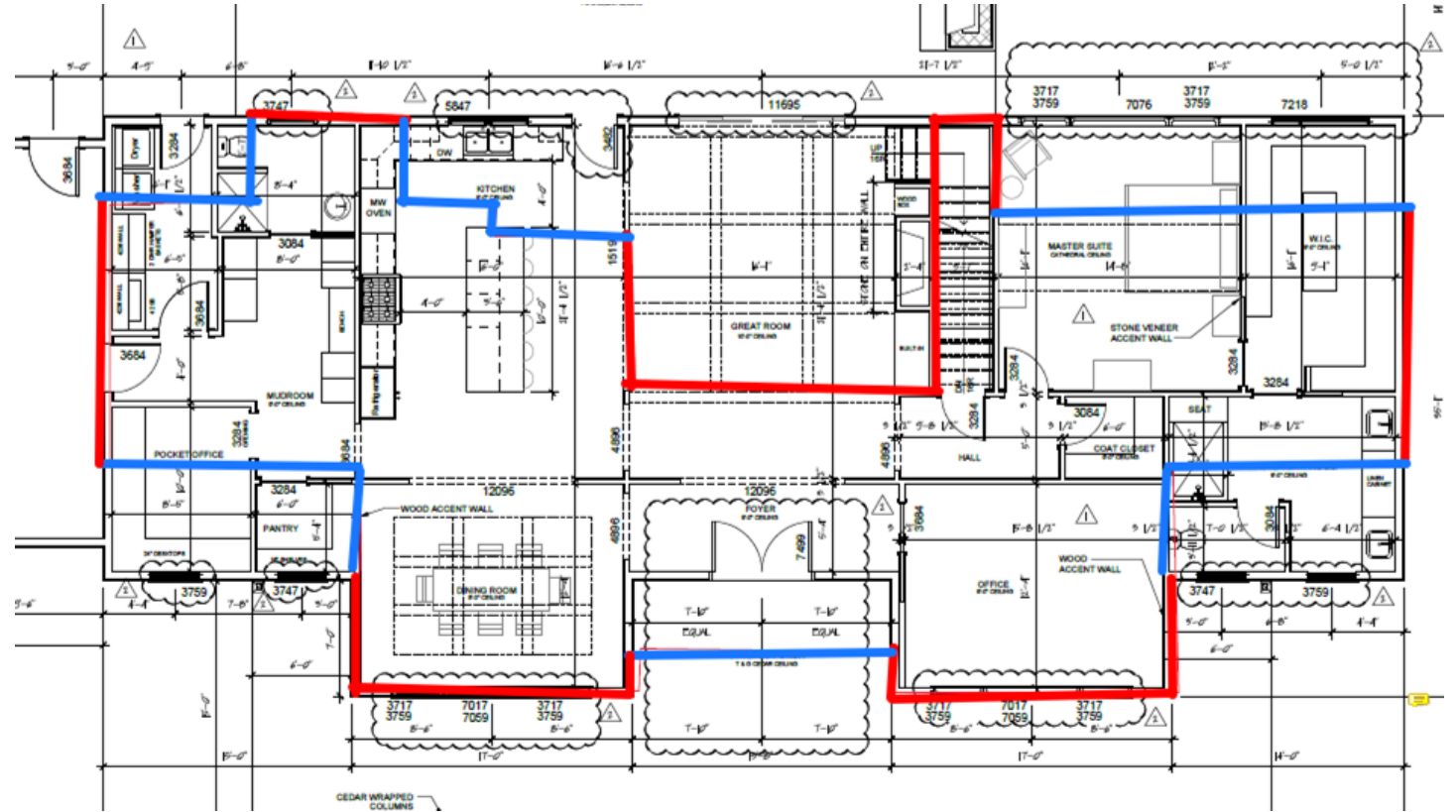
Pre-Drywall Stages of Construction

- Design Stage
- Slab / Foundation
- Rough-In Duct
- Framing (Exterior Air Barrier)
- Insulation & Air Barrier
- Before Attic Insulation (Sealing the Lid)



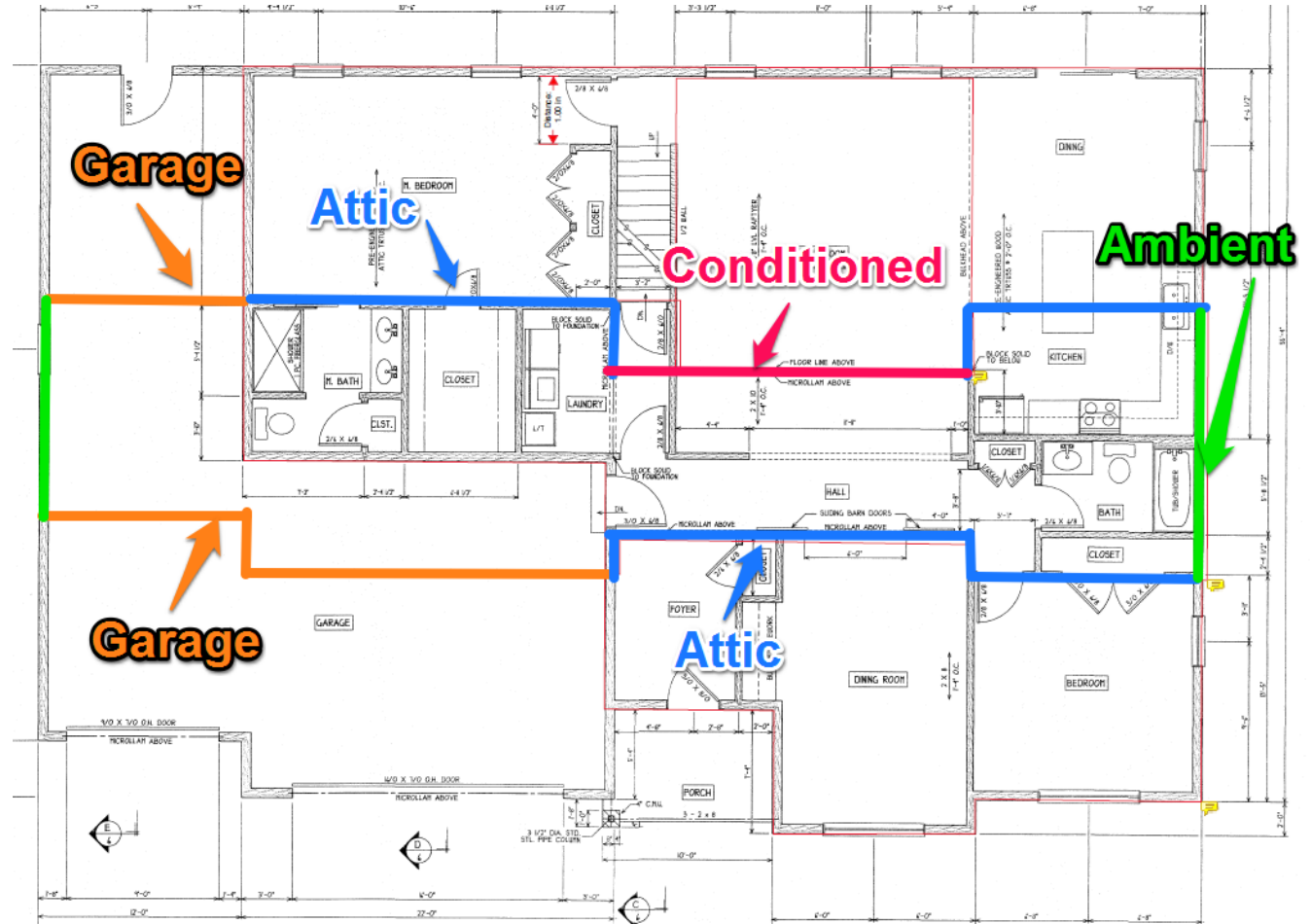
Design Stage

- What can we see here?
- What did we know from the start?
- Concentrate on EITHER:
 - the drywall plane,
 - OR
 - Exterior plane (OSB/sheathing layer)
- Do NOT try to mix both approaches, waste of money.

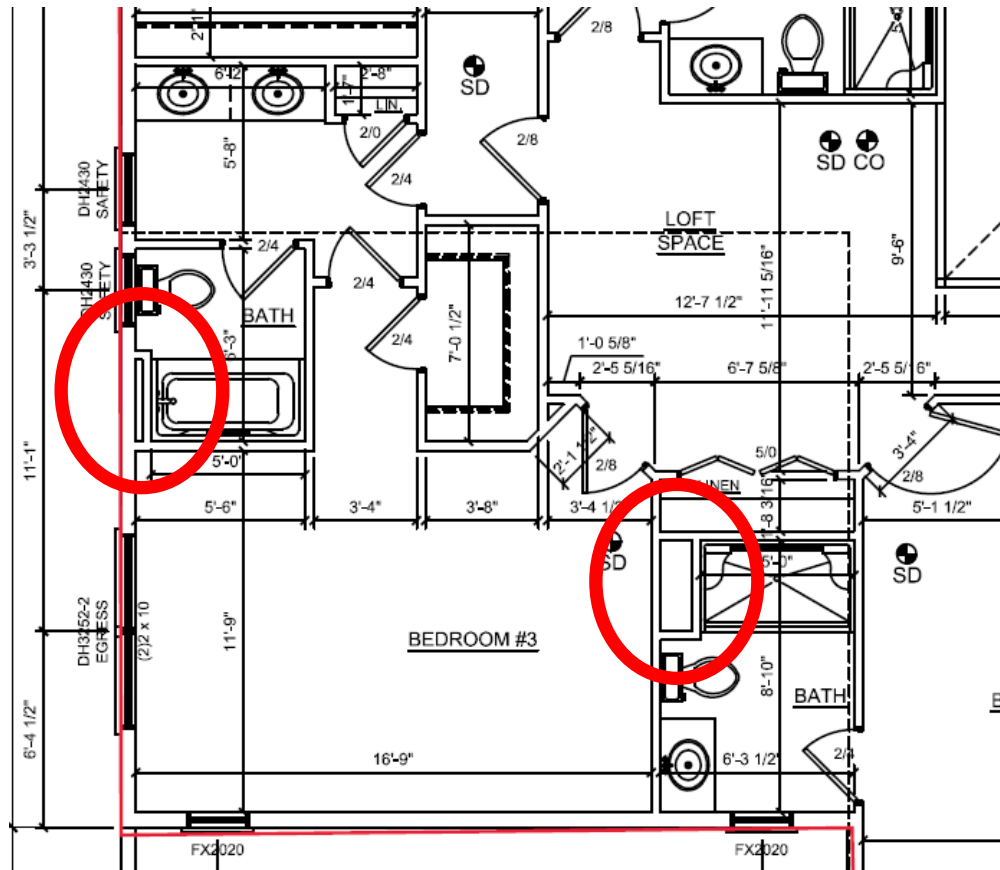


2nd Floor Alignment Over Living Space

- What is on each side of the wall?
 - Ambient
 - Attic
 - Garage
 - Conditioned
- Provide Air Sealing to Complete Misalignments

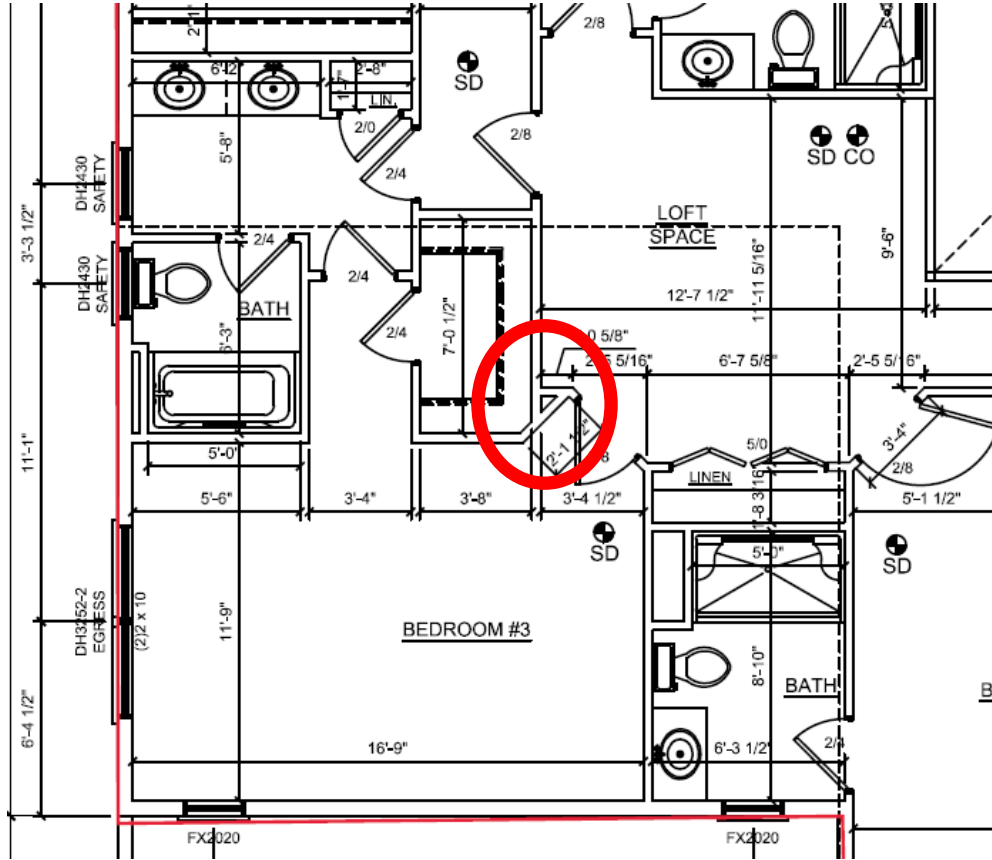


Mechanical and Plumbing Chases



- Open plumbing chase behind bathtub on an ***interior wall***
- Open plumbing chase behind bathtub on an ***exterior wall***

Interior Corner and Closets



- Open chase at *interior wall* corner

Air Sealing Detail known from Plan Review



Foundation Type Verification



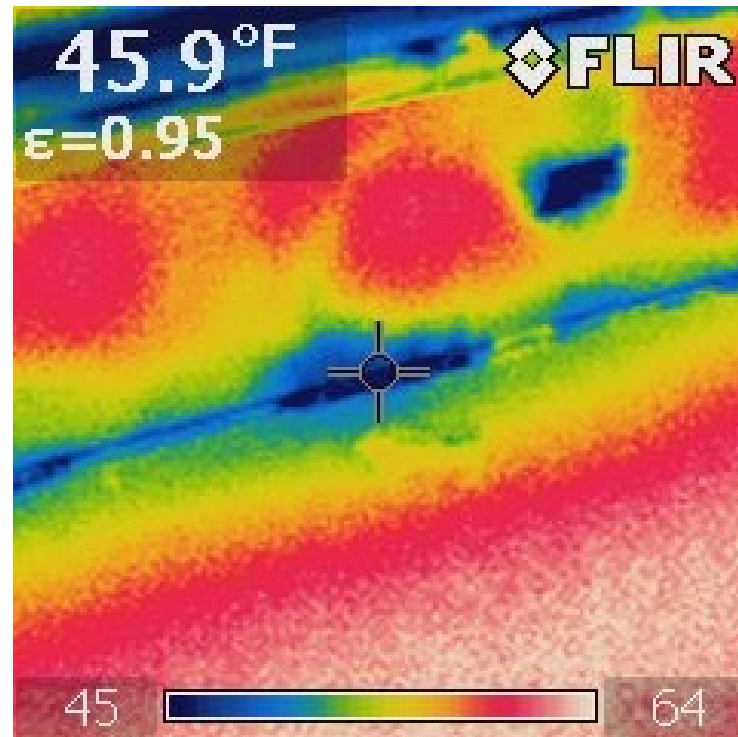
Slab / Foundation Stage

- Clean slab before sealing and framing



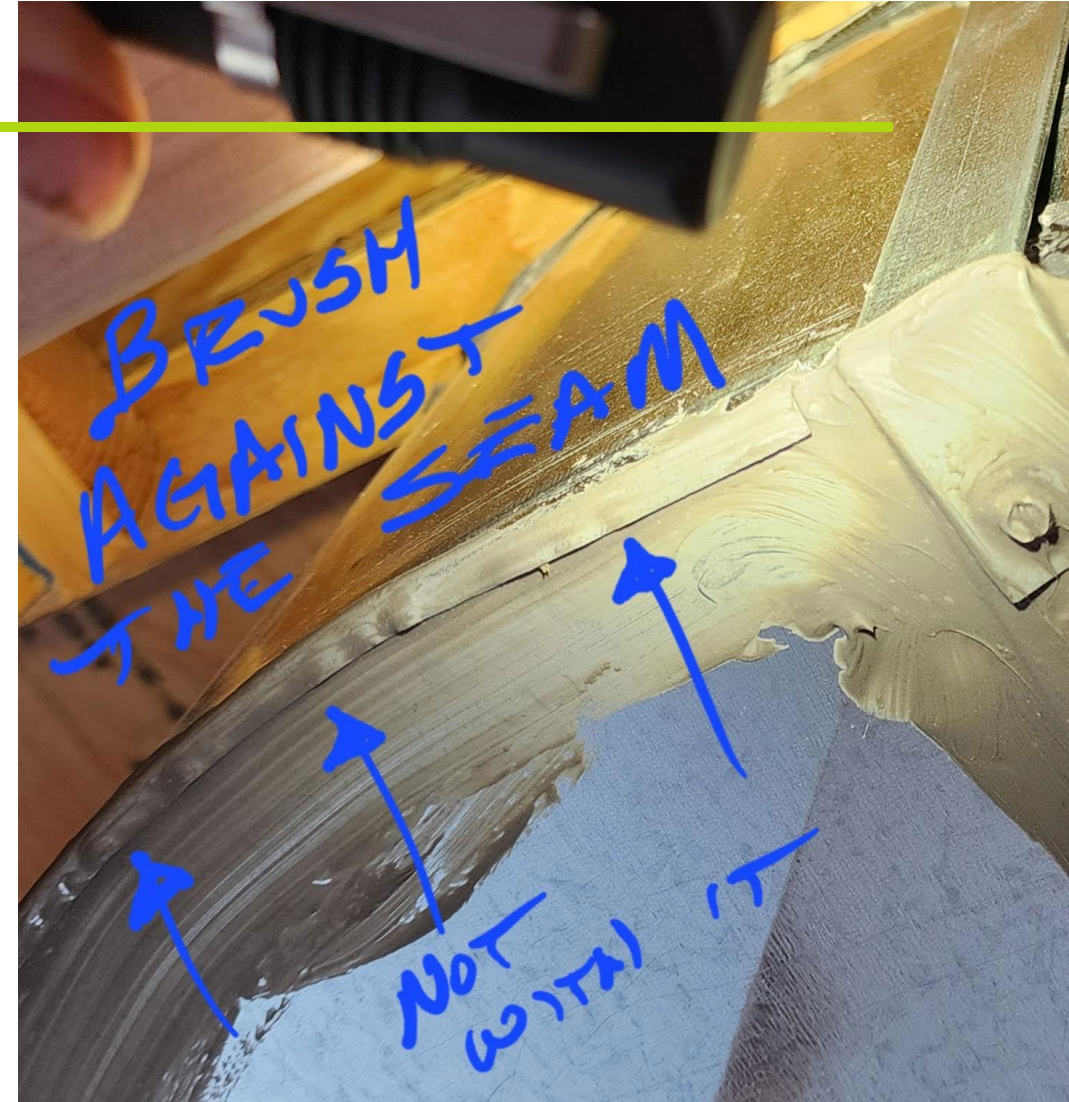
Address Gaps, Cracks or Voids

- Here the expansion joint bulged into the slab pour leaving an infiltration point.

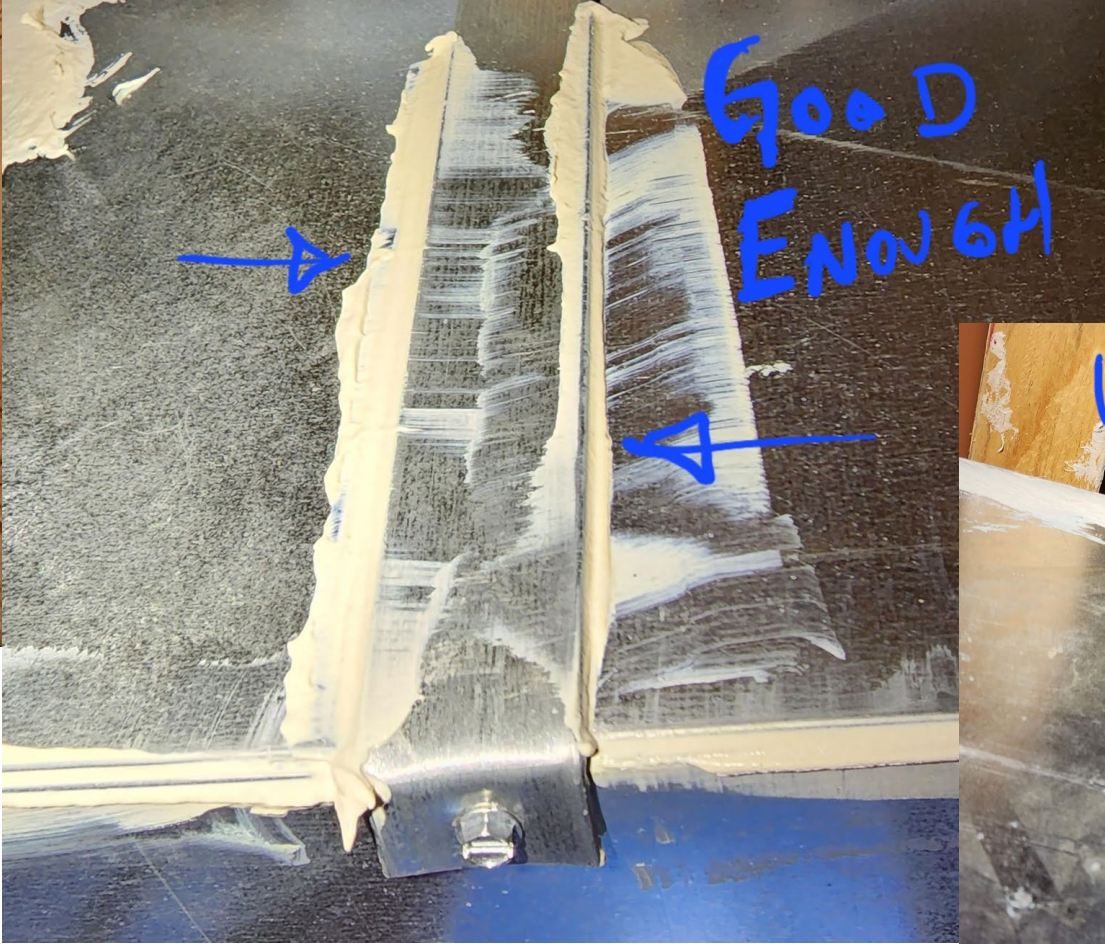


Sealing Ductwork

- Install one section at time
- Seal as you go.
- OR use Aeroseal
- Trying to seal ducts AFTER assembling entire duct system takes more time with worst results.
- Use putty knife; not just brush
- Brush against the grain; not with it.

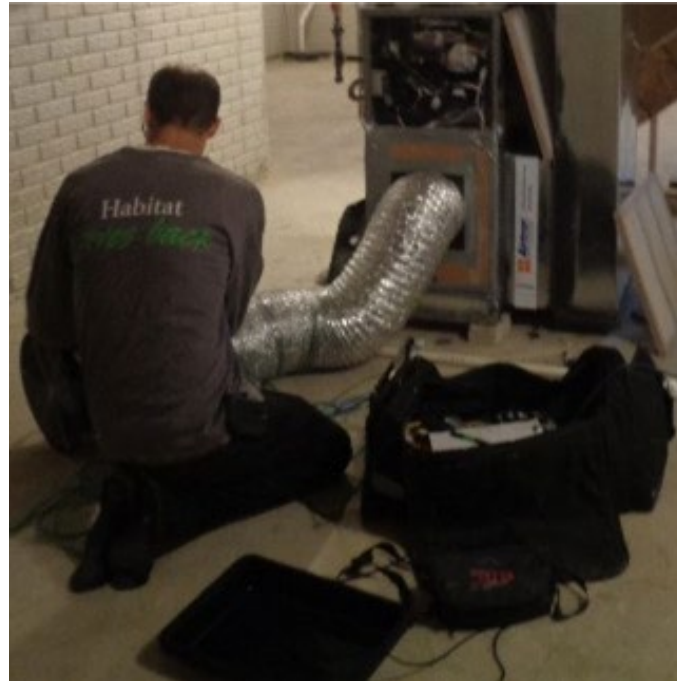


Sealing Ductwork



Total Duct Leakage Testing at Pre-Drywall

- Why test at rough?
- Consider duct testing before insulation; better access to seal the ducts



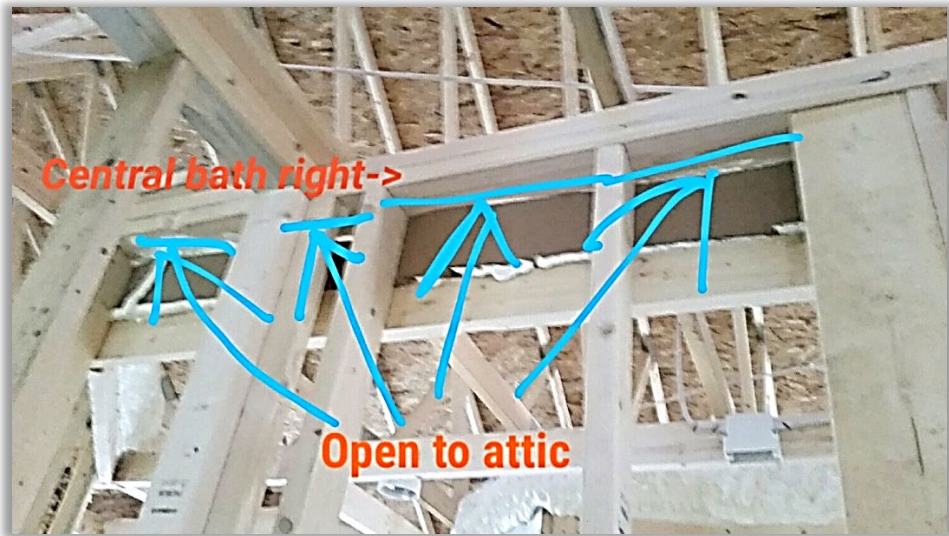
Framing Stage

- Air sealing - easier and more effective at framing (before insulation)



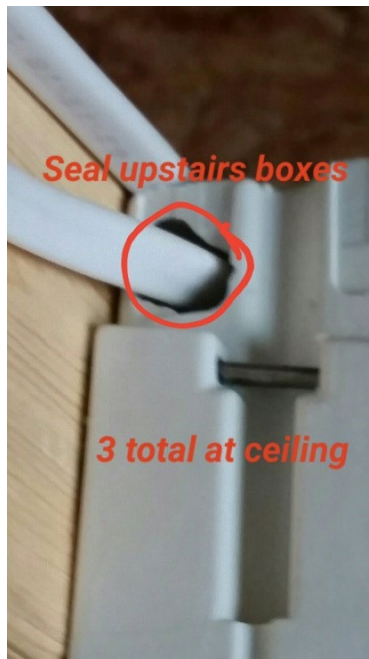
Commonly Missed Locations at Framing

- Example of Energy Rater communication!
 - Easy to share with trades



Potentially Missed Locations at Framing

- Small, and they add up!
- Long, Thin and Discrete



Framing Anomalies (know the WHY)



Attic Pre-Insulation

- Sealing the Lid
- Gasketing too skinny?



Air Sealing Envelope – Drywall Gaskets

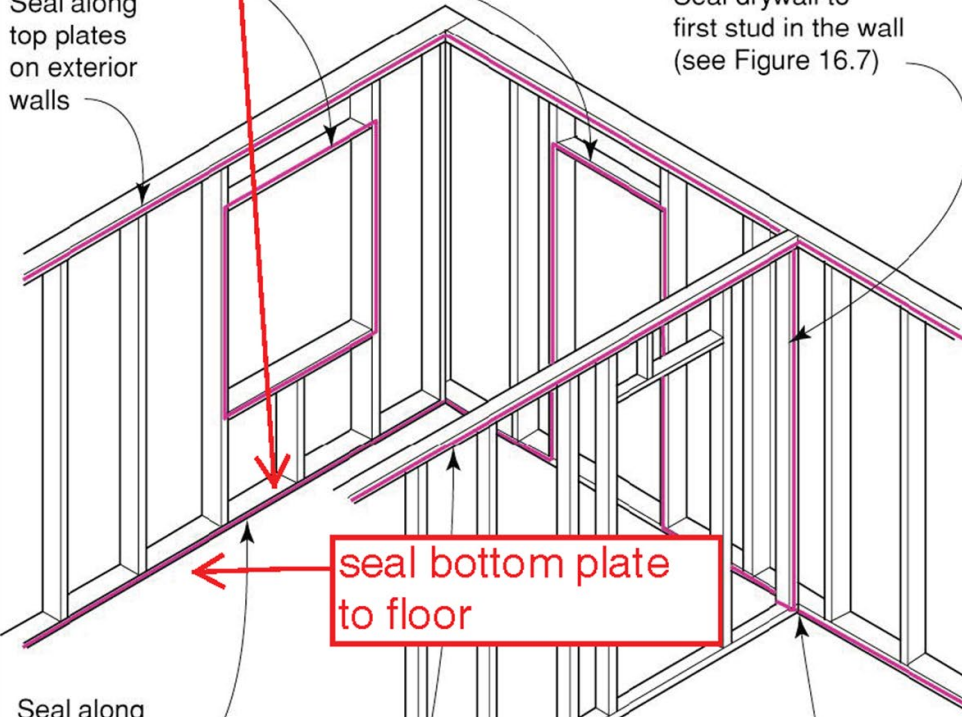


Seal around rough openings of windows and doors

seal drywall to bottom plate

Seal along top plates on exterior walls

Seal drywall to first stud in the wall (see Figure 16.7)



seal bottom plate to floor

Seal along bottom plate on exterior walls

Seal along inside of bottom of first stud in interior wall (see Figure 16.7) or, hold back first stud to pass drywall behind stud (see Figure 16.8)

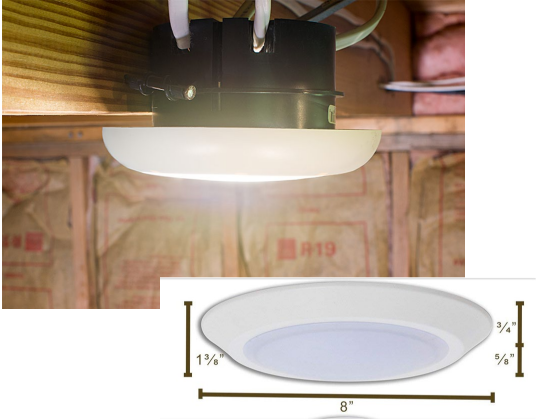
Partitions: seal at top plate where adjacent to an unconditioned space (see Figure 16.8)



Air Sealing Envelope – HVAC sealing to surface



Air Sealing Envelope – Penetrations



Air Sealing Envelope – Aerobarrier



Timeline

- When should everyone be doing their thing?
- Rater involved in pre construction, before bids go out.
- Pre-con meetings with Super, HVAC, Insulators/air sealers, Drywall, (as sticks going in air)
- Rater scheduled to test Ductwork pre-drywall (pre-insulation?)
- Rater scheduled to do final tests (electrical trim)

HVAC Quality Installation - SF New Homes

Certified Homes	Track A: HVAC Grading	Track B: HVAC Credential
HVAC designer completes..	..Std. 310 Design Report + ENERGY STAR Supplement	..ENERGY STAR Design Report
Rater reviews design report per..	..Std. 310 Review Checklist + ENERGY STAR Supplement	..ENERGY STAR Review Checklist
Rater verifies..	[n/a]	..HVAC contractor is credentialed
HVAC contractor installs..	..equipment	..equipment and completes ES HVAC Commissioning Checklist
Rater verifies..	..Grade I total duct leakage, Grade I / II blower fan airflow, Grade I / II blower fan watt draw, Grade I refrigerant charge*	..total duct leakage limits, static pressure, permitted to collect ES HVAC Commissioning Checklist

- Track A- You are Hiring the Rater to Perform Additional Testing and Verification Compared to Design
- Track B- You are Hiring a H-QUITO Credentialed HVAC Contractor
 - (May be sunset on 1/1/2026)

HVAC Quality Installation - MFNC

Multifamily New Construction	Track A: HVAC Grading by Rater	Track B: HVAC Testing by FT Agent
HVAC designer completes..	..Std. 310 Design Report + ENERGY STAR Supplement	..ENERGY STAR HVAC Design Report
Rater reviews design report per..	..Std. 310 Review Checklist + ENERGY STAR Supplement	..ENERGY STAR Design Review Checklist
Rater verifies..	[n/a for In-unit Forced-Air Systems]	..Functional Testing Agent meets credentials
HVAC contractor installs..	..equipment	..equipment & FT Agent completes Functional Testing Checklist
Rater verifies..	..Grade I total duct leakage, Grade I / II blower fan airflow, Grade I / II blower fan watt draw, Grade I refrigerant charge*	..total duct leakage limits, static pressure; required to collect FT Checklist, where FT Agent is not a credentialed contractor

- Track A- You are Hiring the Rater to Perform Additional Testing and Verification Compared to Design
- Track B- You are Hiring a Credentialed Functional Testing Agent (Individuals from Engineering Firms, Rating Companies, Consulting Firms)
 - (May be minimized on 1/1/2026)

https://www.energystar.gov/sites/default/files/tools/MFNC%20HVAC%20Grading%20Factsheet_Builders.pdf

Increased Scrutiny & Oversight



- More Money = More Incentive to Cheat
 - Provider Oversight of Raters
 - Home Certification Organizations (HCOs) Oversight of Providers
 - EPA and DOE Oversight of HCOs
 - Internal Government Oversight of EPA and DOE

Other Benefits of Working with an Energy Rater

- Only Trade that brings you more money than you pay to them
- Reduced callbacks through Independent Energy Rater Services
- Improved Consistency due to defined inspection standards
- Incremental Improvement driven by Rater Feedback and Training for Trades
- Improved Quality and Comfort Driven by an Accountable Independent Third Party

THANK YOU!

Questions???

Mitch Richardson, Building Science West:

www.buildingsciencewest.com mitchrichardson@gmail.com

Scott Doyle, RESNET: www.resnet.us scott@resnet.us

Billy Giblin, RESNET: www.resnet.us billy@resnet.us