

**Residential Code Series:
Plumbing, Mechanical and Radon**

**PART ONE
Plan Review**

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Plan Review Objectives Plumbing, Mechanical and Radon

At the conclusion of this plan review section, participants should be able to:

1. Determine construction documents needed
2. Evaluate calculations of heat gain and heat loss
3. Verify that equipment chosen meets requirements
4. Evaluate compliance for proposed installation of gas meter and piping based on drawings
5. Evaluate potable water supply system for installation
6. Evaluate DWV system based on drawings
7. Develop a list for inspection and testing
8. Evaluate Radon system installation drawings or narrative

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- What is the intent of the code
- R101.3 Intent
 - Minimum requirements
 - Safeguard public safety
 - Insure structural strength
 - Provide
 - Means of egress
 - Sanitation
 - Light and ventilation
 - Energy conservation
 - Safety from fire (occupants and firefighters)

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- Part1
- What you should be getting for Construction Documents
- **R106.1**
 - Two or more sets
 - Design Professional where required
 - *Exception:* BO authorized to waive certain documents and data

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- R106.1.1 Information on construction documents
 - Suitable material
 - Electronic media (where approved by BO)
 - Sufficient clarity
 - Nature and extent of the work
 - Conforms to provisions of code
- Manufacturer's installation instructions
 - Available on job site

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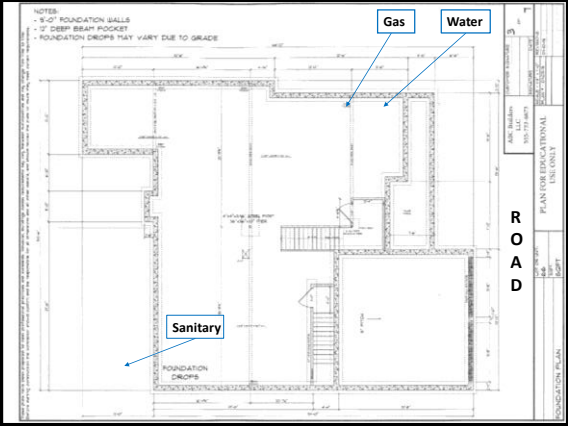
- What was submitted for this project
 - 7 pages of drawings
 - Heat loss/gain calculation based on ACCA Manual J and D
 - REScheck compliance certificate with checklist
 - We are looking at Empirically designed systems

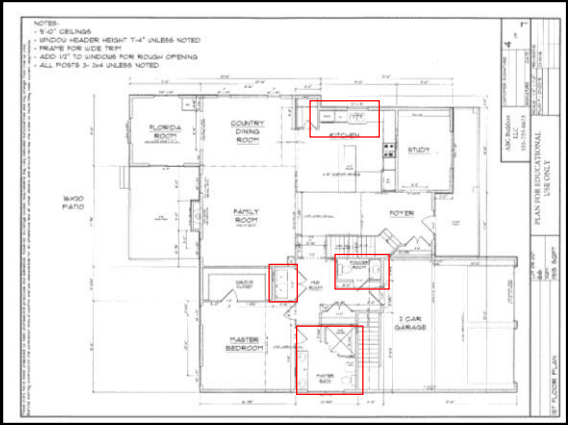
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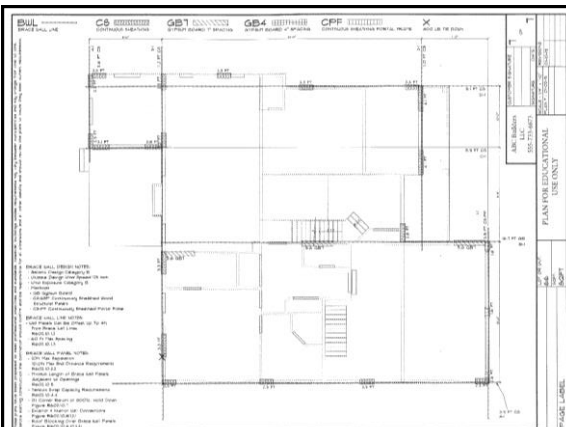
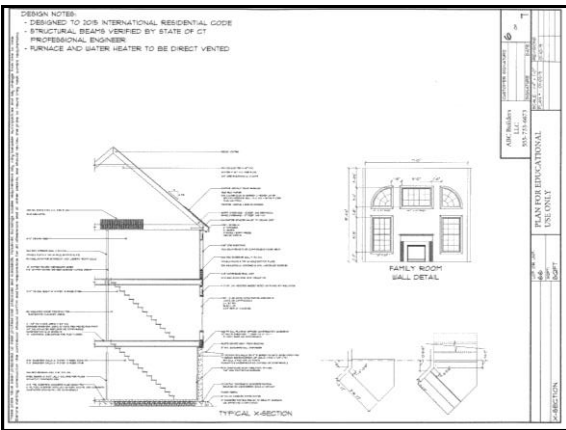
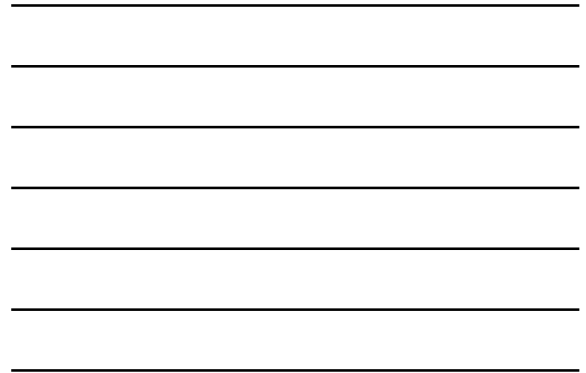
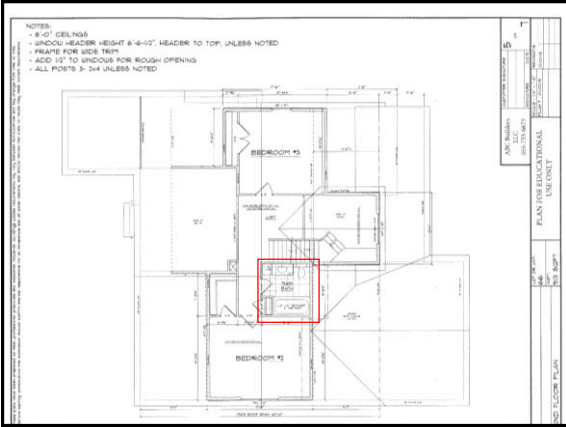










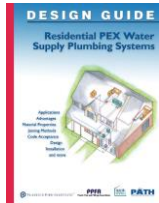


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•PLUMBING

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- IRC Appendix P
- IPC Appendix E
- Code Check 8th Edition
- Table P2903.1 Flow Rate and Flow Pressure
- Table 2903.2 flow rates and consumption for fixtures and fittings
- Tables 2903.6 and Table P2903.6(1)

https://www.huduser.gov/portal/publications/pex_design_guide.pdf

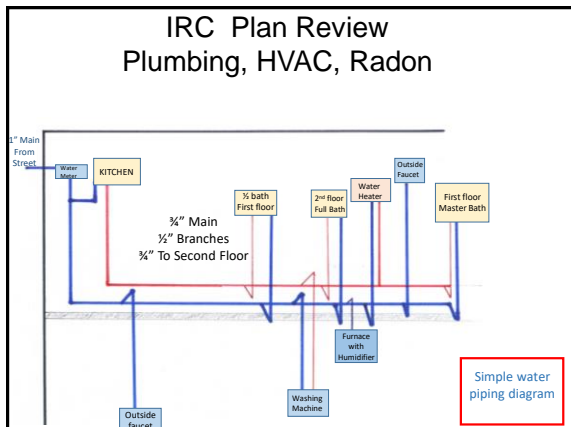
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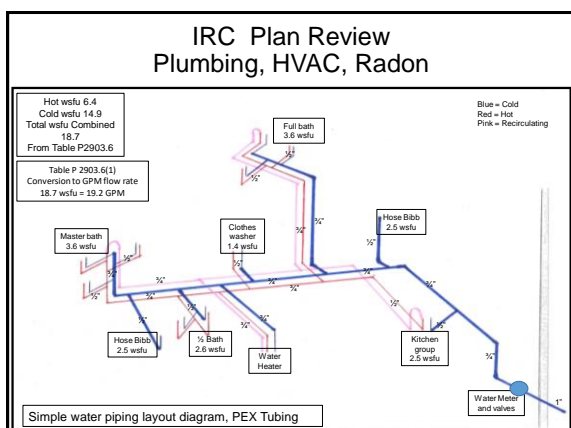
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- Plumbing water distribution system
 - Type of piping materials, ie. Pex, Copper
 - Well or City water
 - Street pressure
 - Piping diagram with pipe sizes
 - Water supply fixture unit values and flow rates from table P2903.6 & Table P2903.6(1)
 - Any special fixture requirements

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TABLE P2903.6
WATER SUPPLY FIXTURE-UNIT VALUES FOR VARIOUS PLUMBING FIXTURES AND FIXTURE GROUPS

TYPE OF FIXTURE OR GROUP OF FIXTURES	WATER SUPPLY FIXTURE-UNIT VALUE (w.s.f.u.)		
	Hot	Cold	Combined
Bathtub (with/without overhead shower head)	1.0	1.0	1.4
Clothes washer	1.0	1.0	1.4
Dishwasher	1.4	2.0	1.4
Full-bath group with bathtub (with/without shower head) or shower stall	1.4	2.0	2.6
Half-bath group (toilet, sink and lavatory)	0.5	2.0	2.5
Hose bibb (with/without)	—	2.5	2.5
Kitchen group (dishwasher and sink with or without food-waste disposer)	1.0	1.0	2.5
Kitchen sink	1.0	1.0	1.4
Laundry group (clothes washer standpipe and laundry tub)	1.8	1.8	2.5
Lavatory	1.0	1.0	1.4
Lavatory (shower stall)	0.5	0.5	0.7
Shower stall	1.0	1.0	1.4
Water closet (tank type)	—	2.0	2.0

For all 1 gallon per minute = 3.785 L/m.

a. The fixture unit value 2.0 assumes a flow demand of 2.0 gpm, such as for an individual lawn sprinkler device. If a hose bibb or sill cock will be required to furnish a group flow, the equivalent fixture-unit value may be obtained from this table or Table P2903.6(1).

TABLE P2903.6(1)
CONVERSIONS FROM WATER SUPPLY FIXTURE-UNIT TO GALLON PER MINUTE FLOW RATES

SUPPLY SYSTEMS PREDOMINANTLY FOR FLUSH TANKS			SUPPLY SYSTEMS PREDOMINANTLY FOR FLOWMETER VALVES		
Fixture	Flow rate (gallons per minute)	Equivalent fixture-unit value	Fixture	Flow rate (gallons per minute)	Equivalent fixture-unit value
1	3.0	0.0104	1	—	—
2	3.0	0.0208	2	—	—
3	3.0	0.0312	3	—	—
4	6.0	0.0554	—	—	—
5	6.0	0.0658	5	15.0	2.0032
6	10.0	1.4303	6	17.4	2.22532
7	11.8	1.57524	7	19.8	2.64664
8	12.8	1.71104	8	22.2	2.96796
9	13.7	1.83116	9	24.6	3.28828
10	14.6	1.95128	10	27.0	3.60960
11	15.4	2.06672	11	27.4	3.71624
12	16.0	2.13888	12	28.6	3.82328
13	16.5	2.20752	13	29.4	3.93032
14	17.0	2.27256	14	30.2	4.03736
15	17.5	2.33464	15	31.0	4.14440
16	18.0	2.39664	16	31.8	4.25144
17	18.4	2.45472	17	32.6	4.35848
18	18.8	2.51280	18	33.4	4.46552
19	19.2	2.56656	19	34.2	4.57256
20	19.6	2.62032	20	35.0	4.67960



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- Water supply fixture unit values from Table P2903.6

Water supply fixture unit values			
Fixtures	Hot	Cold	Combined
2 Full Baths	3	5.4	7.2
1 Half Bath	.5	2.5	2.6
2 Hose Bibbs	0	5.0	5.0
Clothes washer	1	1	1.4
Kitchen group	1.9	1	2.5
Total	6.4	14.9	18.7

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- 18.7 WSFU from table P2903.6

Table AP201.1

MINIMUM SIZE OF WATER METERS, MAINS AND DISTRIBUTION PIPING BASED ON WATER SUPPLY FIXTURE UNIT VALUES

METER AND SERVICE PIPE (inches)	DISTRIBUTION PIPE (inches)	MAXIMUM DEVELOPMENT LENGTH (feet)									
		40	80	80	100	100	200	200	200	400	600
	Pressure Range Over 80	3	3	3	2.5	2	1.5	1.5	1	1	0.5
1/2	1/2	9.5	9.5	9.5	9.5	7.5	6	5	4.5	3.5	3
3/4	3/4	32	32	32	32	32	24	19.5	15.5	11.5	9.5
1	1	32	32	32	32	32	28	28	17	12	9.5
1 1/2	1 1/2	32	32	32	32	32	32	32	32	32	30
2	2	80	80	80	80	80	80	69	60	46	26
2 1/2	2 1/2	80	80	80	80	80	80	76	65	50	38
3	3	87	87	87	87	87	87	87	87	87	84
4	4	151	151	151	151	151	151	151	144	114	94
5	5	151	151	151	151	151	151	151	151	118	97
6	6	87	87	87	87	87	87	87	87	87	87
8	8	275	275	275	275	275	275	275	275	275	252
10	10	365	368	368	368	368	368	368	368	314	275
12	12	533	533	533	533	533	533	533	533	533	533

For SI: 1 inch = 25.4; 1 foot = 304.8 mm; 1 pound per square inch = 6.895 kPa.

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- Water Heater
- Information not part of original submittal documents
 - Navien Model NPE-240A Tankless water heater
 - 83 page installation Manual
 - 19,900-199,900 BTU/H
 - Built in hot water recirculation pump (Demand Recirculating System)



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- R2905 Heated water distribution systems >
 - N1103.5.1.1 Circulating hot water system (circulation pump)
 - N1103.5.1.2 Heat Trace Systems (control for in use)
 - N1103.5.2 Demand recirculation systems
 - No specific length of recirculating hot water piping mentioned in IRC

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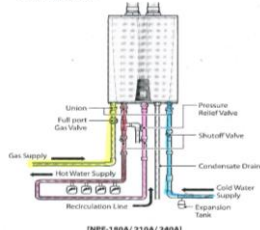
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- Insulation values for Service hot water systems N1103.5.3
 - Circulation Systems R-3
 - Heat Trace R-3
 - Demand Recirculation, Not required
- Required
 - ¾" and larger
 - Outside conditioned space
 - Water heater to manifold
 - Under floor slab
 - Buried

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• The following is a typical water piping example for NPE-180A/210A/240A models.



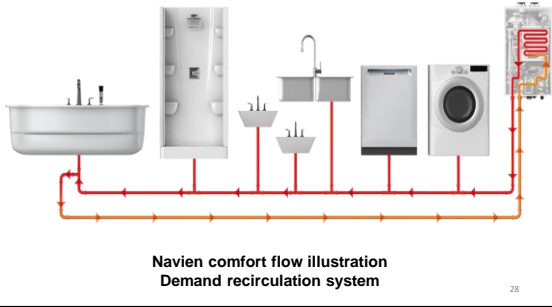
• The following is a typical water piping example for NPE-180S/210S/240S models.

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- Diagram from Navien installation manual for hot water recirculating piping

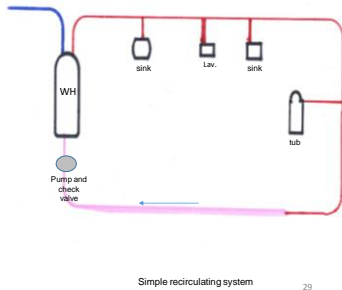


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- Simple Recirculating system
- N1103.5.1
 - Requires pump,
 - Dedicated return pipe,
 - Control to start pump on demand,
 - Stop pump at preset temp,
 - Stop pump when no demand



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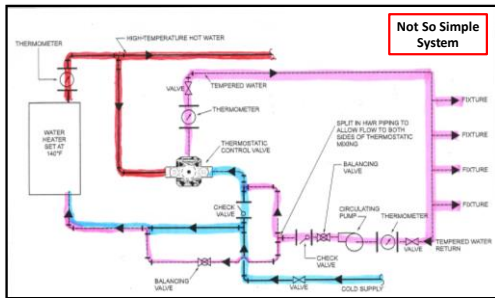


Fig. 607.2.3(1) Proper Recirculation Return with thermostatic control valve



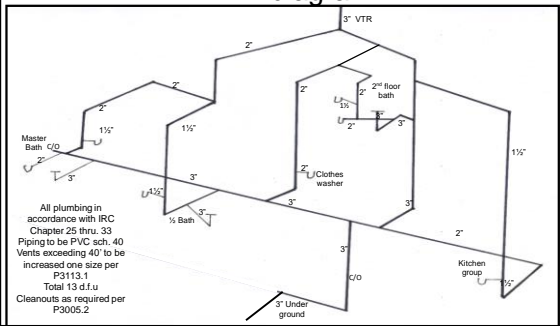
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- DWV plumbing installation documents
 - Type of piping material
 - Type of water heater and manufacturer
 - Any special appliances or fixtures
 - Diagram of piping

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DWV diagram



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Drainage Fixture Unit (d.f.u.) values Table 3004.1	
Type of fixture or group	d.f.u. values
2.5 Bath groups	9
Clothes washer	2
Kitchen group	2
Total	13

Using tables P3005.4.1 and table 3005.4.2, piping shown on diagram is adequate

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•GAS PIPING

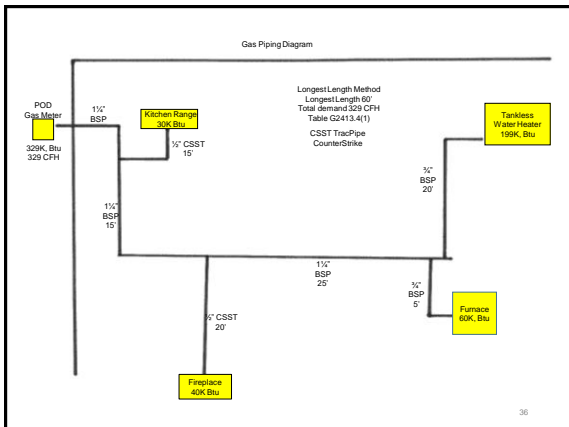
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- Gas piping, Chapter 24
- Black steel pipe and TracPipe Counter Strike CSST
- Maximum demand 329 CFH
- Longest length method

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Gas Piping Diagram





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- HVAC

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- HVAC
- ACCA Manual D & J calculations for duct systems and load calculations
- Building loads calculated with ACCA Manual J
- Systems/methods used to comply with Energy Code
- IRC Chapter 11 or IECC

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- HVAC
- M1401.3
- Sizing per ACCA Manual S
- Duct systems ACCA Manual D/Chapter 16 IRC
- Building loads calculated per ACCA Manual J or
- Other approved calculation methodologies

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Rhvac - Residential & Light Commercial HVAC Loads
For Educational Use Only

Elite Software Development, Inc. Unit 886 Page 1

Project Report

General Project Information

Project Title: Unit 886
 Designed By: Rusty Nall
 Project Date: 02-16-18
 Company Name: ABC Builders LLC
 Company Representative: Rusty Nall
 Company Address: 123 Main St.
 Company City: Any Town CT
 Company Phone: 555-733-6673
 Company Fax:
 Company E-Mail Address:
 Company Website:

Design Data:

Reference City: Hartford, Connecticut
 Building Orientation: Front door faces North
 Daily Temperature Range: Medium
 Latitude: 41 Degrees
 Elevation: 15 ft
 Altitude Factor: 0.999

	Outdoor Dry Bulb	Outdoor Wet Bulb	Outdoor Rel.Hum	Indoor Rel.Hum	Indoor Dry Bulb	Grains Difference
Winter:	85	61	n/a	50%	70	n/a
Summer:	85	73	49%	50%	70	44

Check Figures:

Total Building Supply CFM: 871 CFM Per Square Ft.: 0.186
 Square Ft. of Room Area: 4,446 Square Ft. Per Ton: 2,345
 Volume (BT): 27,529

Building Loads

	Total Heating Required Including Ventilation Air:	36,989 Btuh	36,989 MBH
Total Sensible Gain:	19,143 Btuh	16 %	
Total Latent Gain:	3,604 Btuh	16 %	
Total Cooling Required Including Ventilation Air:	22,747 Btuh	1.90 Tons (Based On Sensible + Latent)	

Rhvac is an ACCA approved Manual J and Manual D computer program. Calculations are performed per ACCA Manual J 9th Edition, Version 2, and ACCA Manual D. All computed results are estimates as building use and weather may vary. Be sure to select a unit that meets both sensible and latent loads according to the manufacturer's performance data at your design conditions.

Rhvac - Residential & Light Commercial HVAC Loads
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Elite Software Development, Inc. Unit 886 Page 2

System 1 Main Floor Summary Loads

Component Description	Area	Gain	Lat	Gain	Total
Koritech Window: Glazing-Koritech Window, u-value 0.29, SHGC 0.28	20	353	0	201	201
Koritech Window: Glazing-Koritech Window, u-value 0.27, SHGC 0.27	289.5	4,922	0	5,961	5,961
Koritech Slider: Glazing-Slider, u-value 0.29, SHGC 0.3	40	791	0	1,338	1,338
Fiberglass Door: Full Glass Door	40	796	0	348	348
R-10 Door: Full Door	40	428	0	188	188
R-19 Wall: Frame, Custom, R-19 Batt	2813.2	12,058	0	4,901	4,901
R-10 Core: Wall-Battery, Custom, Basement Wall	1,086	4,583	0	0	0
R-49: Roof/Ceiling-Under Attic with Insulation on Attic	1797.9	2,265	0	2,513	2,513
Floor (also use for Knee Walls and Partition Ceiling): Custom, R-49 Brown Insulation	186.4	235	0	93	93
R-13 + 2" Rad/Ceiling-Under Attic with Insulation on Attic Floor (also use for Knee Walls and Partition Ceiling): Custom, Cathedral	33.8	55	0	11	11
R-38: Floor-Over open crawl space or garage, Custom, Over Garage	1914	2,653	0	0	0
Subtotal for structure:	8	29,047	1,840	2,400	4,240
Equipment:	0	0	0	0	0
Lighting:	0	0	0	0	0
Infiltration: Winter CFM: 115, Summer CFM: 60	7,942	1,764	1,178	2,942	2,942
Ventilation: Winter CFM: 0, Summer CFM: 0	0	0	0	0	0
System 1 Main Floor Totals:		36,989	3,604	19,143	22,747

Check Figures:

Supply CFM: 871 CFM Per Square Ft.: 0.186
 Square Ft. of Room Area: 4,446 Square Ft. Per Ton: 2,345
 Volume (BT): 27,529

Building Loads

	Total Heating Required Including Ventilation Air:	36,989 Btuh	36,989 MBH
Total Sensible Gain:	19,143 Btuh	54 %	
Total Latent Gain:	3,604 Btuh	16 %	
Total Cooling Required Including Ventilation Air:	22,747 Btuh	1.90 Tons (Based On Sensible + Latent)	

Rhvac is an ACCA approved Manual J and Manual D computer program. Calculations are performed per ACCA Manual J 9th Edition, Version 2, and ACCA Manual D. All computed results are estimates as building use and weather may vary. Be sure to select a unit that meets both sensible and latent loads according to the manufacturer's performance data at your design conditions.

Rhvac - Residential & Light Commercial HVAC Loads
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Elite Software Development, Inc. Unit 886 Page 3

System 1 Room Load Summary

Room	Area	Sensib	Latent	Total	Heating	Cooling	Latent	Total
1 Porch	275	3,780	76	1-6	360	1,296	209	59
2 Study	126	2,274	45	1-6	240	1,206	132	47
3 Kitchen	249	1,367	28	1-6	462	1,906	1,014	91
4 Living Room	34	377	31	1-6	298	1,287	80	59
5 Family Room	44	3,027	72	2-6	174	16,322	1,76	147
6 Master Bedroom	275	3,082	62	2-6	344	2,956	1,053	138
7 Bedroom 2	262	3,027	61	2-6	286	2,777	156	58
8 Master Bath	74	442	9	1-6	50	216	129	10
9 Bedroom 1	122	1,601	30	1-6	169	769	108	36
10 Master Room	155	745	15	1-6	64	278	49	13
11 Powder Room	26	223	5	1-6	19	82	17	4
Zone 1 subtotal	1,808	21,002	425		14,465	3,032	898	656
12 Bedroom 3	248	3,212	65	1-6	471	2,035	199	83
13 Bed 2 Walk In	36	697	14	1-6	61	285	53	12
14 2nd Floor Hall	4	377	1-6	28	123	30	6	0
15 Main Bath	72	949	11	1-6	59	259	37	12
16 Bedroom 5	264	3,077	62	1-6	378	1,817	209	74
17 Headed Basement	1,814	8,075	163	1-6	89	363	44	17
Zone 2 subtotal	2,638	15,967	323		4,678	572	213	211
System 1 total	4,446	36,989	748		19,143	3,604	871	871

System 1 Main Trunk Size: 14x12 in.
 Velocity: 745 ft/min
 Load per 100 ft.: 0.091 in w/g

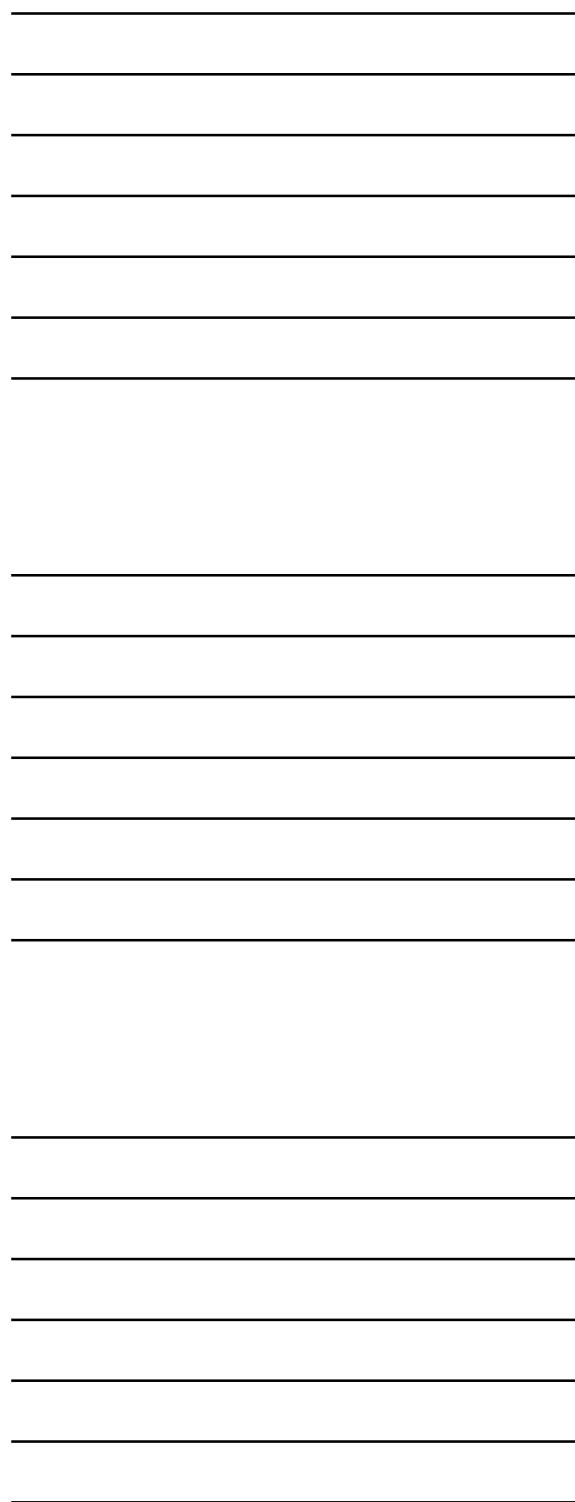
Note: Since the system is multi-zone, the Peak Fenestration Gain Procedure was used to determine glass sensible gains at the room and zone levels, so the sums of the zone sensible gains and airflow for cooling zones above are not intended to equal the totals at the system level. Room and zone sensible gains and cooling CFM values are for the hour in which the glass sensible gain for the zone is at its peak. Sensible gains at the system level are based on the "Average Load Procedure" - Global CFM method.

Building System Summary

	Cooling	Heating System	Latent	Total
Net Required	1.90	84% + 16%	19,143	3,604
System Data		Heating System: Natural Gas Furnace	Cooling System: Standard Air Conditioner	

System Data

Type	Model	Efficiency	Comment
Heating	0	0 AFUE	
Cooling	0	0 SEER	
Sensible Capacity	0	0 Btuh	
Latent Capacity	0	0 Btuh	



Section & Req ID	Insulation Inspection	Plans Verified Value	Field Verified Value	Complete?	Comments/Assumptions
402.1.0 (F401.0) (F401.1) (F401.2)	Door U-factor.	U-_____	U-_____	<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	See the Knowledge Assesment table for values.
402.1.1 (F401.3) (F401.4) (F401.5)	Glazing U-factor (area-weighted average).	U-_____	U-_____	<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	See the Knowledge Assesment table for values.
403.1.0 (F401.6)	U-factor of fenestration products installed in accordance with the NFRC test procedure or label from the label table.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.2.1 (F402.0)	Air barrier and thermal barrier installed as manufacturer's			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.2.2 (F402.1) (F402.2)	Penetration that is not a wall, floor, ceiling or roof joint must be sealed with a sealant that is approved for use with the substrate and sealant and that do not restrict egress.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.2.3 (F402.3)	IC rated recessed lighting fixtures must be installed in accordance with the manufacturer's instructions.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.2.4 (F402.4)	Insulation must be installed in accordance with the manufacturer's instructions.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.2.5 (F402.5)	Insulation must not be used as a work of art.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.3.0 (F403.0)	Insulation must be installed in accordance with the manufacturer's instructions and in contact with the substrate.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.3.1 (F403.1)	Insulation must be installed in accordance with the manufacturer's instructions and in contact with the substrate.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.3.2 (F403.2)	Insulation must be installed in accordance with the manufacturer's instructions and in contact with the substrate.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.3.3 (F403.3)	Insulation must be installed in accordance with the manufacturer's instructions and in contact with the substrate.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.3.4 (F403.4)	Insulation must be installed in accordance with the manufacturer's instructions and in contact with the substrate.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.3.5 (F403.5)	Insulation must be installed in accordance with the manufacturer's instructions and in contact with the substrate.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.3.6 (F403.6)	Automatic or gravity drainage are installed as manufacturer's instructions.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	

1 High Impact (F401.1) 2 Medium Impact (F401.2) 3 Low Impact (F401.3)

Project Title: Unit #7 CEDM Heights
Data Filename: C:\BSEP Group, Inc\FVAC, Heat Loss, ResCheck\ResCheck\F401 Group, INC\CEM Heights\BSEP.rch

Report date: 03/31/19
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Section & Req ID	Insulation Inspection	Plans Verified Value	Field Verified Value	Complete?	Comments/Assumptions
401.1 (F401.1)	All installed insulation is labeled as the installed R-values provided.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.1.1 (F401.1) (F401.2) (F401.3)	Floor insulation R-value.	R-_____ <input type="checkbox"/> Wood <input type="checkbox"/> Steel	R-_____ <input type="checkbox"/> Wood <input type="checkbox"/> Steel	<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	See the Knowledge Assesment table for values.
402.2 (F402.0) (F402.1) (F402.2)	Floor insulation installed per manufacturer's instructions and in contact with the substrate.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.3.1 (F403.1)	Wall insulation R-value if this is a single wall with at least 1/2" of wall insulation on the wall exterior. (the exterior insulation requirement applies (F410).	R-_____ <input type="checkbox"/> Wood <input type="checkbox"/> Mass <input type="checkbox"/> Steel	R-_____ <input type="checkbox"/> Wood <input type="checkbox"/> Mass <input type="checkbox"/> Steel	<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	See the Knowledge Assesment table for values.
402.3.2 (F403.2)	Wall insulation is installed per manufacturer's instructions.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:

Section & Req ID	Radon Inspection Provisions	Plans Verified Value	Field Verified Value	Complete?	Comments/Assumptions
402.1 (F401.0) (F401.1) (F401.2)	Leading radon entry.	R-_____ <input type="checkbox"/> Wood <input type="checkbox"/> Steel	R-_____ <input type="checkbox"/> Wood <input type="checkbox"/> Steel	<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	See the Knowledge Assesment table for values.
402.1.1 (F401.3)	Crack insulation installed per manufacturer's instructions.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.2 (F402.0) (F402.1) (F402.2)	Vent pipes with air permeable insulation must be sealed at roof and eave penetrations.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.3 (F403.0) (F403.1) (F403.2)	Airtight ceiling, floor and door assembly must be installed in accordance with the manufacturer's instructions.	R-_____	R-_____	<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.3.1 (F403.1)	Blower door test @ 50 Pa with airtightness (leakage) of _____ cfm50.	ACH 50 _____	ACH 50 _____	<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.3.2 (F403.2)	Blower door test @ 50 Pa with airtightness (leakage) of _____ cfm50.	ACH 50 _____	ACH 50 _____	<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.3.3 (F403.3)	Radon gas testing must be performed in accordance with the manufacturer's instructions.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.3.4 (F403.4)	Radon gas testing must be performed in accordance with the manufacturer's instructions.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.3.5 (F403.5)	Radon gas testing must be performed in accordance with the manufacturer's instructions.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	
402.3.6 (F403.6)	Radon gas testing must be performed in accordance with the manufacturer's instructions.			<input type="checkbox"/> Complete <input type="checkbox"/> Does Not <input type="checkbox"/> Not Applicable	

1 High Impact (F401.1) 2 Medium Impact (F401.2) 3 Low Impact (F401.3)

Project Title: Unit #7 Castle Heights
Data Filename: C:\Carrier Group, Inc\FVAC, Heat Loss, ResCheck\ResCheck\Carrier Group, INC\Castle Heights\BSEP.rch

Report date: 03/31/19
Page 9 of 10



IRC Plan Review Plumbing, HVAC, Radon

- Radon piping
- Appendix F
- New construction shall comply with AF104
 - Exception: If it complies with AF103

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IRC Plan Review Plumbing, HVAC, Radon

- AF 104 requirements
- 6-mil soil gas retarder (plastic)
- 3" Tee fitting (under plastic)
- Gravel between ¼" and 2" (around the fitting, under the plastic)
- Filter fabric (around the gravel, which is around the fitting, which is under the gravel)
- In a hole, min. 8" deep by 24" in diameter
- All of the above attached to a 3" pipe, (which)
- Runs up through conditioned space
- Terminates min. 12" above roof
- 10' from any window or opening
- Not less than 2' below

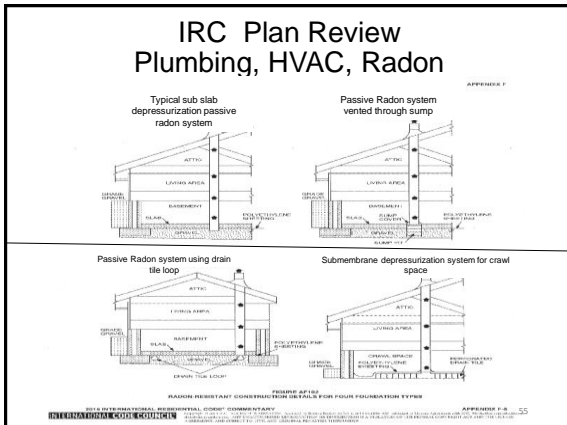
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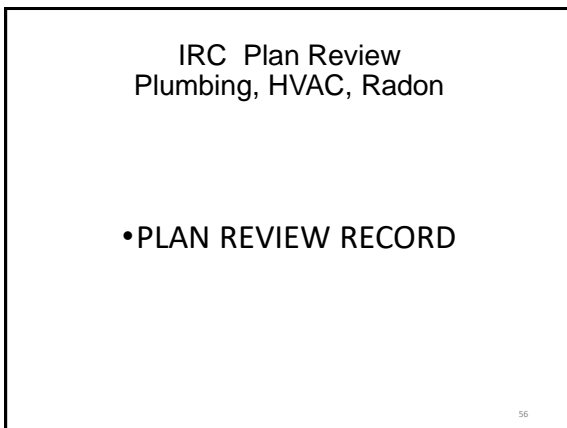
IRC Plan Review Plumbing, HVAC, Radon



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IRC Plan Review Plumbing, HVAC, Radon

2015 INTERNATIONAL RESIDENTIAL CODE®
FOR ONE- AND TWO-FAMILY DWELLINGS
PLAN REVIEW RECORD

JURISDICTION: _____ (City/Town/Village/State)

BUILDING LOCATION: _____ (Street address)

BUILDING DESCRIPTION: _____

REVIEWED BY: _____

Plan Review #: _____ Date: _____
 Validator: _____ Fee: _____

CORRECTIONS LIST

No.	DESCRIPTION	Code Section



IRC Plan Review Plumbing, HVAC, Radon

MECHANICAL (Chapters 12-23)

- VIF** Appliances labeling (M1302, M1303)
- VIE** Appliances access (M1305, M1401)
- VIF** Appliances installation (M1307)
- Heating and cooling equipment; load calculations (Chapter 14)
- VIF** Exhaust systems (Chapter 15)
- VIF** Duct systems (Chapter 16)
- Combustion air (Chapter 17)
- VIE** Chimney and vent location and terminations (Chapters 18 and 19)
- N/A** Special equipment (Chapter 18)
- V/VIF** Radiant/boiler heaters (Chapter 20)
- N/A** Hydraulic piping (Chapter 21)
- N/A** Special piping and storage systems (Chapter 22)
- N/A** Solar thermal energy systems (Chapter 23)
- N/A** Penetrations of fire-resistance rated assemblies (R302.4, R302.5)

FUEL GAS (Chapter 24)

- Appliance (G2401.1)
- General regulators (G2404)
- VIF** Appliance location (G2406)
- Air requirements (G2407)
- VIF** Installation (G2408)
- VIF** Clearances (G2409)
- VIF** Electrical and electrical bonding (G2410, G2411)
- V/VIF** Pipe sizing (G2412)
- V/VIF** Piping materials (G2414)

IRC Plan Review Plumbing, HVAC, Radon

FUEL GAS (cont'd)

- Piping installation (G2415 and G2418)
- VIF** Piping support (G2418 and G2404)
- VIF** Valves, controls, connections (G2420, G2421 and G2422)
- VIE** Venting (G2425 - G2429)
- VIF** Misc appliances (G2432, G2430 - G2454)

PLUMBING (Chapters 25-33)

- V/VIF** Water service location and depth (P2602, P2604)
- VIF** Sanitary and storm sewer location and depth (P2602, P2604)
- VIF** Piping support (Table P2605.1)
- VIF** Listed plastic materials (P2609)
- VIF** Plumbing fixtures (Chapter 27)
- V/VIF** Water heater size and location (Chapter 28)
- V/VIE** Water supply and distribution system design and calculations (Chapter 29)
- N/A** Dwelling unit fire sprinkler systems (P2804)
- N/A** NFPA 13D system (P2804.1)
- N/A** Temperature rating (P2904.2.1, P2904.2.2)
- N/A** Freezing protection (P2904.2.3)
- N/A** Sprinkler coverage (P2904.2.4)
- N/A** Piping materials (P2904.3)
- N/A** Flow rates (P2904.4.1, P2904.4.2)
- N/A** Water supply capacity (P2904.5.2)
- N/A** Pipe sizing (P2904.6)
- V/VIF** Drain, waste and vent pipe sizing and riser diagram (P3004, P3005, Chapter 31)
- N/A** Sumps and ejectors (P3007)
- N/A** Backwater valves (P3008)
- VIE** Fixture traps (P3009)
- VIE** Storm drainage (Chapter 33)
- N/A** Penetrations of fire-resistance rated assemblies (P3002.4, R302.5)

IRC Plan Review Plumbing, HVAC, Radon

PASSIVE RADON GAS CONTROLS (Appendix F)

- Provisions adopted (R102.5)
- V/VIF** Compliance with Appendix F verified

PATIO COVERS (Appendix H)

- Provisions adopted (R102.5)
- Compliance with Appendix H verified

PRIVATE SEWAGE DISPOSAL (Appendix I)

Contact Health department

- Provisions adopted (R102.5)
- Compliance with Appendix I verified



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Please find the plan review for the proposed work listed above. Building Code sections identified, referenced in the 2018 International Residential Code (IRC) portion of the 2018 State Building Code (SBC) with 2018 amendments.

1. Comply with Public Act No. 16-45 AN ACT CONCERNING CONCRETE FOUNDATIONS by submitting the concrete producer and installer at time of issuance of a Certificate of Occupancy so that it can be filed for the required time. R 303.4
2. Comply with "whole house mechanical ventilation" in accordance with section M 1507.3 R 312.2
3. Comply with window fall protection R 312.2
4. Comply with minimum horizontal reinforcement in concrete basement walls Table R 404.1.2 (1)
5. Comply with fire protection of floors with either 5/8" drywall, 5/8" plywood or compliance with the exceptions R 501.3
6. Comply with taping of plywood seams of roof sheathing prior to underlayment application R 905.1.1
7. Comply with attic access weather-stripped and insulated N 1102.2.4
8. Comply with insulation & fenestration requirements by component Table N 1102.1.1
9. Comply with Blower Door testing of dwelling to verify as having an air leakage rate of not exceeding 3 air changes per hour in Climate Zone 5 Amended N 1102.4.1.2
10. Comply with duct leakage testing N 1103.2.2
11. Comply with insulation of hot water piping w/ R3 N 1103.4.2
12. Comply with makeup air where kitchen hood exhaust 400 CFM, see exception M 1503.4
13. Comply with GFCI protection of kitchen dishwasher circuit Added F 3902.6
14. Comply with Arc Fault Circuit Interrupter Protection of Branch circuits located in kitchens, family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, laundry areas and similar rooms F 3902.12
15. Comply with AFCI to be readily accessible F 3902.14
16. Comply with Appendix F Radon mitigation preparation Amended AF 103.1

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- Make your own personal plan review record
- Use Code Check books
- Go to internet
- ~~Collaboration~~ Collaboration with ~~Russian~~ other Building Officials

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PART TWO INSPECTIONS

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- At the conclusion of this plan review section, participants should be able to:
- 1. Inspect installed furnace and Air Conditioning system for compliance of sizing, efficiencies, venting, combustion air, controls, manufacturer's installation requirements
- 2. Witness testing and installation of gas piping system
- 3. Witness potable water system testing and inspect installation
- 4. Witness testing of DWV system and verify installation matches drawing
- 5. Verify Radon system compliance with Appendix F

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PLUMBING INSPECTION

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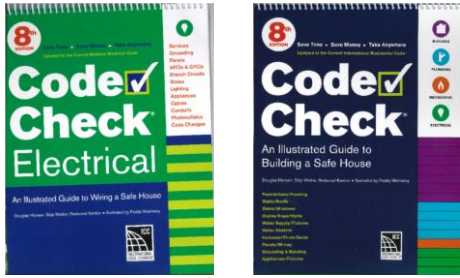
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- ICC Plan review sheet as checklist
- Your personal checklist
- REScheck checklist for mechanical
- Use pre-inspection check lists for contractors
- Whatever way works for you, *and*
 - Covers what you need to look at
 - Provides permanent record of inspection
 - Can be used to inform permit holder of any discrepancies

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• Example of pre-inspection check list for contractors or home owners

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- Rough Plumbing Inspection
 - Water main entering building and test
 - Testing building sewer
 - Testing of water and DWV systems
 - Proper sizes of DWV mains, branches and vents
 - Pipe size
 - Valves
 - Hangers
 - Proper fittings
 - Location of cleanouts
 - Shower liner test
 - Pipe insulation



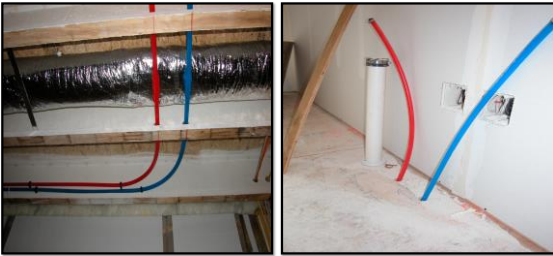


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- 2 x 10 max bored hole 3 1/16"
- No prescribed fix
- R104.1.1 Alternative materials, design and methods
- BO may approve alternative such as engineered fix

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Master bath shower area

Almost finished master
bath shower area

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- Shower
- Early stages of construction

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Water Heater



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- Check venting of water heater
- pitch and length
- Relief valve piping
- Condensate disposal

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Water Heater



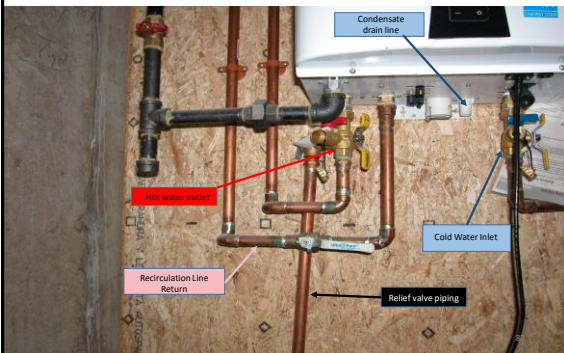
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- Completed water heater
- Set to 120 degrees
- Condensate piping installed

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Noritz tankless with condensate neutralizer with No Recirculating line. 88

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- Final Plumbing Inspection
 - Hot water temperature at tub/shower
 - General hot water temperature
 - Fixtures properly installed/caulked
 - DWV water and gas tightness



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GAS PIPING INSPECTION

90

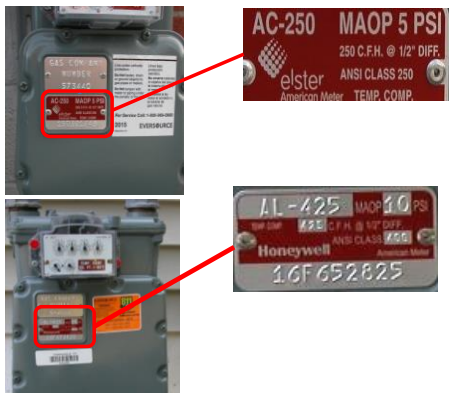


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- Gas Piping

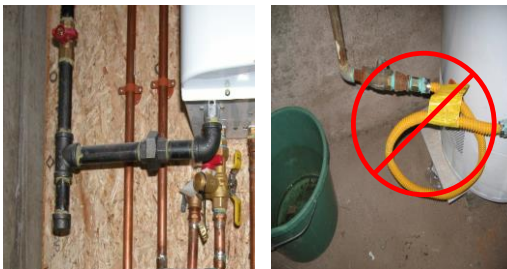


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- Witness air test G2417.4.1
- Verify all openings capped or plugged
- Verify pipe sizes and appliance connections G2413
- Verify water heater make and model
- Verify metal hangers
- Protection of CSST
- Check venting if completed
- Is additional CSST bonding required G2411

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Ventless Gas Fireplace

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Fireplace bump out

Gas outlet for kitchen range

99



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- Final inspection
- Verify all attached appliances are functioning
- Appliances in attic have proper access

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RADON INSPECTION

101

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Basement

No change since rough,
only basement and attic
visible



102



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103

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104

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**HVAC ROUGH
INSPECTION**

105



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**REScheck Software Version 4.6.5
Inspection Checklist
Energy Code: 2015 IECC**

Requirements: 0.0% were addressed directly in the REScheck software. Requirements: 0.0% were addressed directly in the REScheck software. For each requirement, the user certifies that a code requirement will be met and how that is accomplished, or that an exception is being claimed. Where compliance is detected in a separate table, a reference to that table is provided.

Section # & Reg ID	Pre-Inspection/Plan Review	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
503.4 503.4.1 503.4.1.1 503.4.1.2 503.4.1.3 503.4.1.4 503.4.1.5	Construction drawings and specification documents are reviewed for compliance with the building envelope Thermal Envelope requirements.	Value	Value	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
503.6 503.6.1 503.6.2 503.6.3	Construction drawings and specification documents are reviewed for compliance with the HVAC systems, including controls, energy conservation, and energy code compliance with the IECC Controlled Processes.	Value	Value	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
503.7 503.7.1 503.7.2	Plans are prepared in accordance with Section 600.4 and 600.4.1, and approved by the code official.	Approved: Member	Approved: Member	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:

Section # & Reg ID	Foundation Inspection	Complies?	Comments/Assumptions
603.2.1 603.2.1.1 603.2.1.2	A protective covering is installed to protect exposed exterior insulation and extends a minimum of 6 in. below grade.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
603.9 603.9.1 603.9.2	Some and ice-melting system controls installed.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:

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- Work from REScheck check list and HVAC load sheet, plan review record or other check list
- verify
- Equipment make and model
- Instructions are with equipment
- Mechanical piping properly installed and insulated

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Rivis - Residential & Light Commercial HVAC Loads
FOR EDUCATIONAL USE ONLY

Elite Software Development, Inc., Unit #69 Page 1

Project Report

General Project Information

Project Title: Unit #69
 Designed By: Rusty Nail
 Project Date: 02-16-18
 Company Name: ABC Builders LLC
 Company Representative: Rusty Nail
 Company Address: 123 Main St
 Company City: Any Town CT
 Company Phone: 555-733-6673
 Company Fax:
 Company E-Mail Address:
 Company Website:

Design Data

Reference City: Hartford, Connecticut
 Building Orientation: Front door faces North
 Daily Temperature Range: Medium
 Latitude: 41 Degrees
 Elevation: 19 ft.
 Altitude Factor: 0.999

Writer:	Outdoor Dry Bulb	Outdoor Wet Bulb	Outdoor Rel. Hum.	Indoor Rel. Hum.	Indoor Dry Bulb	Grains Difference
Summer:	85	61	49%	50%	75	44

Check Figures

Total Building Supply CFM: 671 CFM Per Square Ft.: 0.196
 Square Ft. of Room Area: 4,442 Square Ft. Per Ton: 2,345
 Volume (ft³): 27,926

Build Loads	Total Heating Required Including Ventilation Air:	36,969 Btuh	36,965 MBH
Total Sensible Gain:	19,143 Btuh	84 %	
Total Latent Gain:	3,624 Btuh	16 %	
Total Cooling Required Including Ventilation Air:	22,747 Btuh	1.90 Tons (Based On Sensible + Latent)	

Rivis is an ACCA approved Manual J and Manual D computer program. Calculations are performed per ACCA Manual J 8th Edition, Version 2, and ACCA Manual D. All computed results are estimates as building use and weather may vary. Be sure to select a unit that meets both sensible and latent loads according to the manufacturer's performance data at your design conditions.



System 1 Main Floor Summary Loads

Component	Area	Gain	Lat	Gain	Total	
Description	Glaze	Loss	Glaze	Open	Glaze	
Kolitech Window: Glazing-Kolitech Window, u-value 0.26, SHGC 0.27	20	35.3	0	20.1	20.1	
Kolitech Window: Glazing-Kolitech Window, u-value 0.27, SHGC 0.27	289.5	4,922	0	5,961	5,961	
Kolitech Slider: Glazing-Slider, u-value 0.29, SHGC 0.3	40	731	0	1,339	1,339	
Full Glass Door: Full Glass Door	40	756	0	348	348	
Full Door: Full Door	40	428	0	198	198	
R-19: Wall-Framed, Custom, R-19 Batt	2813.7	12,058	0	4,901	4,901	
R-10 Cont. Wall-Basement, Custom, Basement Wall	1696	4,593	0	0	0	
R-49: Roof/Ceiling-Under Attic, with Insulation on Attic Ceiling, Custom, R-49 Blown Insulation	1787.8	2,365	0	2,513	2,513	
Floor (also use for Knee Walls and Partition Ceilings), Custom, R-49 Blown Insulation	186.4	235	0	93	93	
R-39 + 2: Roof/Ceiling-Under Attic with Insulation on Attic Floor (also use for Knee Walls and Partition Ceilings), Custom, Cathedral	33.8	55	0	11	11	
R-38: Floor-Over open crawlspace or garage, Custom, Over Garage						
Slab, Floor-Basement, Custom, Basement Slab	1914	2,653	0	0	0	
Subtotals for structure:	8	29,047	0	15,565	15,565	
People:			1,843	2,450	4,240	
Equipment:				0	0	
Lighting:				0	0	
Ductwork:			0	0	0	
Infiltration: Winter CFM: 116, Summer CFM: 60			7,942	1,764	2,942	
Ventilation: Winter CFM: 0, Summer CFM: 0			0	0	0	
System 1 Main Floor Load Totals:			36,989	3,604	19,143	22,747



Check Figures

Supply CFM:	971	CFM Per Square Ft.:	0.196
Square Ft. of Room Area:	4,440	Square Ft. Per Ton:	2,345
Volume (ft³):	27,529		

Total Heating Required including Ventilation Air: 36,989 Btuh, 36,989 MBH
Total Sensible Gain: 19,143 Btuh, 54 %
Total Latent Gain: 3,604 Btuh, 16 %
Total Cooling Required including Ventilation Air: 22,747 Btuh, 1.90 Tons (Based On Sensible + Latent)

EnergyPlus is an ACCA approved Manual J and Manual D computer program. Calculations are performed per ACCA Manual J 8th Edition, Variation 2, and ACCA Manual D. All computed results are estimates as building use and weather may vary. Be sure to select a unit that meets both sensible and latent loads according to the manufacturer's performance data at your design conditions.

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Furnace Label 110

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A/C coil information
Dryer, Water heater, Furnace vents 111



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Return air duct built into wall for second and first floor

Looking up at basement ceiling, flex duct and furnace venting

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118

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- Honeywell HZ311 zone damper/ thermostat control center (cover off)



Cover on

119

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First and second floor
zone dampers

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TABLE N103.6.1 (R403.6.1)
MECHANICAL VENTILATION SYSTEM FAN EFFICACY


FAN LOCATION	AIR FLOW RATE MINIMUM (CFM)	MINIMUM EFFICACY (CFM/WATT)	AIR FLOW RATE MAXIMUM (CFM)
Range hoods	Any	2.8 cfm/watt	Any
In-line fan	Any	2.8 cfm/watt	Any
Bedroom, utility room	10	1.4 cfm/watt	<90
Bathroom, utility room	90	2.8 cfm/watt	Any

n.s. 1 cubic foot per minute = 24.3 L/min.

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Section # (e. Reg. ID)	Final Inspection Provisions	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
R403.3 (717) ¹	Compliance certificate posted.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
R403.3 (718) ¹	Manufacturer manuals for mechanical and water heating systems have been provided.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:



2015 IECC Energy Efficiency Certificate

Insulation Rating	R-Value
Above-Grade Wall	13.00
Below-Grade Wall	5.00
Floor	38.00
Ceiling / Roof	49.00

Ductwork (unconditioned spaces):

Glaze & Gase Rating	U-Factor	SHGC
Window	0.27	0.29
Door	0.17	

Heating & Cooling Equipment Efficiency:

Heating System: _____

Cooling System: _____

Water Heater: _____

Name: _____ Date: _____

Comments: _____

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M1502 Clothes dryer exhaust

- Dryer exhaust duct
 - Metal
 - Exhausted to outdoors
 - Minimum 28 gage, 4"
 - Sealed per M1601.4.1
 - Terminate 3' from openings
- M1502.4.4
 - UL 705 Power Ventilators allowed
- All joints taped M1601.4.1
 - UL181B Listed
 - Permanent label or tag> 35'



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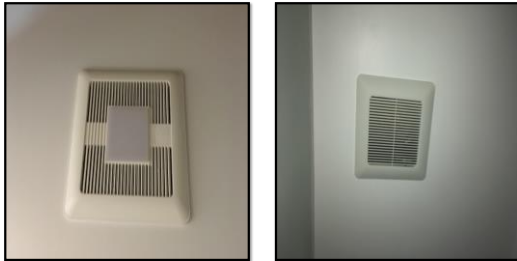
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Duct for second floor bath fan

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Bath exhaust used as part of ventilation system

Normal 1/2 Bath exhaust

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M1503.4 This unit < 400CFM
No additional makeup air required

Exhaust opening for Range hood

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Section # & Req. ID	Final Inspection Provisions	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
402.1.1 (F14.1)	Door U-factor:	U _____	U _____	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Approval Assumptions label for values.
402.1.2 (F14.2)	Glazing U-factor (area weighted average):	U _____	U _____	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Approval Assumptions label for values.
402.1.3 (F14.3)	U-factor of fenestration products (F14.1)			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
402.1.4 (F14.4)	All interior and exterior doors installed per manufacturer's instructions:			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
402.1.5 (F14.5)	Fenestration that is not side hung (F14.1)			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
402.1.6 (F14.6)	IC rated recessed lighting fixtures and luminaires (F14.1)			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
402.1.7 (F14.7)	Supply and return ducts in attics (F14.1)			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
402.1.8 (F14.8)	Supply and return ducts in attics (F14.1)			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
402.1.9 (F14.9)	Supply and return ducts in attics (F14.1)			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
402.1.10 (F14.10)	Supply and return ducts in attics (F14.1)			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
402.1.11 (F14.11)	Production of insulation on HVAC piping:			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
402.1.12 (F14.12)	Hot water pipes are insulated to: a) _____	R _____	R _____	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
402.1.13 (F14.13)	Automatic or gravity dampers are installed on all outdoor air intakes and exhausts:			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

1 High Impact (Tier 1)
 2 Medium Impact (Tier 2)
 3 Low Impact (Tier 3)

Project Title: Unit # - OEDM Heights
 Data Provided: CUESP Group, HVAC, Heat Loss, ResCheck/ResCheck/PEP Group, INC/ODM Heights/GS/PK

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Section # & Req. ID	Final Inspection Provisions	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
401.3 (F17)	Compliance certificate posted.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
303.3 (F18)	Manufacturer manuals for mechanical and water heating systems have been provided.			<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	

Additional Comments/Assumptions:

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- Compliance certificate posted N1101.14
- Approved location

Insulation Rating		R Value	
Above-Grade Wall		19.00	
Below-Grade Wall		5.00	
Floor		38.00	
Ceiling / Roof		49.00	
Ductwork (unconditioned spaces):			
Glass & Door Rating		U-Factor	SHGC
Window		0.27	0.29
Door		0.17	
Heating & Cooling Equipment		Efficiency	
Heating System:			
Cooling System:			
Water Heater:			
Name:	Date:		
Comments			

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**Any
Questions?**

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Residential Code Series: Plumbing, Mechanical and Radon

- Thank You:
- Johnny Carrier P.E. (Carrier Group, Inc.) for Plans and documents used in this presentation

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Residential Code Series:
Plumbing, Mechanical and Radon





Use of OEDM Training Materials

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