Building Code Compliance 101

Building Code Compliance 101

Responsible Parties:

- Design professionals
- Builders or remodelers
- Subcontractors
- Homeowners
- Plan reviewers
- Building code inspectors

Role of Plan Reviews

- Provide some assurance that plans are complete, at least for the most difficult and big ticket items.
- Recognizing that:
  - Not everything can be put on the plans
  - The approved plans are a legal document
  - The approved plans are intended to be on-site during any inspection.
  - The approved plans should be in hand during any inspection

Role of Inspections

- To check for indications for compliance with the IRC.
- This should focus on:
  1. Determining if the building is being built according to the approved plan; and,
  2. Compliance issues that can not be accomplished at plan review.

Construction Documents

IRC: R106.1

- Each municipality or Third Party Agency will determine what plans are required
  - Will vary depending on type or scope of construction

- Building Code Official has the authority to waive the submission of plans and documents if not needed to assure UCC compliance
  - i.e., Compliance can be verified through on-site inspection

PHRC

Review and Approval of Plans & Documents

IRC: R106.3.1

- Building Code Official (BCO) shall examine construction documents and determine compliance with UCC
- BCO shall stamp each page of submitted documents as reviewed and approved
- BCO shall clearly mark non-design changes directly on the documents/plans

PHRC

Review and Approval of Plans & Documents

IRC: R106.3.1

Building Code Official shall return one set of reviewed, approved and stamped documents with approval notations and any required changes

Permit holder shall keep a set of these documents at the work site, available for inspection at all times during normal working hours

PHRC

Work Installed Per Plans

- Work shall be installed per approved construction documents
- Permit holder shall submit revised set of construction documents for approval for changes made during construction that are not in accordance with approved construction documents (AS BUILTS)

(Before Final Inspection is done and Certificate of Occupancy is issued)

IRC: R106.4

Inspections

1. Floodplain(*)
2. Footing
3. Foundation wall rebar inspection (masonry/concrete)
4. Foundation Wall
5. Rough Plumbing
6. Rough Mechanical
7. Rough Gas
8. Rough Electrical
9. Rough Framing
10. Slab
11. Insulation
12. Wallboard
13. Final Plumbing
14. Final Mechanical
15. Final Gas
16. Final Electrical
17. Other inspections (*)
18. Fire-Resistance(*)
19. Final

Inspections we will cover (*) if required

Plan Review

Role of the Plans Examiner

H

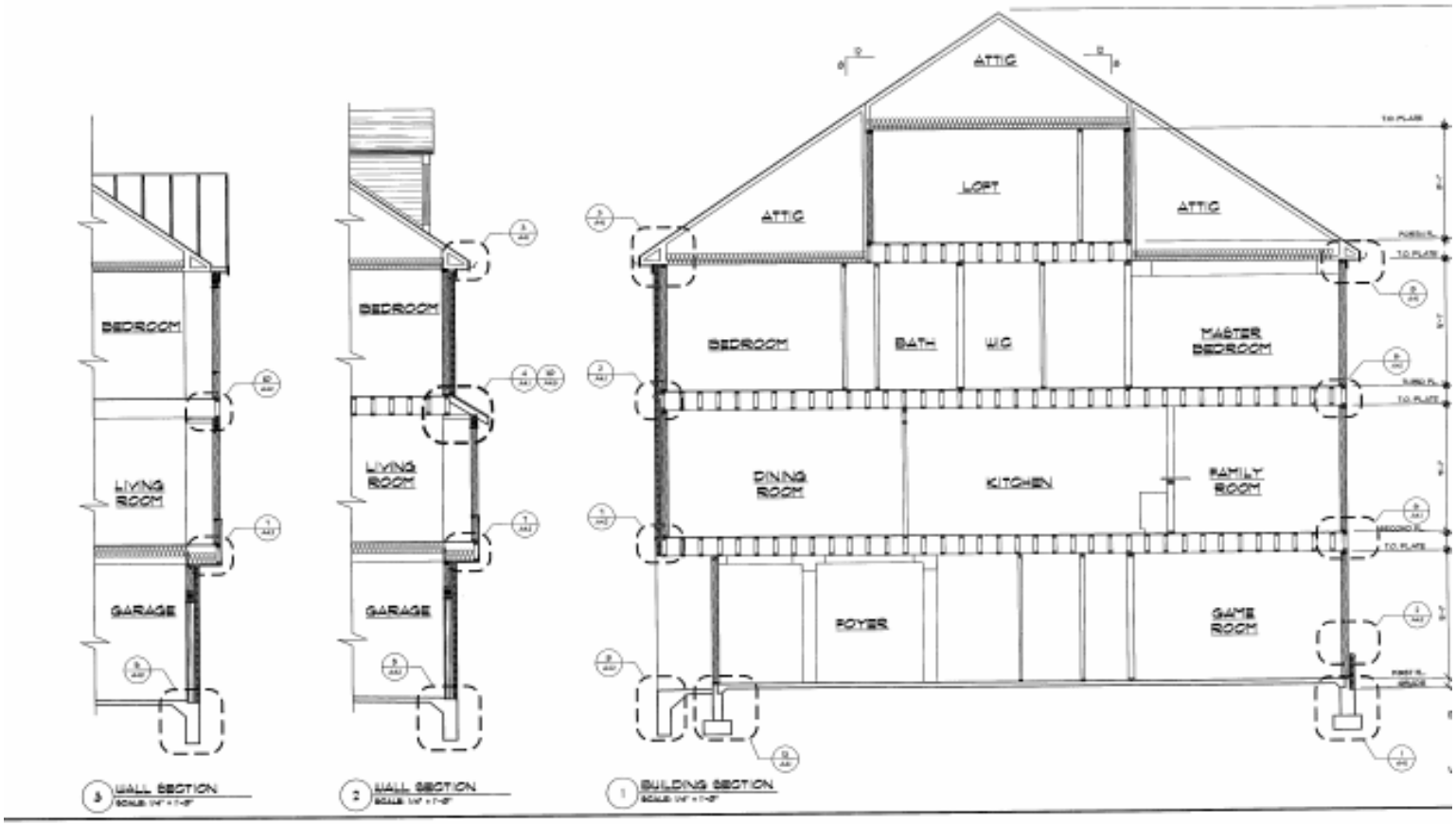
Role of the Plans Examiner

- First line of defense / opportunity for communication
- Make sure builder understands requirements upfront
- Easier to fix before it’s built
- Fewer re-inspections
- Important link to inspections

Tools for Plan Review

- Building permit application
- Plan submittal checklist
- Residential Energy Provisions Worksheet
- Plan review checklist

Commercial vs. Residential



RESIDENTIAL BUILDING. For this code, includes R-3 buildings, as well as R-2 and R-4 buildings **three stories or less.**

Details Needed on Plans

1. Which compliance path is being used (with year)

2. Window, Door & Skylight Schedules

   U-values and emergency escape windows

3. Typical Cross Section

   Insulation in basement, walls, floors, ceiling, etc.

Details Needed on Plans

4. Duct R-value:

   All paths identical except PA-Alternative

5. Proposed grading

Details Needed on Plans

6. Other Stuff?

Air sealing

Duct sealing

Window/Door Exemptions

Cathedral Ceiling Exemption

Pipe Insulation

Heated slab

Plan Reviews

Issues for all compliance paths:

- Code year
- Continuous thermal envelope
- Do R-values make sense w/framing?
- Window and door schedules
- Continuous versus cavity insulation
- Conditioned/Unconditioned Basement?
- Walk-out basement slab insulation
- Standard Framing or Energy Truss?
- Look for Multiple HVAC Systems

Plan Reviews

Prescriptive Path Issues:

- Do R- and U-values match table?
- Cathedral Ceiling?
- Foam sheathing and bracing method (25% structural sheathing)

Plan Reviews

RES*check* Path Issues:

- Software version
- Are component areas reasonable?
- Do R-values make sense?
- Bracing Method? (structural sheathing entered separately from insulated)
- Multiple HVAC Systems not allowed
- Equipment Efficiency?

Plan Reviews

PA Alternative Path Issues:

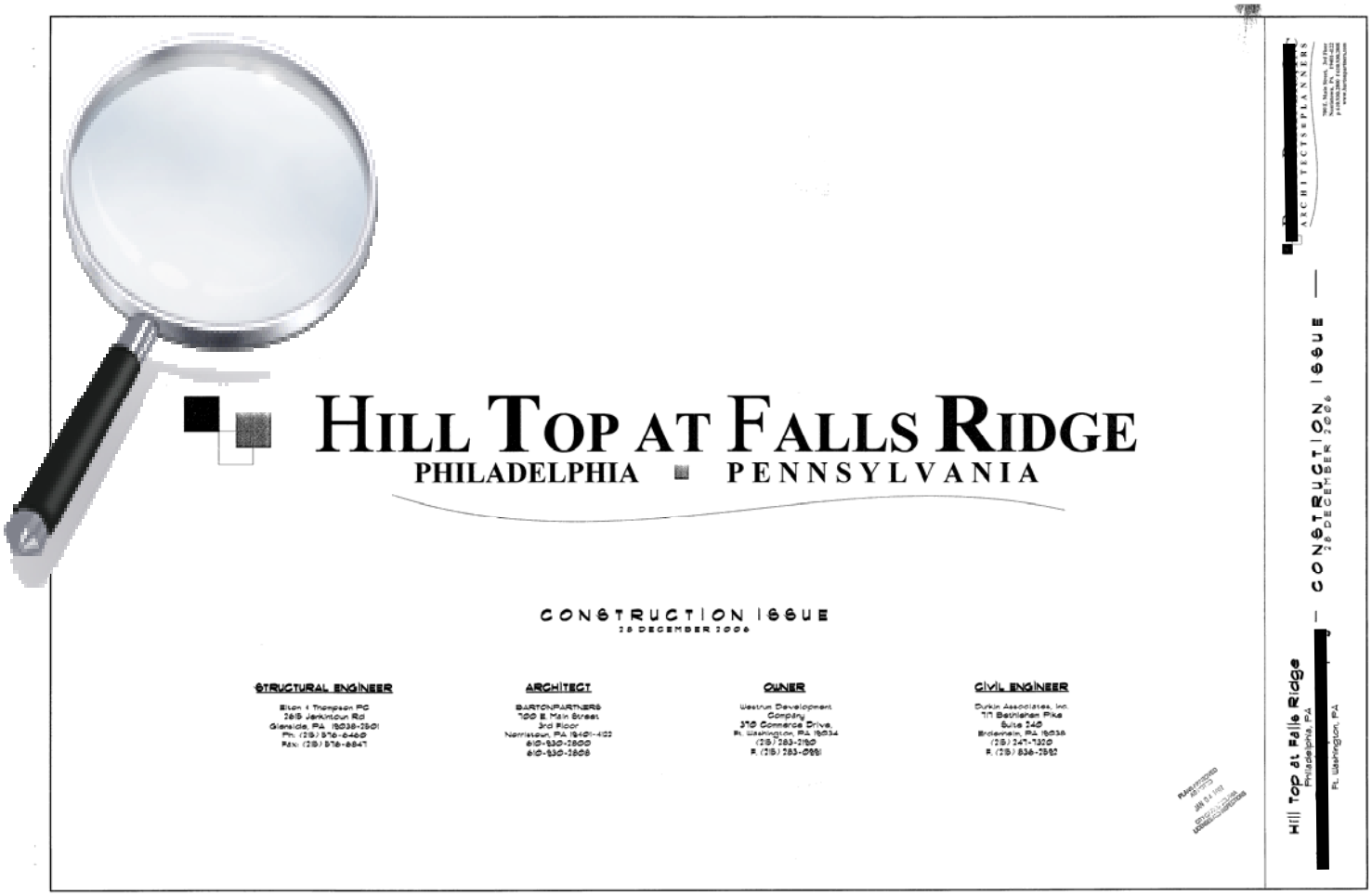
- Garage/Basement Wall
- Floors over unconditioned space
- Duct placement
- Tradeoffs?

Plan Reviews

Performance Path Issues:

- Address of residence
- An inspection checklist containing building component characteristics in Table 404.5.2(1)
- Name of individual completing compliance report
- Name and version of the compliance software tool (e.g. REM/Rate, EnergyGuage, TREAT, RES*check*)

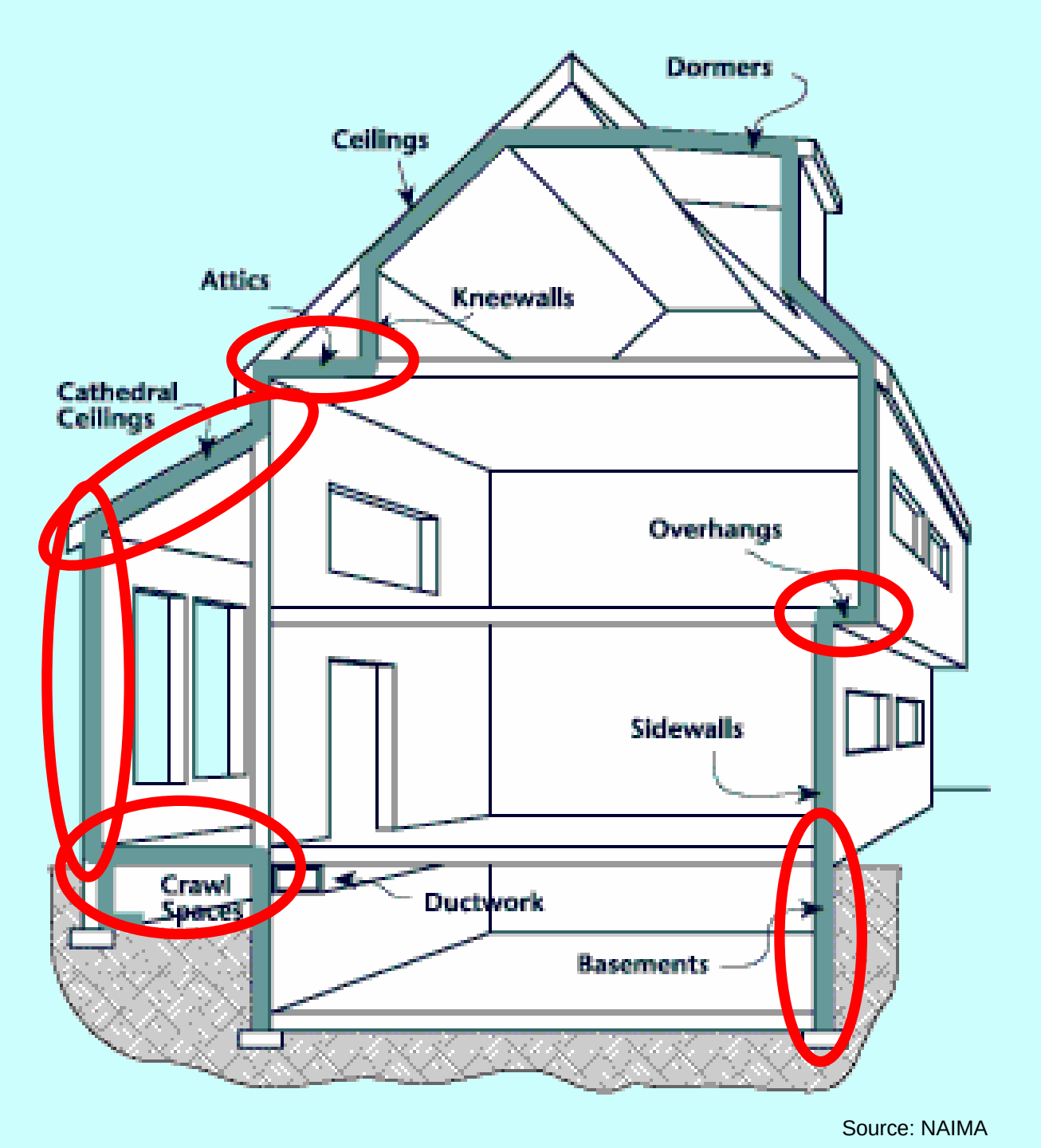
Performing the Plan Review



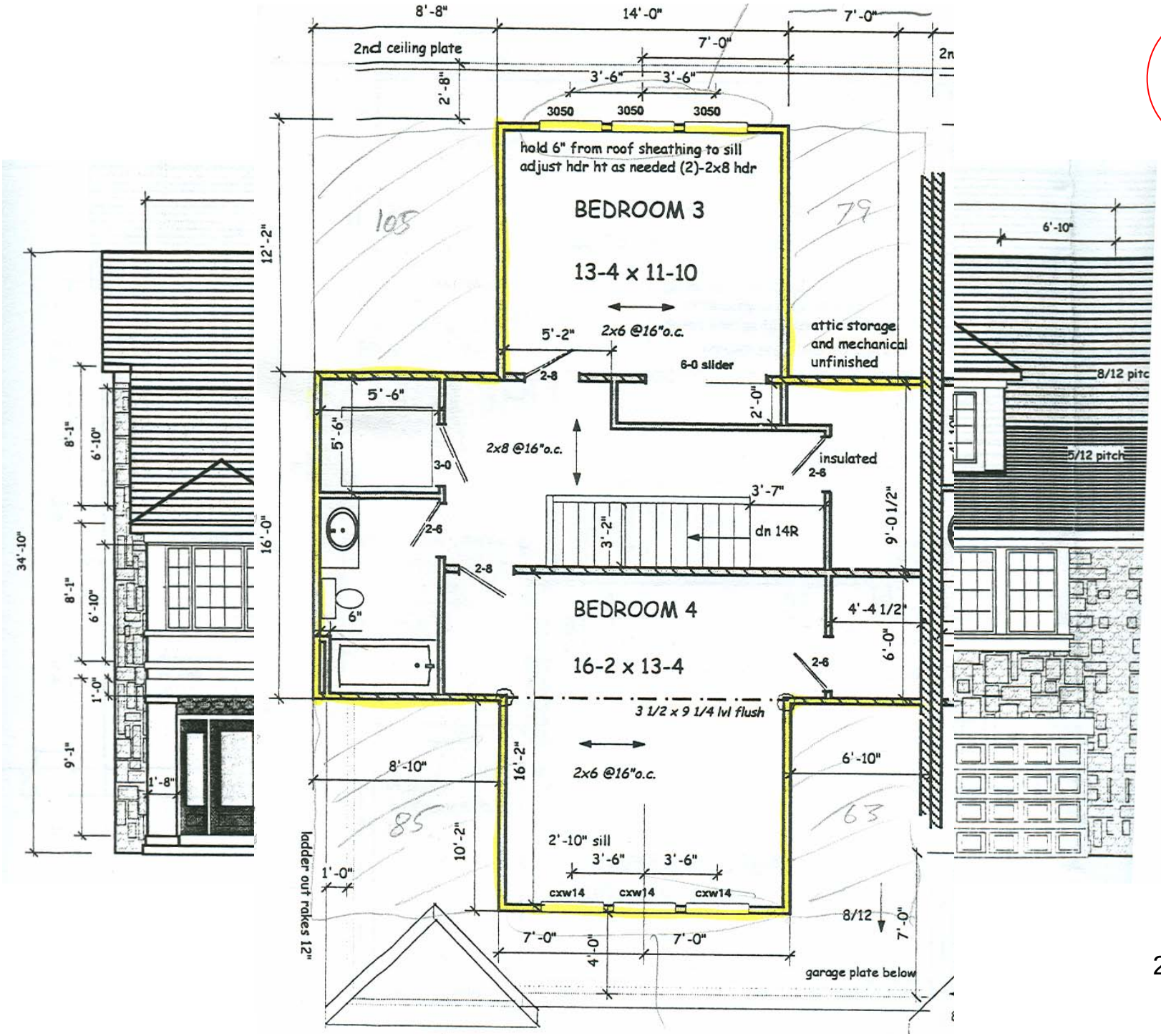
Identify the Thermal Envelope

- Verify that all thermal envelope components (e.g. walls, ceilings, floors over garage) have insulation spec'd on plans

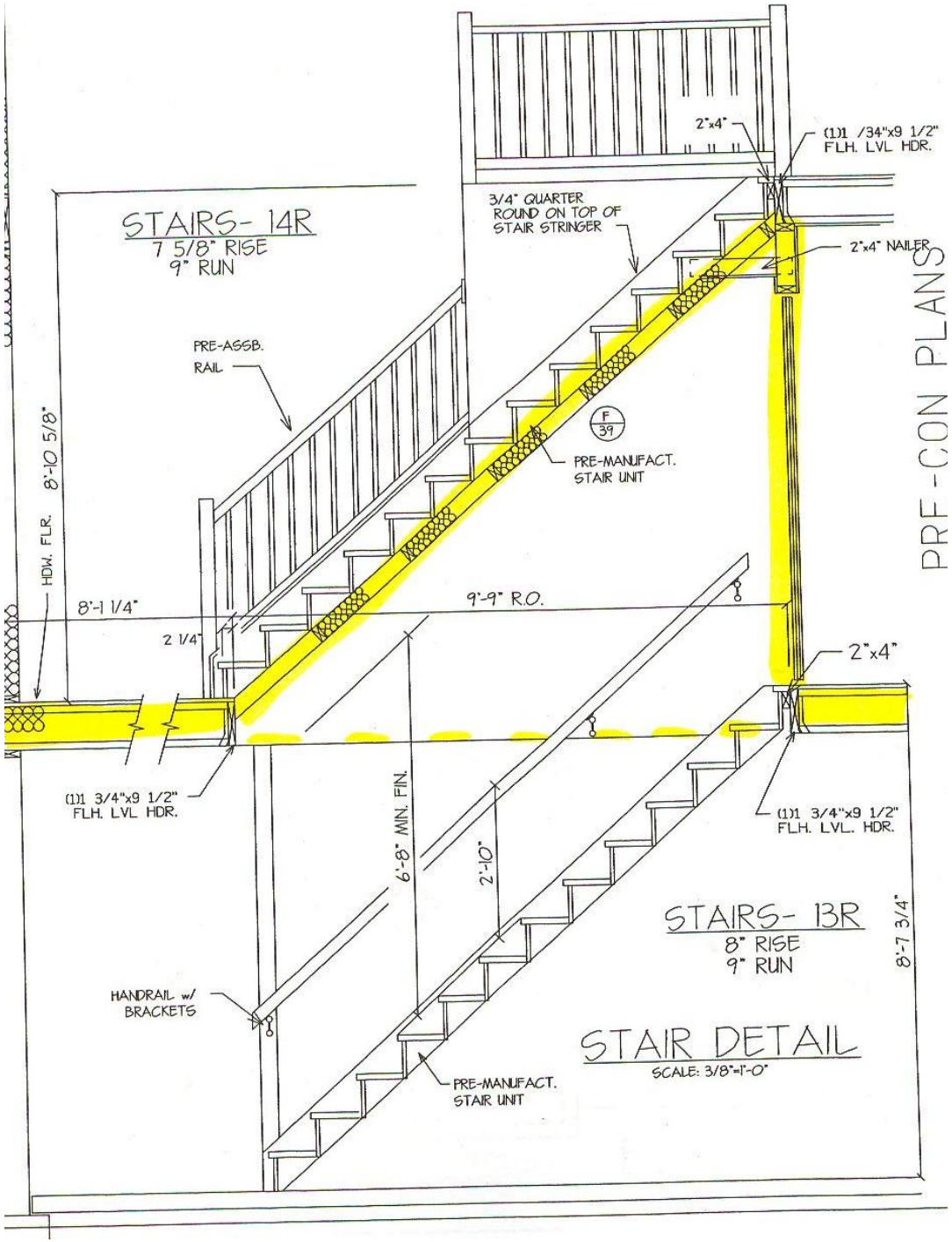
- Verify that all thermal envelope components present on plans other compliance documentation (e.g. RES*check*)

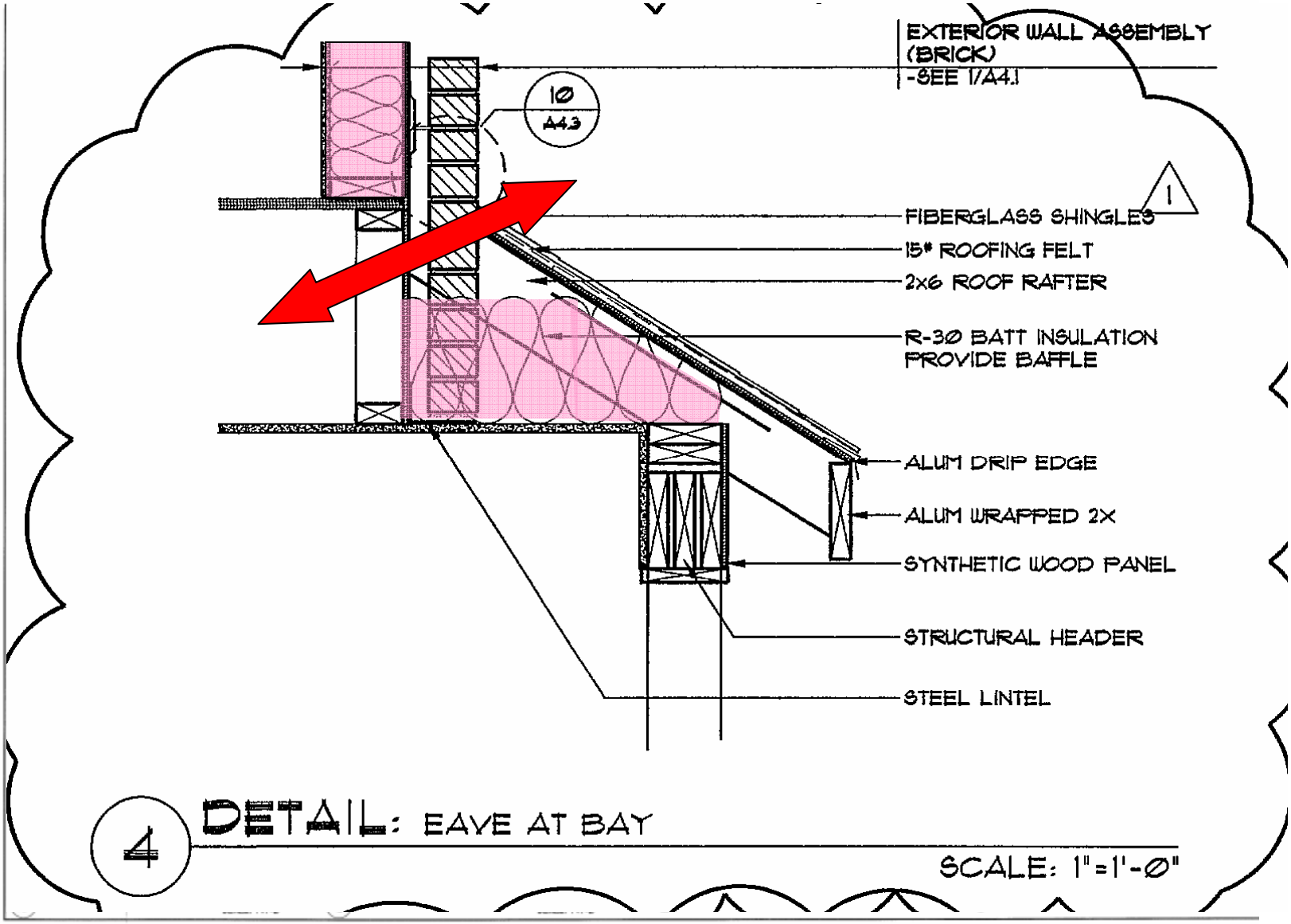


Source: NAIMA


8'-8"
14'-0"
7'-0"
2nd ceiling plate
7'-0"
3'-6"
3'-6"
2'-8"
3050
3050
3050
hold 6" from roof sheathing to sill
adjust hdr ht as needed (2)-2x8 hdr
BEDROOM 3
13-4 x 11-10
105
79
12'-2"
5'-2"
2x6 @16"o.c.
attic storage
and mechanical
unfinished
6-0 slider
2-8
5'-6"
5'-6"
2'-0"
2x8 @16"o.c.
3-0
insulated
2-6
3'-7"
dn 14R
3'-2"
9'-0 1/2"
2-6
2-8
16'-0"
6"
BEDROOM 4
4'-4 1/2"
6'-0"
16-2 x 13-4
2-6
3 1/2 x 9 1/4 lvl flush
2x6 @16"o.c.
8'-10"
16'-2"
6'-10"
85
63
10'-2"
2'-10" sill
3'-6"
3'-6"
cxw14
cxw14
cxw14
1'-0"
ladder out rakes 12"
8/12
7'-0"
7'-0"
7'-0"
4'-0"
garage plate below
34'-10"
8'-1"
6'-10"
8'-1"
6'-10"
1'-0"
9'-1"
1'-8"
6'-10"
8/12 pitc
5/12 pitch

H


STAIRS- 14R
7 5/8" RISE
9" RUN
3/4" QUARTER ROUND ON TOP OF STAIR STRINGER
2"x4"
(1)1 /34"x9 1/2" FLH. LVL HDR.
2"x4" NAILER
PRE-ASSB. RAIL
F
39
PRE-MANUFACT. STAIR UNIT
HDW. FLR.
8'-10 5/8"
8'-1 1/4"
9'-9" R.O.
2 1/4"
2"x4"
(1)1 3/4"x9 1/2" FLH. LVL HDR.
6'-8" MIN. FIN.
2'-10"
(1)1 3/4"x9 1/2" FLH. LVL. HDR.
STAIRS- 13R
8" RISE
9" RUN
8'-7 3/4"
HANDRAIL w/ BRACKETS
STAIR DETAIL
SCALE: 3/8"=1'-0"
PRE-MANUFACT. STAIR UNIT
PRE-CON PLANS


EXTERIOR WALL ASSEMBLY
(BRICK)
-SEE 1/A4.1
10
A4.3
1
FIBERGLASS SHINGLES
15# ROOFING FELT
2x6 ROOF RAFTER
R-30 BATT INSULATION
PROVIDE BAFFLE
ALUM DRIP EDGE
ALUM WRAPPED 2X
SYNTHETIC WOOD PANEL
STRUCTURAL HEADER
STEEL LINTEL
4
DETAIL: EAVE AT BAY
SCALE: 1"=1'-0"

Is Basement Conditioned?

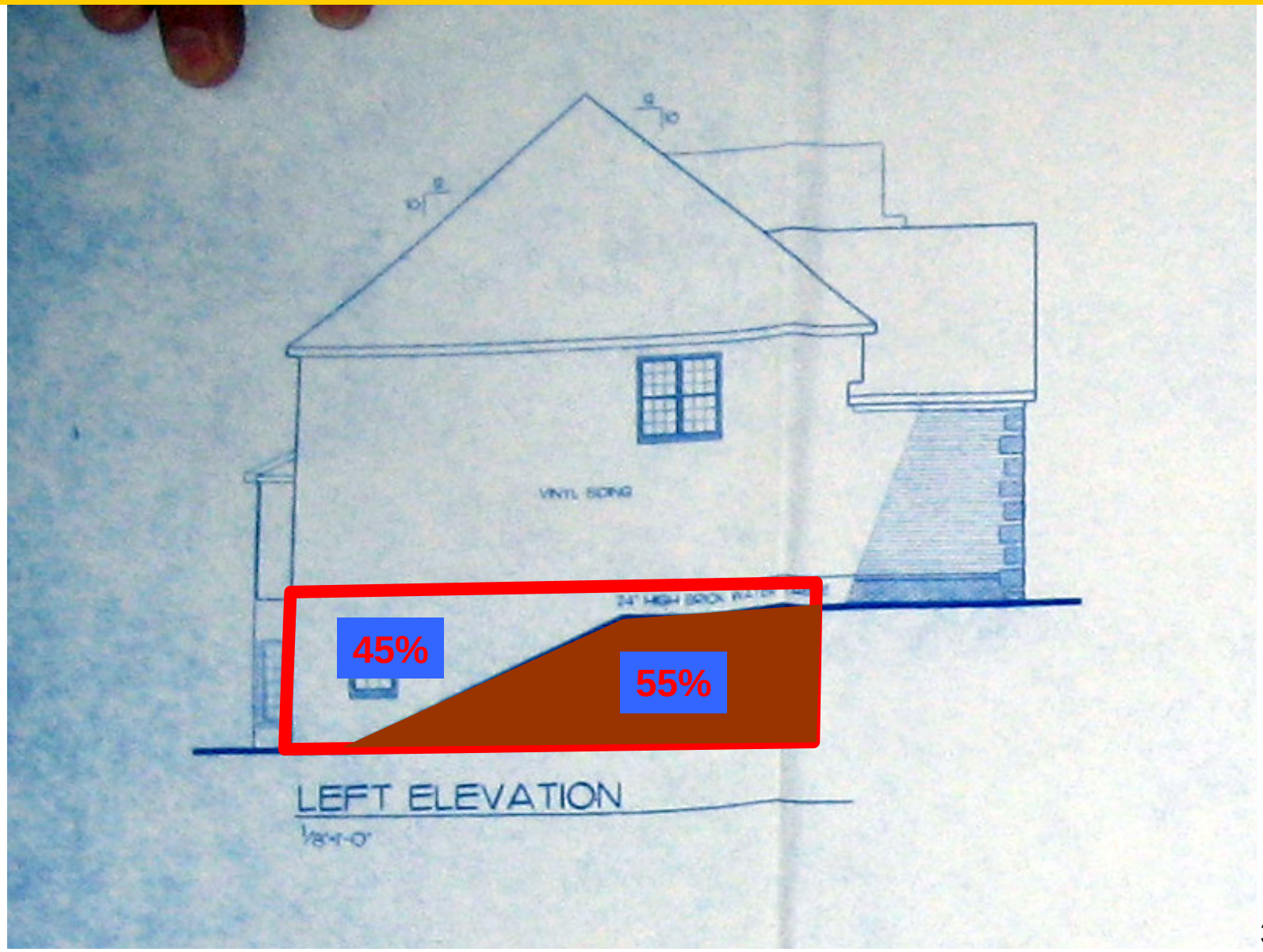
Who cares?

- Affects:
  - Whether or not foundation insulation is required
  - Whether or not slab insulation is required
  - Duct insulation

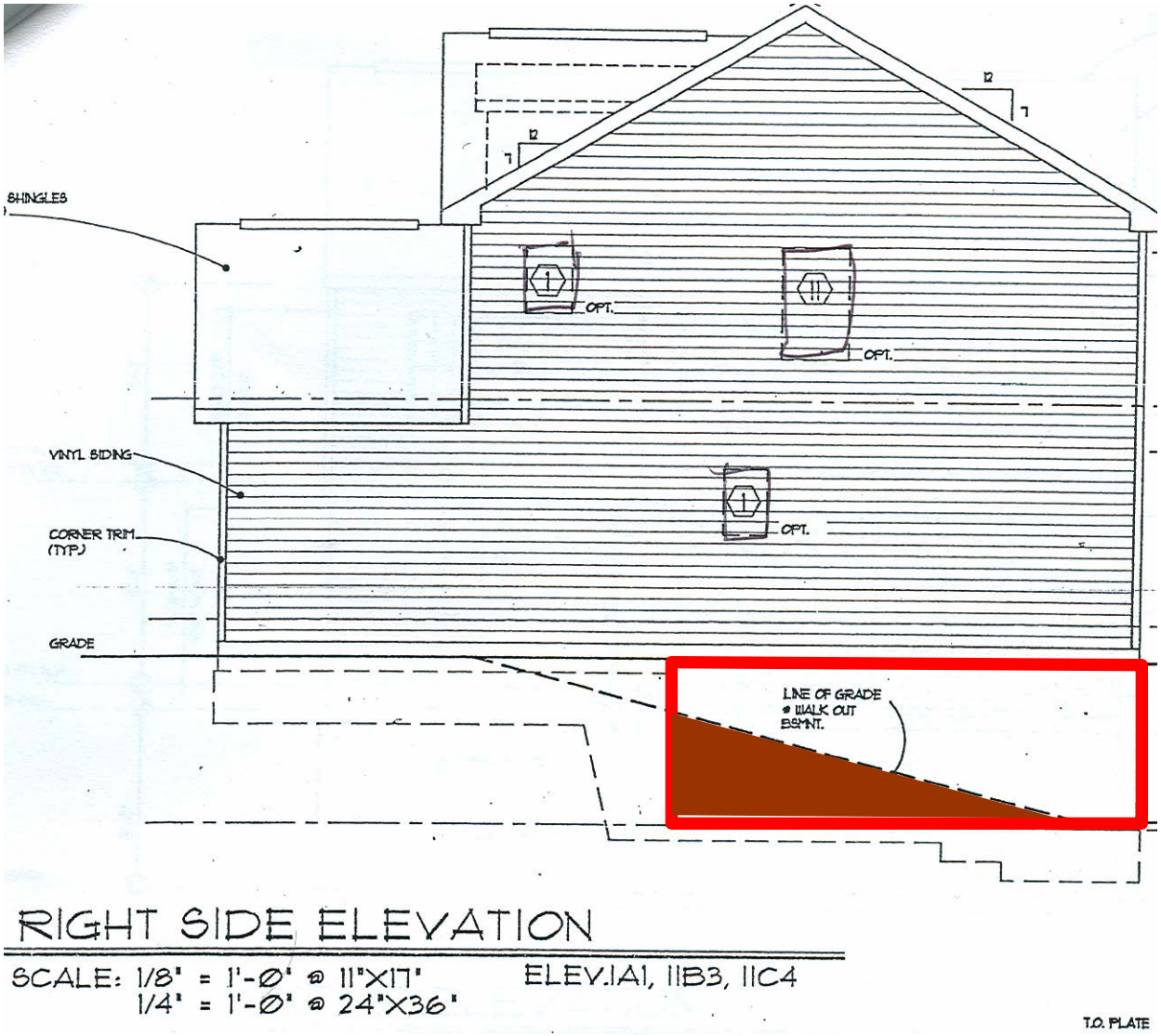
Is Basement Conditioned?

- Heated or cooled (i.e. contains one or more supply registers)
- Uninsulated ducts
- Fixed opening directly into an adjacent conditioned space

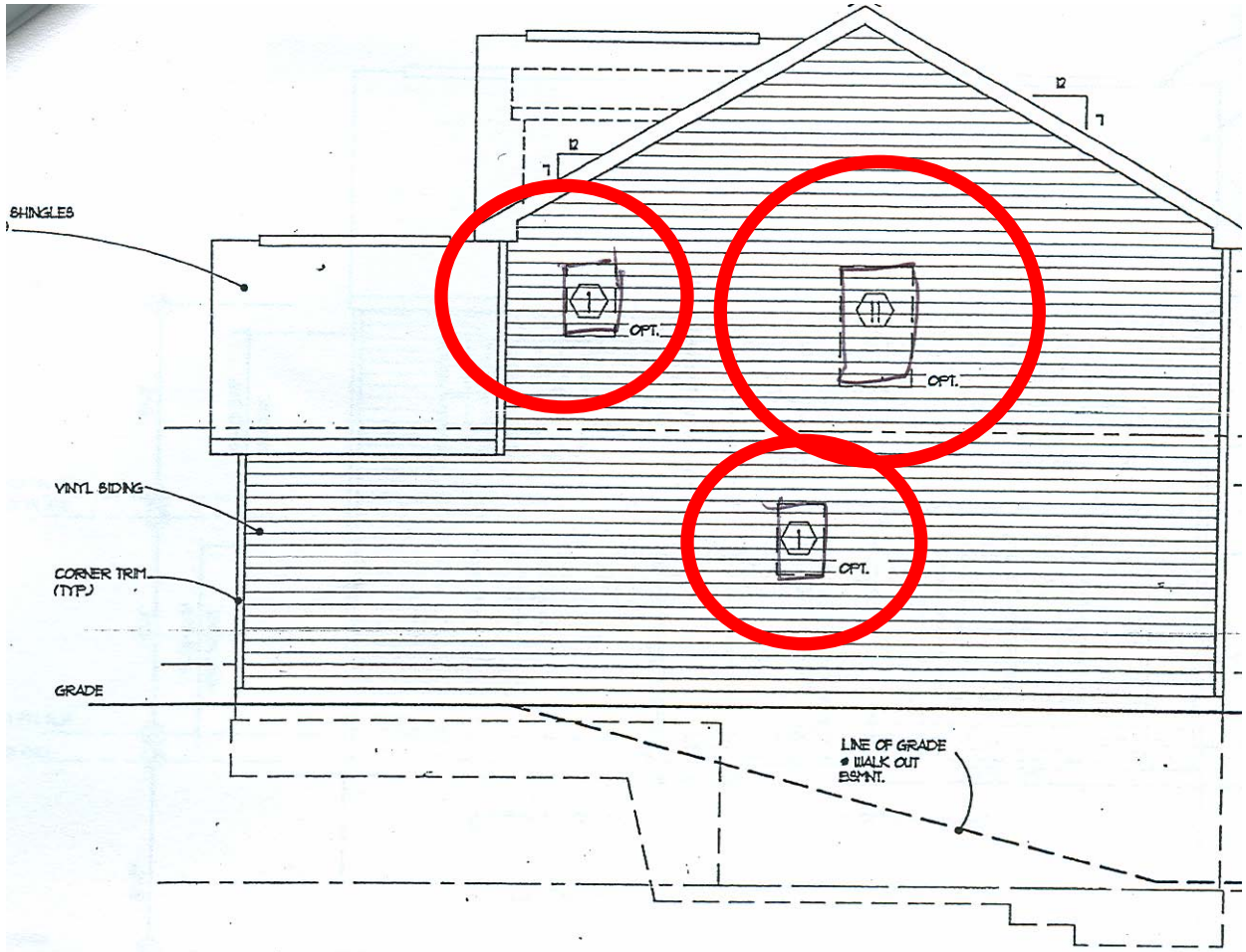
Basement Wall: R-10/13



Above Grade Wall: R-19, 13+5



H



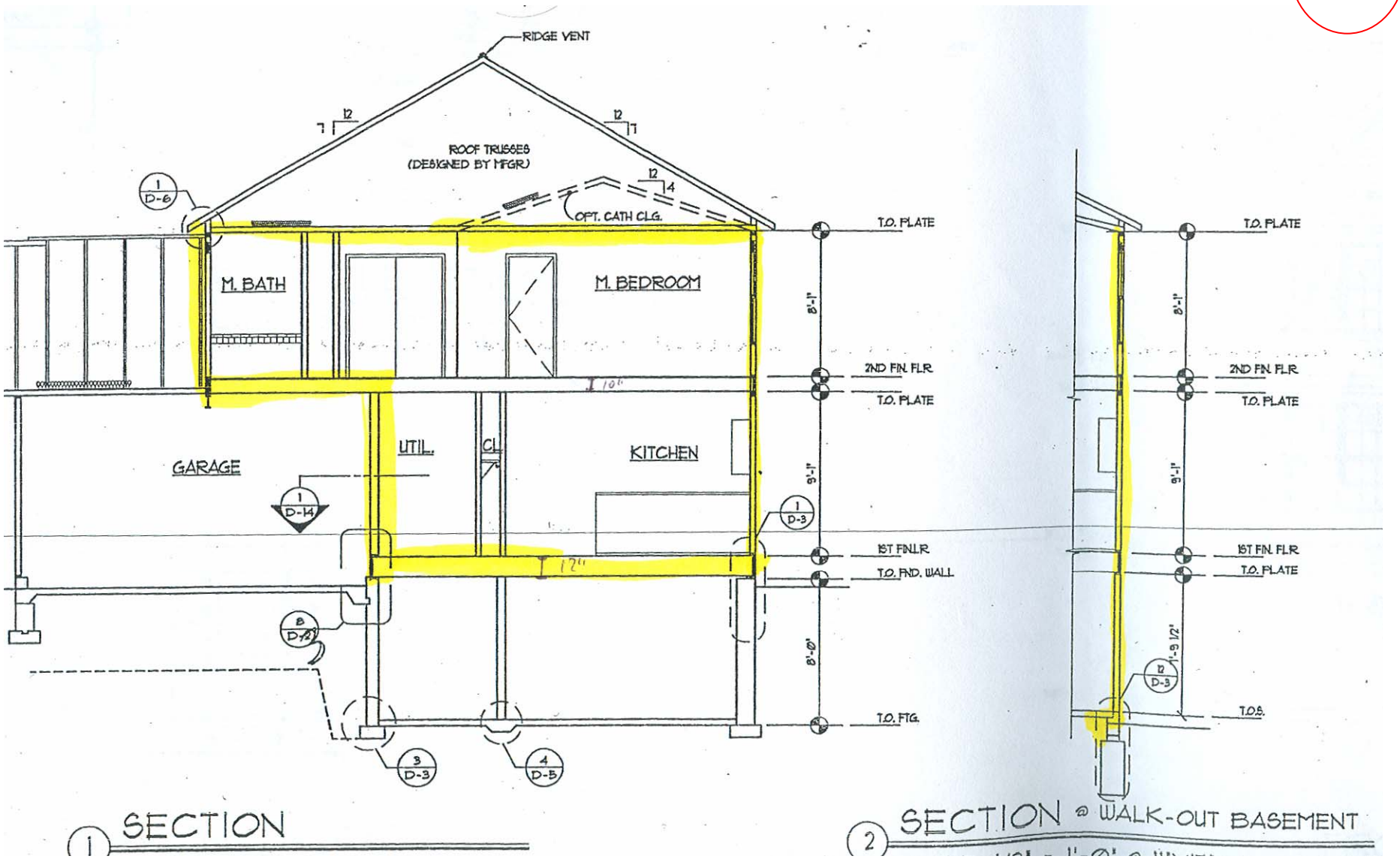
RIGHT SIDE ELEVATION

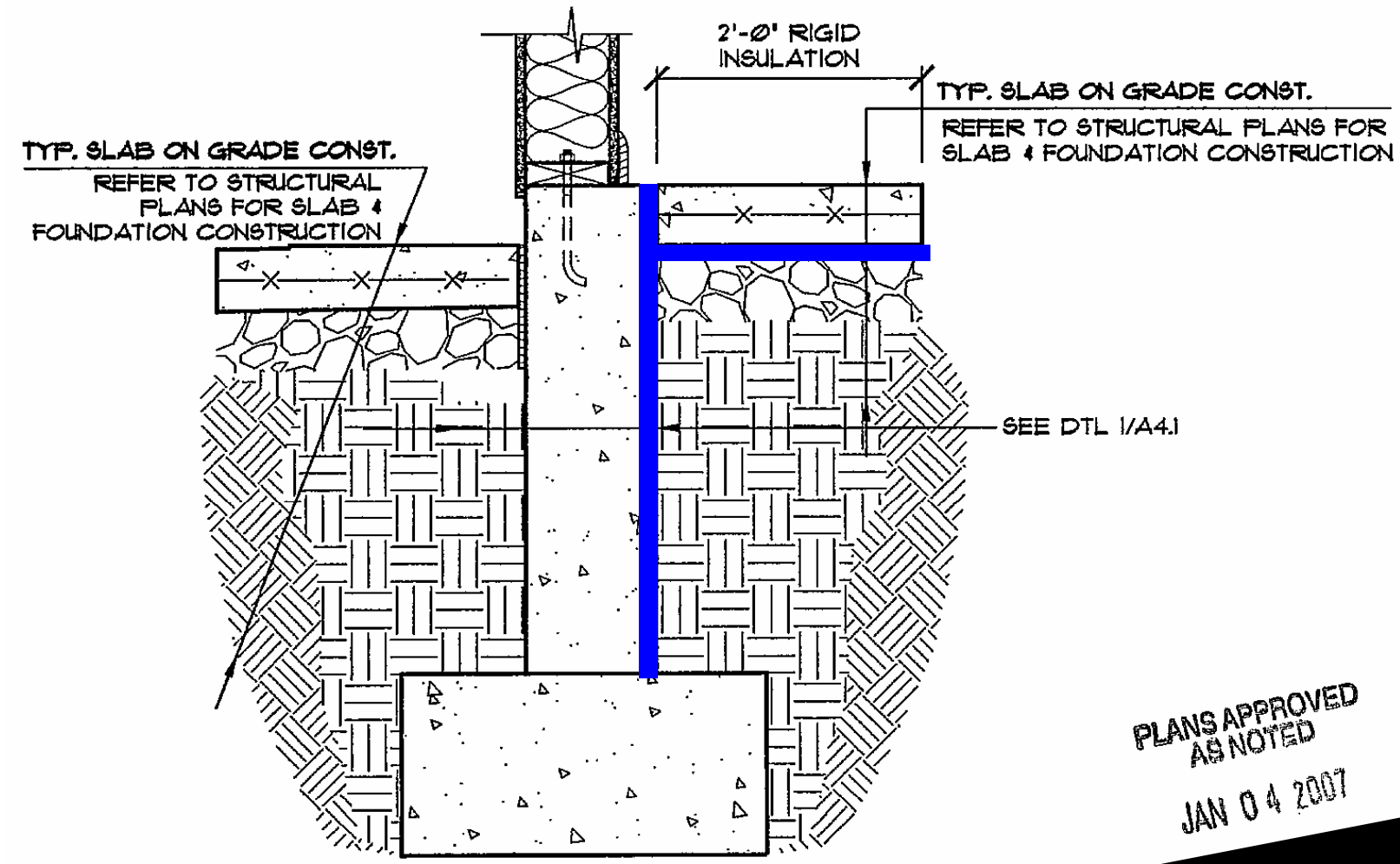
SCALE: 1/8" = 1'-0" @ 11"X17"
1/4" = 1'-0" @ 24"X36"

ELEV.1A1, 1B3, 1C4

T.O. PLATE

H


RIDGE VENT
ROOF TRUSSES
(DESIGNED BY MFGR)
OPT. CATH CLG.
M. BATH
M. BEDROOM
GARAGE
UTIL.
CL.
KITCHEN
T.O. PLATE
2ND FIN. FLR.
T.O. PLATE
1ST FIN.LR.
T.O. FND. WALL
T.O. FTG.
T.O.S.
8'-1"
9'-1"
8'-0"
1'-9 1/2"
10"
12"
1 SECTION
2 SECTION @ WALK-OUT BASEMENT



PLANS APPROVED AS NOTED

JAN 04 2007

[redacted]

1 DETAIL: GARAGE/UNIT FOUNDATION

SCALE: 1"=1'-0"

INSULATION SCHEDULE	
FLOOR INSULATION	R-19
WALL INSULATION	R-13
CEILING INSULATION	R-30
CONTINUOUS WALL INSULATION	R-3
DAYLIGHT BASEMENT INSULATION	N/A
HEATER EFFICIENCY	80% EFFICIENCY

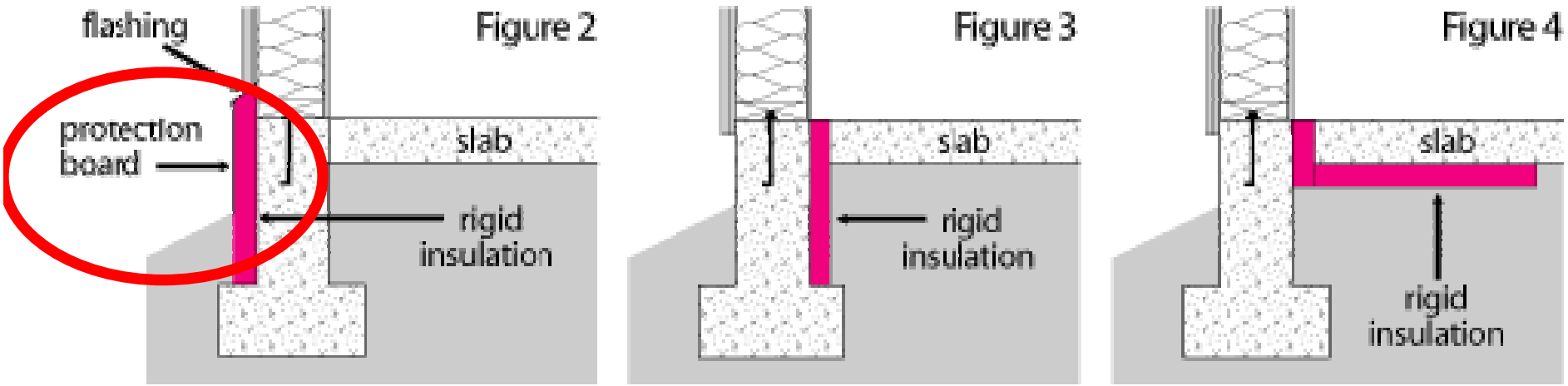
NOTES:

- BUILDER RESPONSIBLE FOR ALL BEAMS
- 8" CONCRETE FOUNDATION WALLS (TYP.)
- FULL BASEMENT
- SUMP PUMP OR DAYLIGHT DRAIN
- HEAT REGISTER W/ RETURN VENT
- MASONRY FRONT PER PLAN

Installation

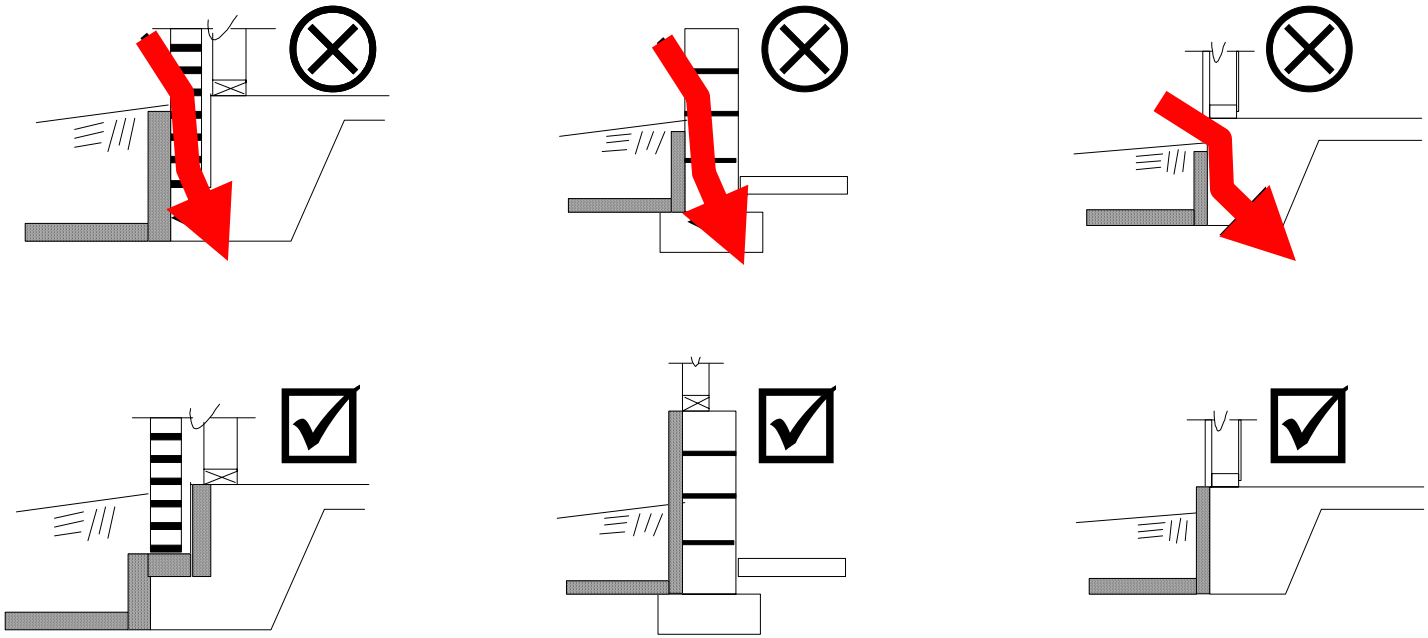
402.2.7

- Insulation shall extend downward from the **top of the slab**



Continuity (no cold bridges)

Continuous insulation stops heat flow (Small cracks and gaps are acceptable)



(a) Cold-Bridge Through Brick Veneer and Correction

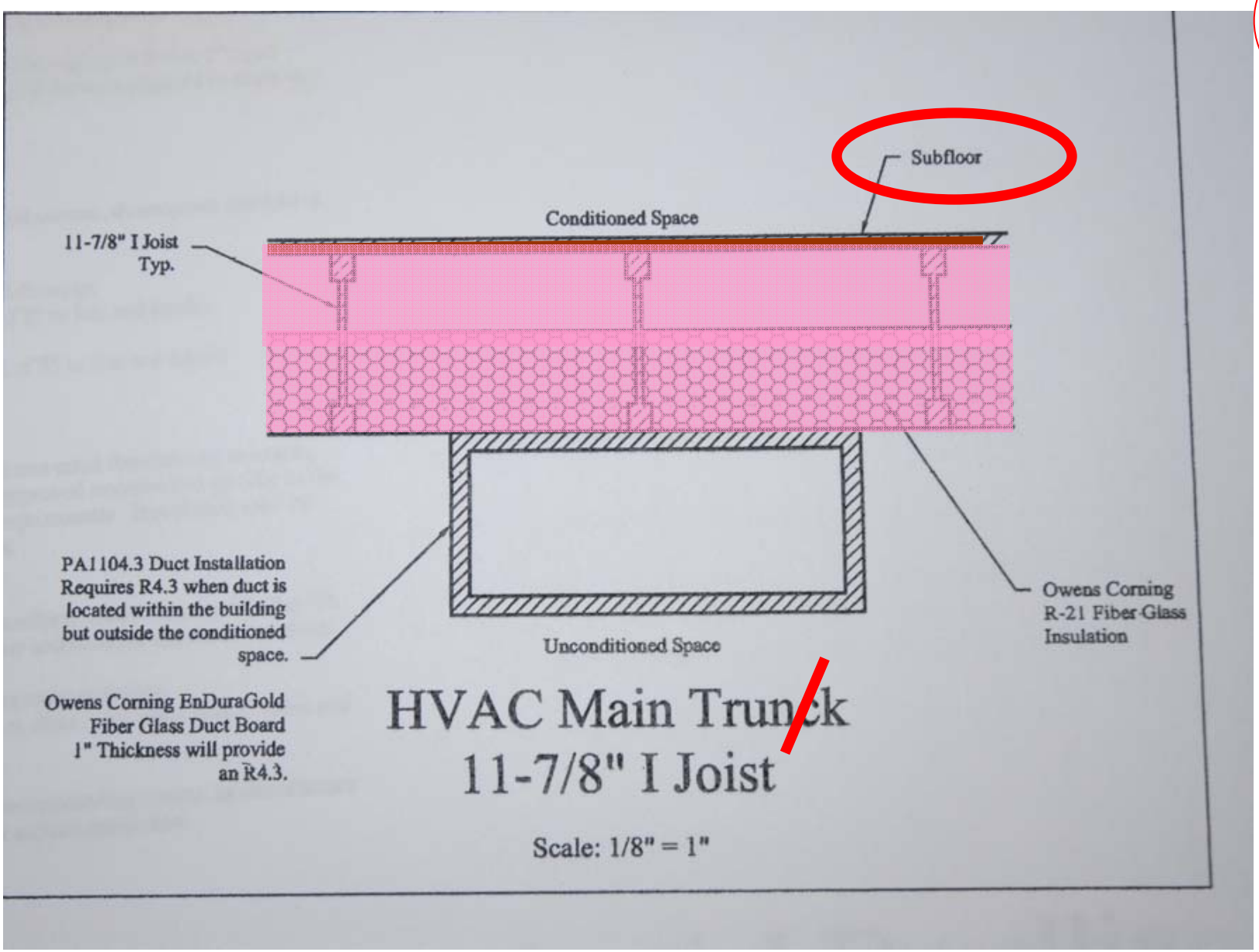
(b) Cold-Bridge Through Basement Wall and Correction

(c) Cold-Bridge Through Exposed Foundation Wall and Correction

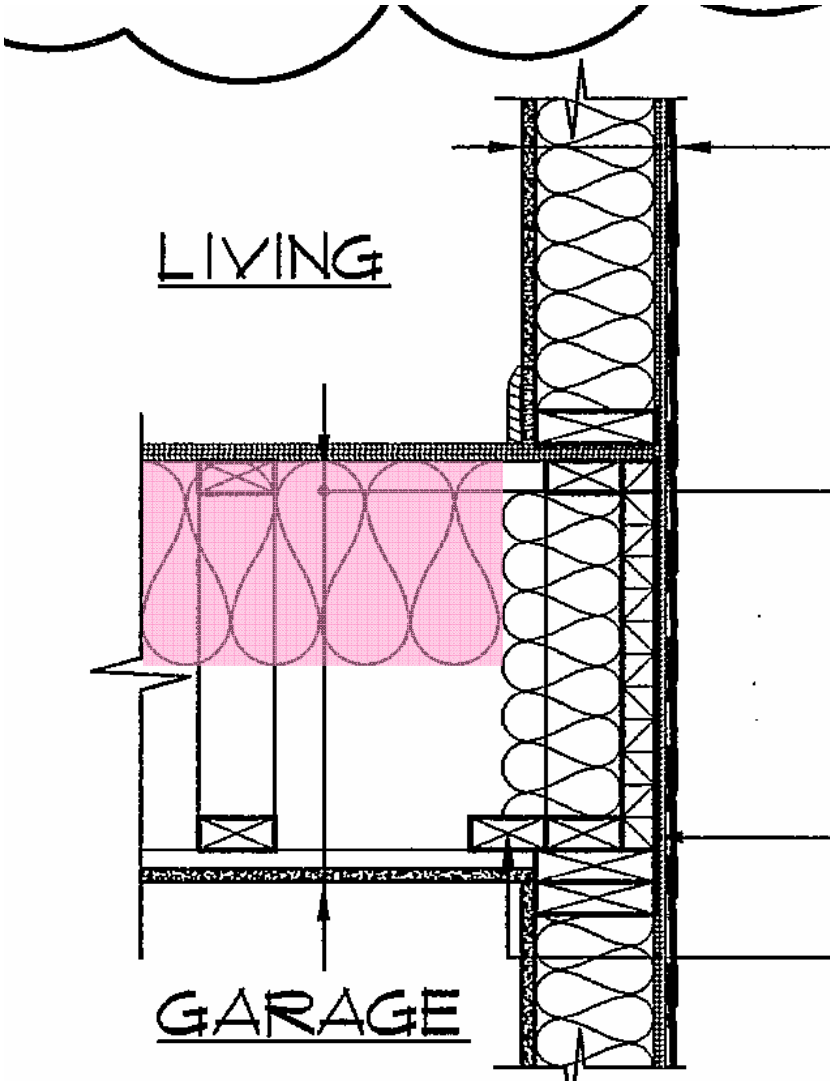
Floors

402.2.5 Floors. Floor insulation shall be installed to maintain permanent contact with the underside of the subfloor decking

H


Subfloor
Conditioned Space
11-7/8" I Joist
Typ.
PA1104.3 Duct Installation
Requires R4.3 when duct is
located within the building
but outside the conditioned
space.
Owens Corning EnDuraGold
Fiber Glass Duct Board
1" Thickness will provide
an R4.3.
Unconditioned Space
Owens Corning
R-21 Fiber Glass
Insulation
HVAC Main Trunk
11-7/8" I Joist
Scale: 1/8" = 1"

H

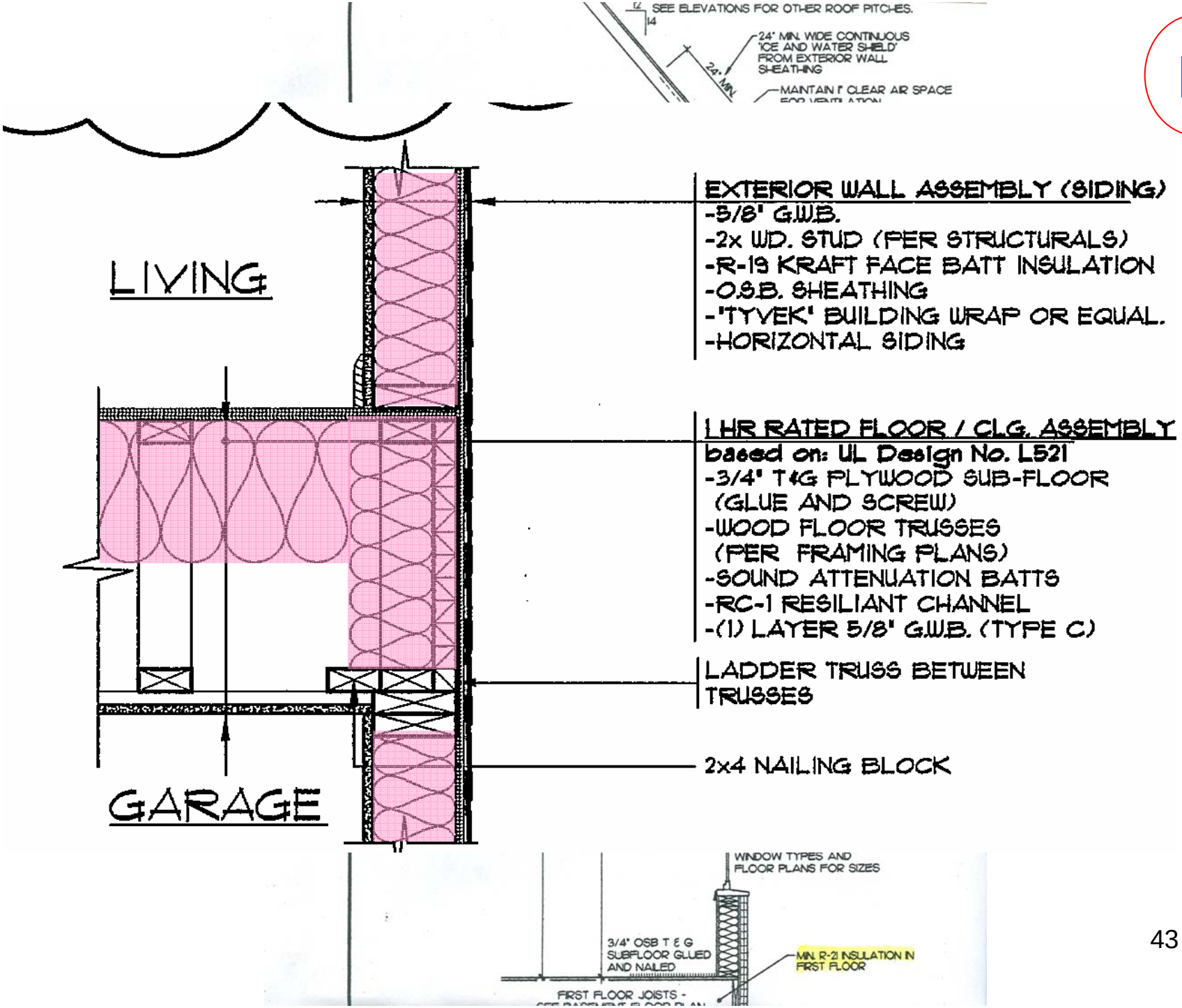


EXTERIOR WALL ASSEMBLY (SIDING)
-5/8" G.W.B.
-2x WD. STUD (PER STRUCTURALS)
-R-19 KRAFT FACE BATT INSULATION
-O.S.B. SHEATHING
-"TYVEK" BUILDING WRAP OR EQUAL.
-HORIZONTAL SIDING

1 HR RATED FLOOR / CLG. ASSEMBLY
based on: UL Design No. L521
-3/4" T&G PLYWOOD SUB-FLOOR
(GLUE AND SCREW)
-WOOD FLOOR TRUSSES
(PER FRAMING PLANS)
-SOUND ATTENUATION BATTS
-RC-1 RESILIANT CHANNEL
-(1) LAYER 5/8" G.W.B. (TYPE C)

LADDER TRUSS BETWEEN TRUSSES

2x4 NAILING BLOCK


SEE ELEVATIONS FOR OTHER ROOF PITCHES.
24" MIN. WIDE CONTINUOUS 'ICE AND WATER SHIELD' FROM EXTERIOR WALL SHEATHING
24" MIN.
MAINTAIN 1" CLEAR AIR SPACE
H
LIVING
GARAGE
EXTERIOR WALL ASSEMBLY (SIDING)
-5/8" G.W.B.
-2x WD. STUD (PER STRUCTURALS)
-R-19 KRAFT FACE BATT INSULATION
-O.S.B. SHEATHING
-"TYVEK" BUILDING WRAP OR EQUAL.
-HORIZONTAL SIDING
1 HR RATED FLOOR / CLG. ASSEMBLY
based on: UL Design No. L521
-3/4" T&G PLYWOOD SUB-FLOOR (GLUE AND SCREW)
-WOOD FLOOR TRUSSES (PER FRAMING PLANS)
-SOUND ATTENUATION BATTS
-RC-1 RESILIANT CHANNEL
-(1) LAYER 5/8" G.W.B. (TYPE C)
LADDER TRUSS BETWEEN TRUSSES
2x4 NAILING BLOCK
WINDOW TYPES AND FLOOR PLANS FOR SIZES
3/4" OSB T & G SUBFLOOR GLUED AND NAILED
MIN. R-21 INSULATION IN FIRST FLOOR
FIRST FLOOR JOISTS -

E103.1.1

Above code programs

- Code official may accept documentation from an approved energy efficiency program as proof of compliance with the IECC
- These may be local, state or national programs that exceed the IECC requirements when complied with properly

Above code programs

H

Examples of above code programs that could be considered

- US EPA Energy Star
- Comfort Home
- Masco – Environments for Living

Summary

- If it’s not on the plans it won’t be inspected in the field
- Plan submittal checklists - adequate detail from applicants
- Continuous thermal envelope
- Basements