Residential Site Inspections

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Objective…

This course is meant to provide a basic understanding of core concepts necessary when conducting site inspections, with emphasis on new construction.

*Knowledge of the code derives from **education** and **experience**. If you have questions in the areas we discuss, someone else probably does too, so **speak up!** Gaining understanding and experience will give you confidence and allow you to enforce the code uniformly and accurately.*

Agenda

DEPARTMENT OF LABOR AND INDUSTRY

- Inspector Basics
- Inspection Basics
- Footings
- Foundation Walls
- Foundation Wall Waterproofing
- Drain Tile/Below Grade Insulation
- Concrete Slab
- Rough-in (Electrical, Mechanical, Plumbing)
- Fireplace (Gas)
- Framing
- Lath (Adhered Masonry Veneer)
- Insulation
- Final Inspections / Certificate of Occupancy

Details provided in binder.

Inspector Basics

- Your primary role is an educator.
- Always be learning.
- Always be asking, what is the intent of the Code?
- Explain WHY.
- Will you guide with a stick, or a carrot?
- Learn to navigate the code books effectively.
- Don’t add or remove sections of the code book.
- Ask questions.

Inspector Basics

- Be as accurate as possible.
- Be on time for inspections.
- You might be wrong, keep an open mind.
- Learn from your mistakes.
- Share knowledge with your peers, and gain from their experience.
- Be fair and consistent.
- This is a pretty good job…have fun.

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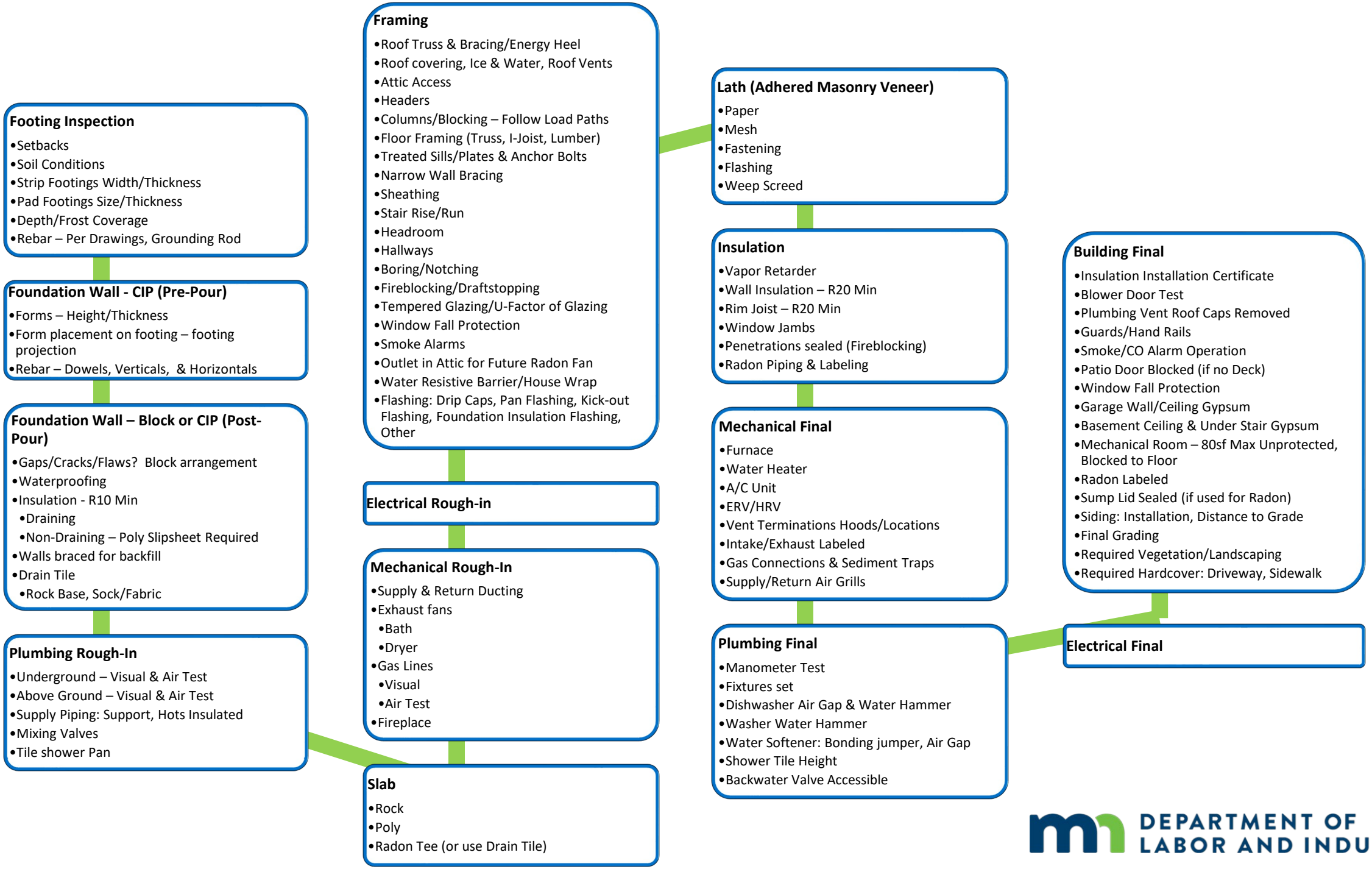
Inspection Basics



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Inspection Record Card

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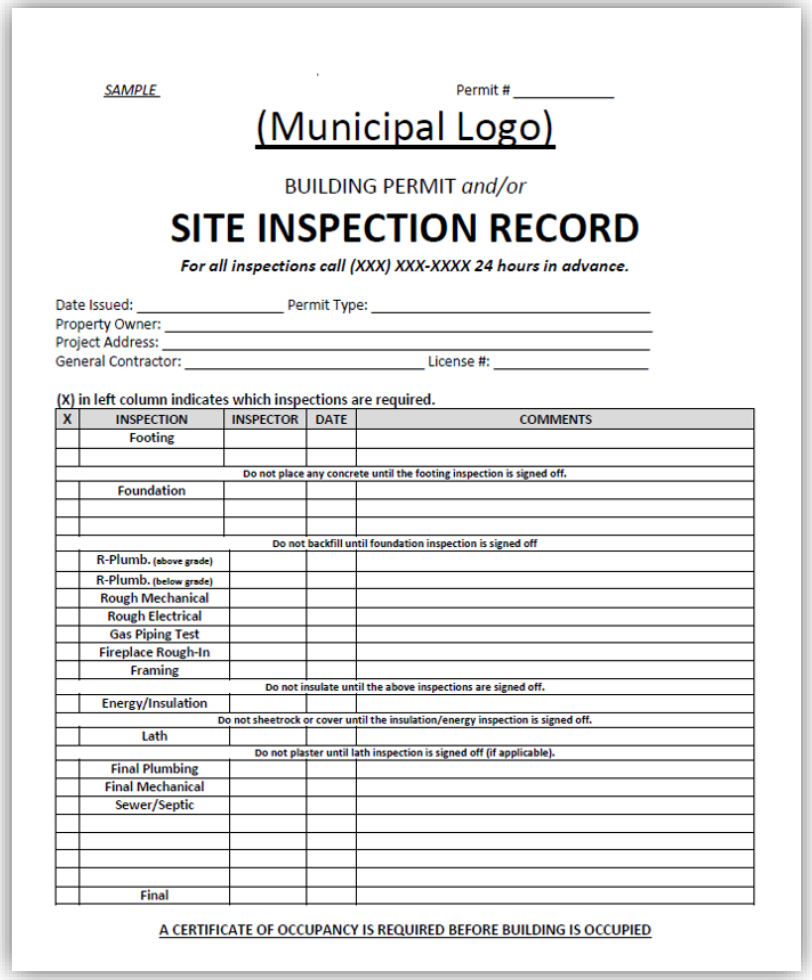
MN Rules 1300.0210, Subp. 6



SAMPLE Permit # _____

(Municipal Logo)

BUILDING PERMIT *and/or*

SITE INSPECTION RECORD

For all inspections call (XXX) XXX-XXXX 24 hours in advance.

Date Issued: _____ Permit Type: _____
Property Owner: _____
Project Address: _____
General Contractor: _____ License #: _____

(X) in left column indicates which inspections are required.

X	INSPECTION	INSPECTOR	DATE	COMMENTS
	Footing			
	Do not place any concrete until the footing inspection is signed off.			
	Foundation			
	Do not backfill until foundation inspection is signed off			
	R-Plumb. (above grade)			
	R-Plumb. (below grade)			
	Rough Mechanical			
	Rough Electrical			
	Gas Piping Test			
	Fireplace Rough-In			
	Framing			
	Do not insulate until the above inspections are signed off.			
	Energy/Insulation			
	Do not sheetrock or cover until the insulation/energy inspection is signed off.			
	Lath			
	Do not plaster until lath inspection is signed off (if applicable).			
	Final Plumbing			
	Final Mechanical			
	Sewer/Septic			
	Final			

A CERTIFICATE OF OCCUPANCY IS REQUIRED BEFORE BUILDING IS OCCUPIED

- Footings
- Foundations (before pour)
- Concrete Slab (before pour)
- Rough-In
- Framing
- Energy Efficiency
- Lath and Gypsum Board
- Fire-Resistant Assemblies
- Fireplaces
- Final

Building Official Duties and Powers

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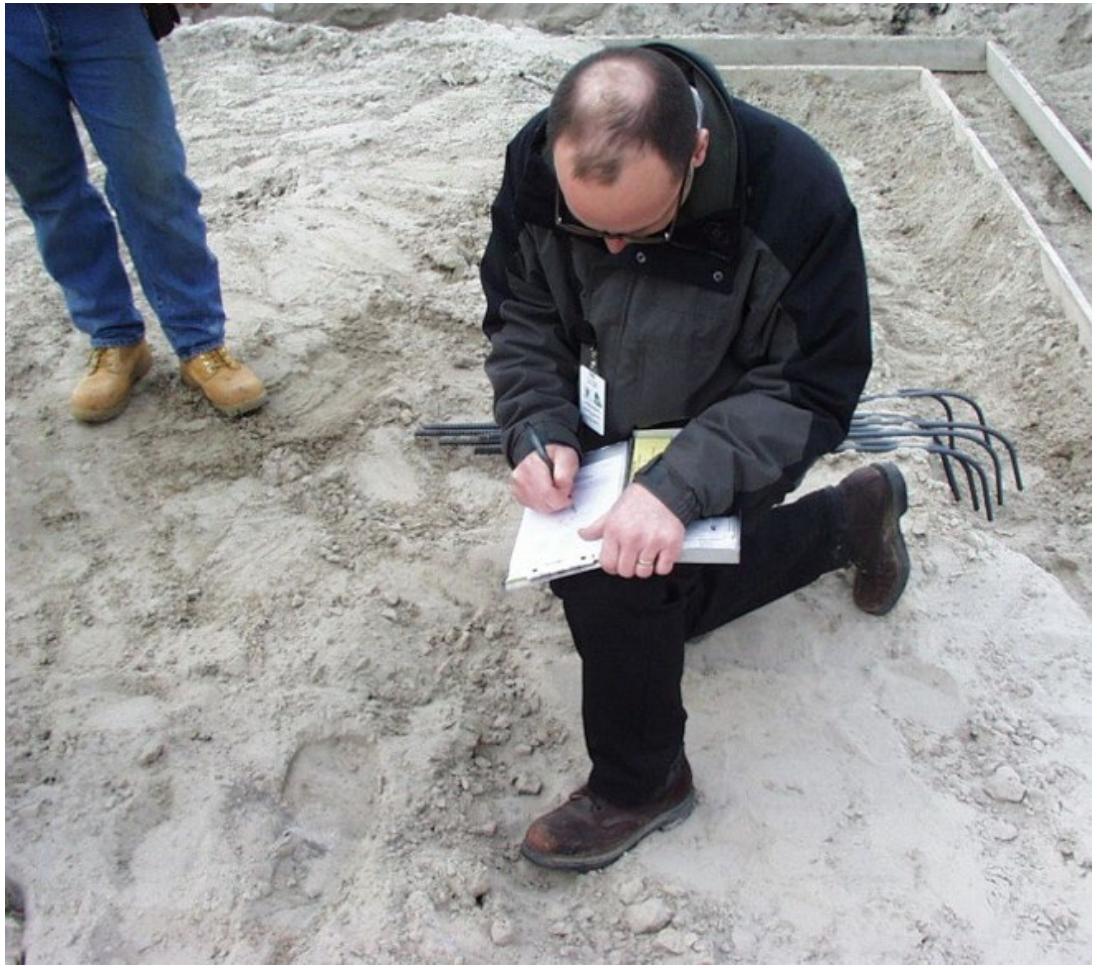
MN Rules 1300.0110, Subp. 5

- Results of inspections shall be documented on the job site inspection card and in the official records of the municipality.
- The inspector shall either indicate the portion of the construction that is satisfactory as completed or notify the permit holder of any failures to comply with the code.

Corrective Actions



Written Corrections:

- Clearly itemize all violations.
- Specify exact code sections.
- Deliver corrections to individuals in charge of work.
- Explain your orders completely.

Details provided in binder.

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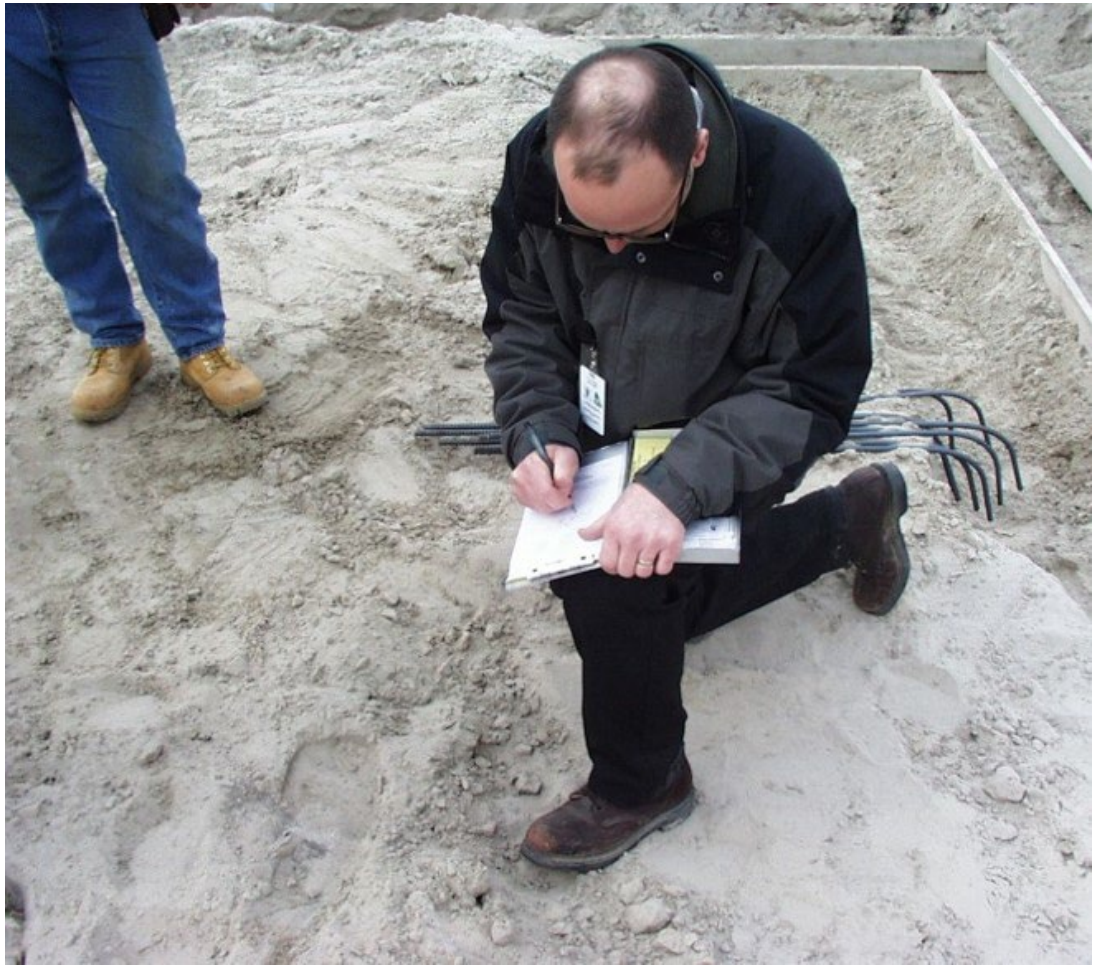

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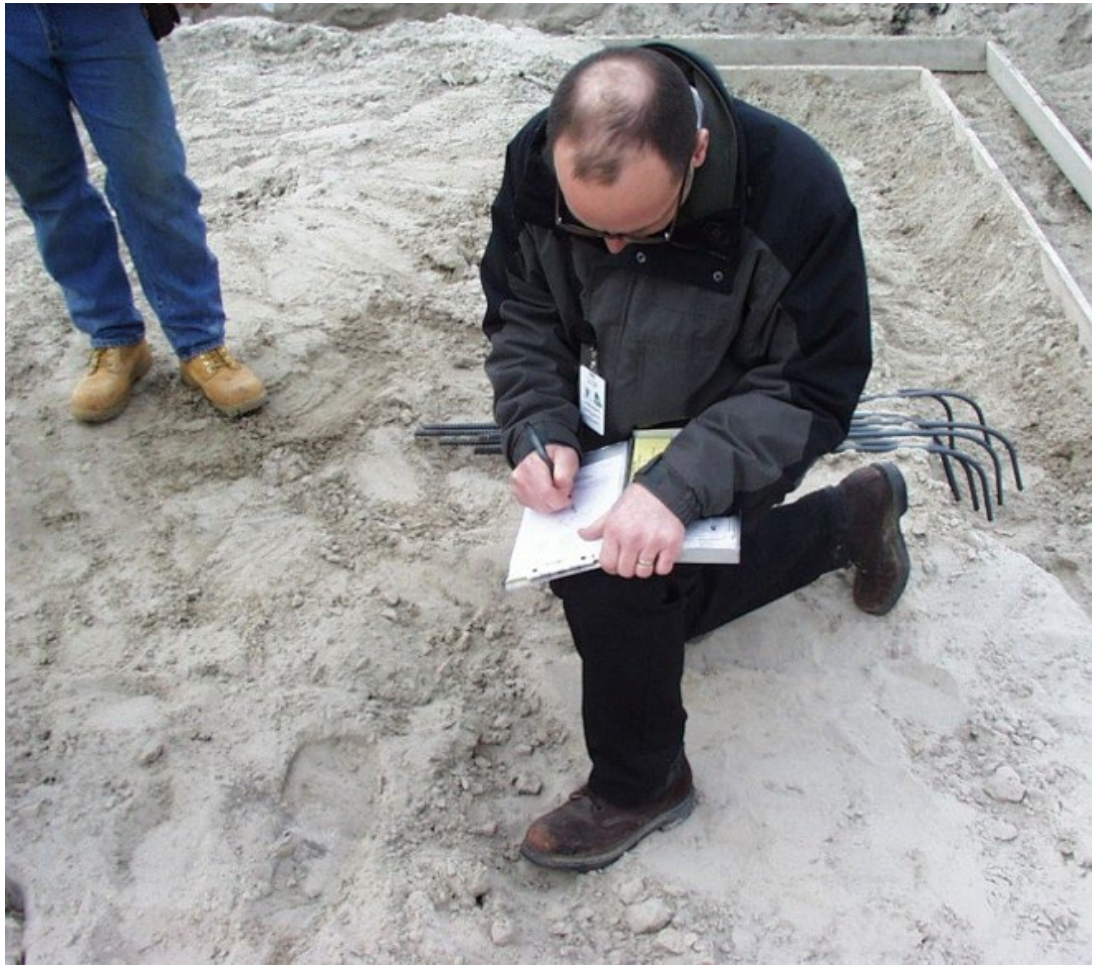

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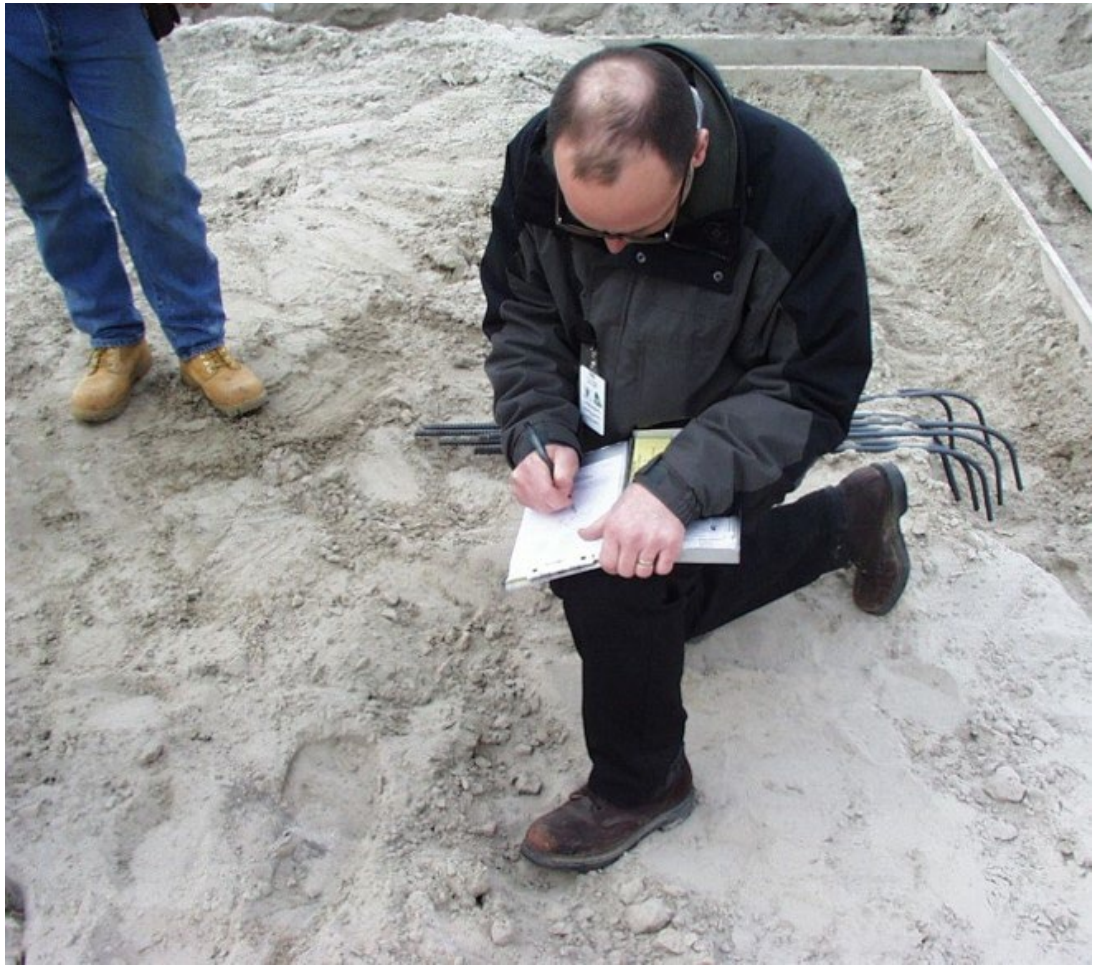

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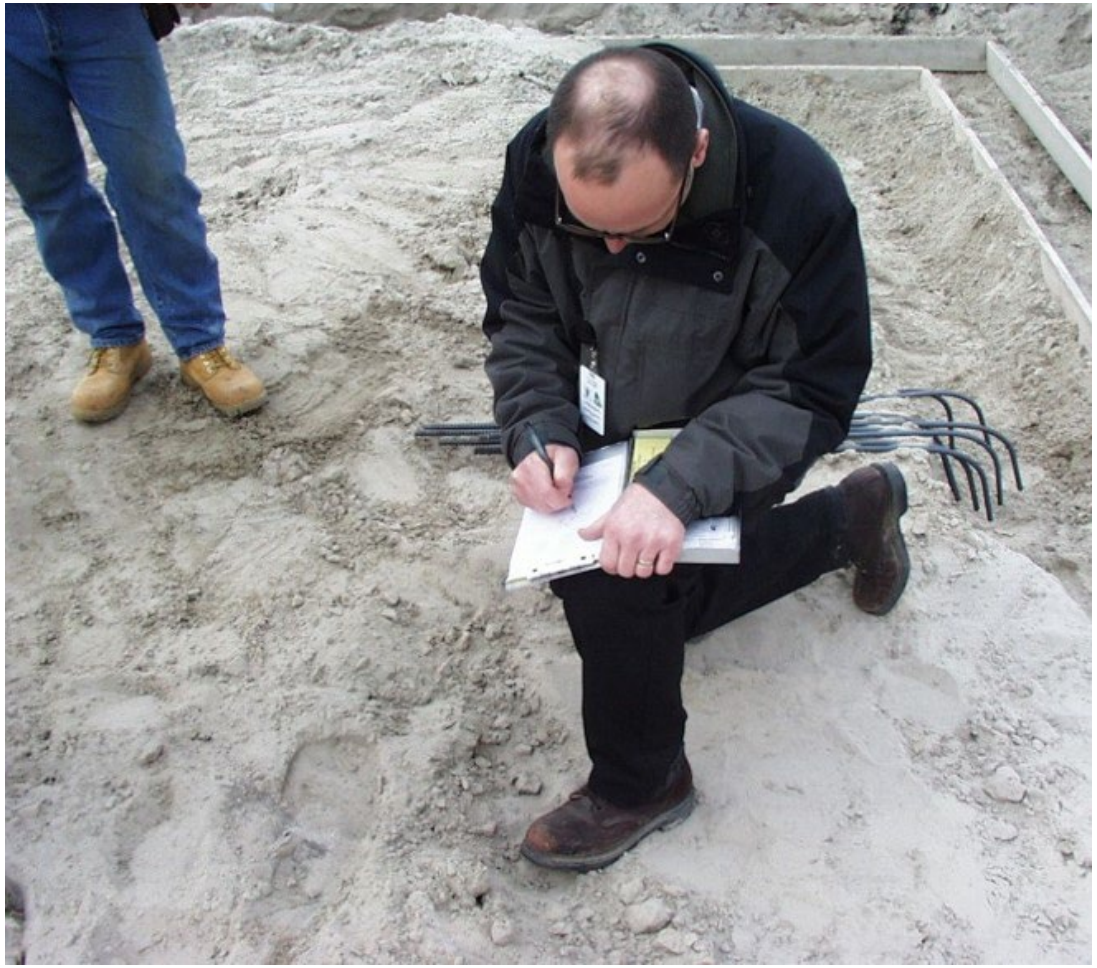

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- Follow up on corrections based on time frame.
- Log corrections in department records.
- Issue “stop work” orders only when necessary.

Details provided in binder.

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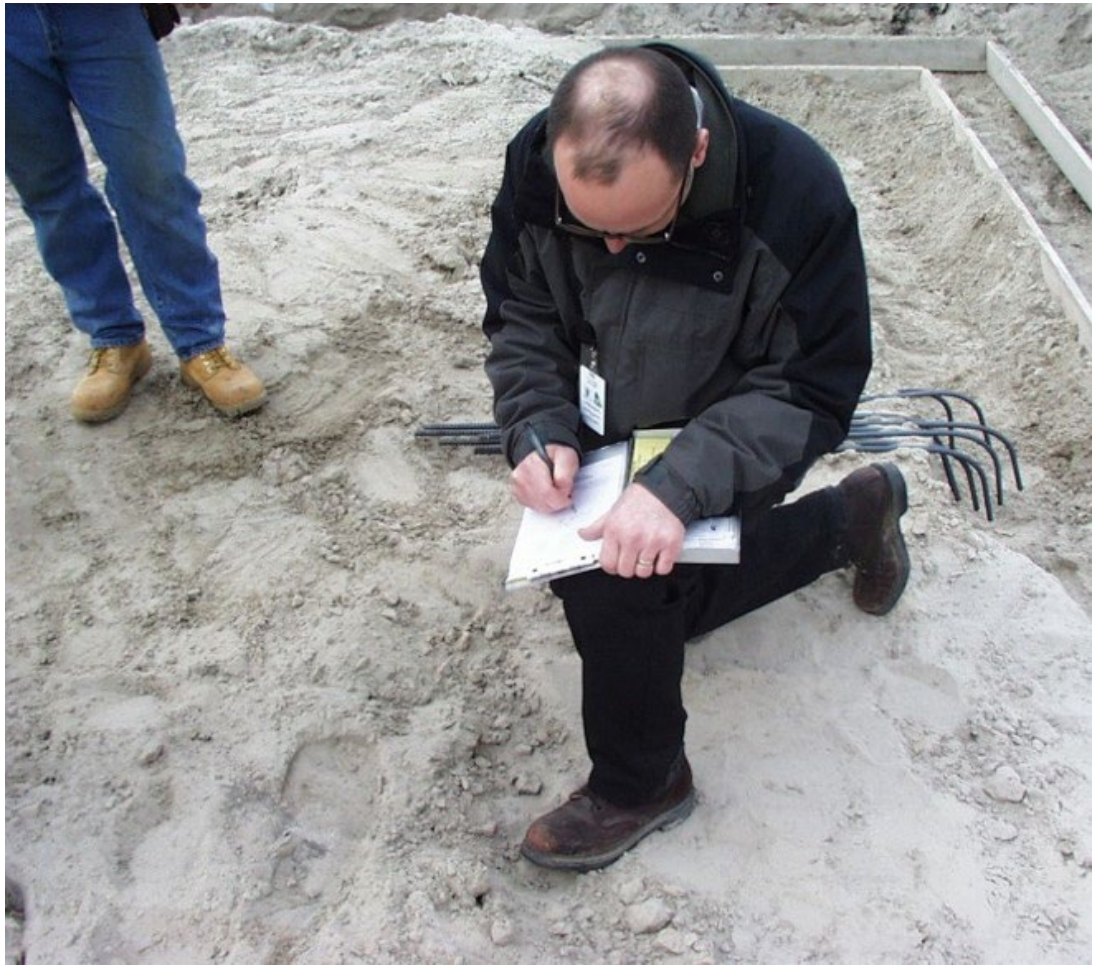

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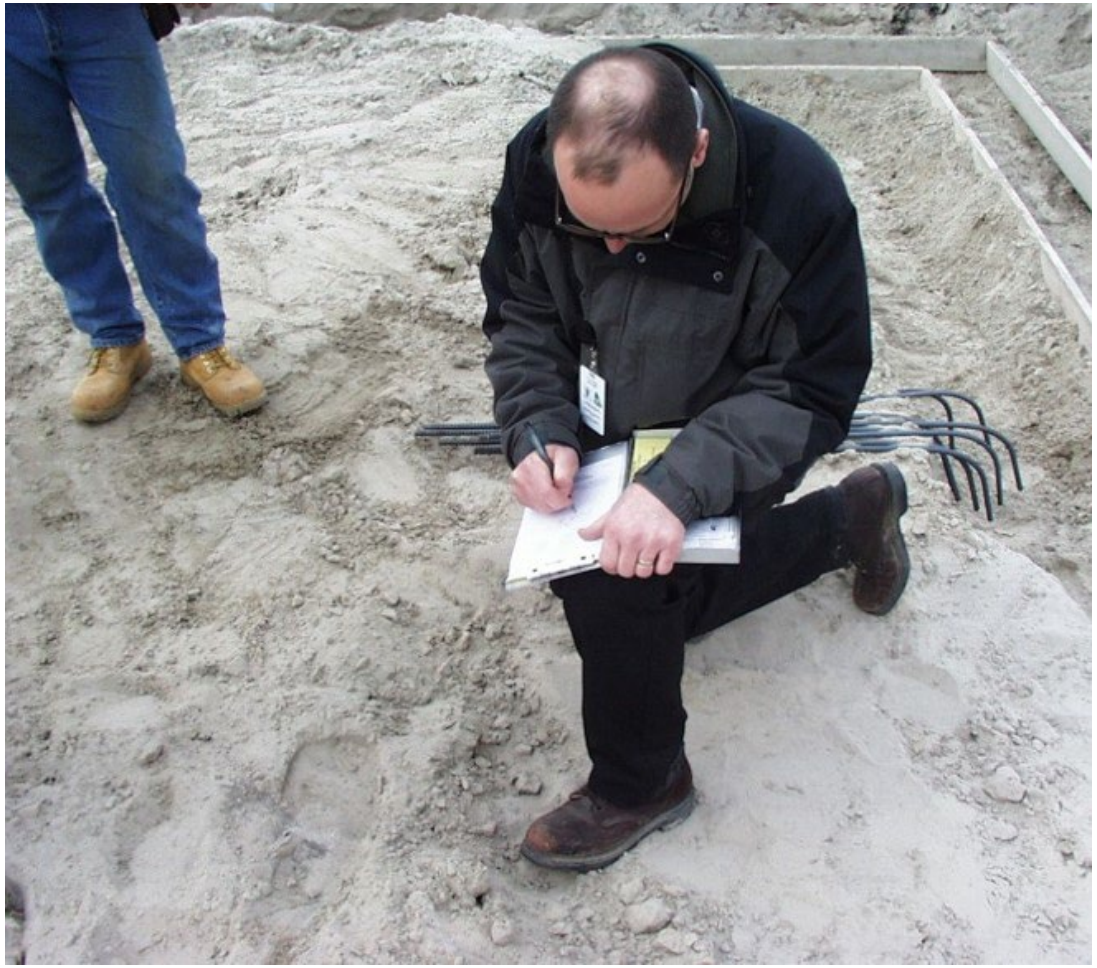

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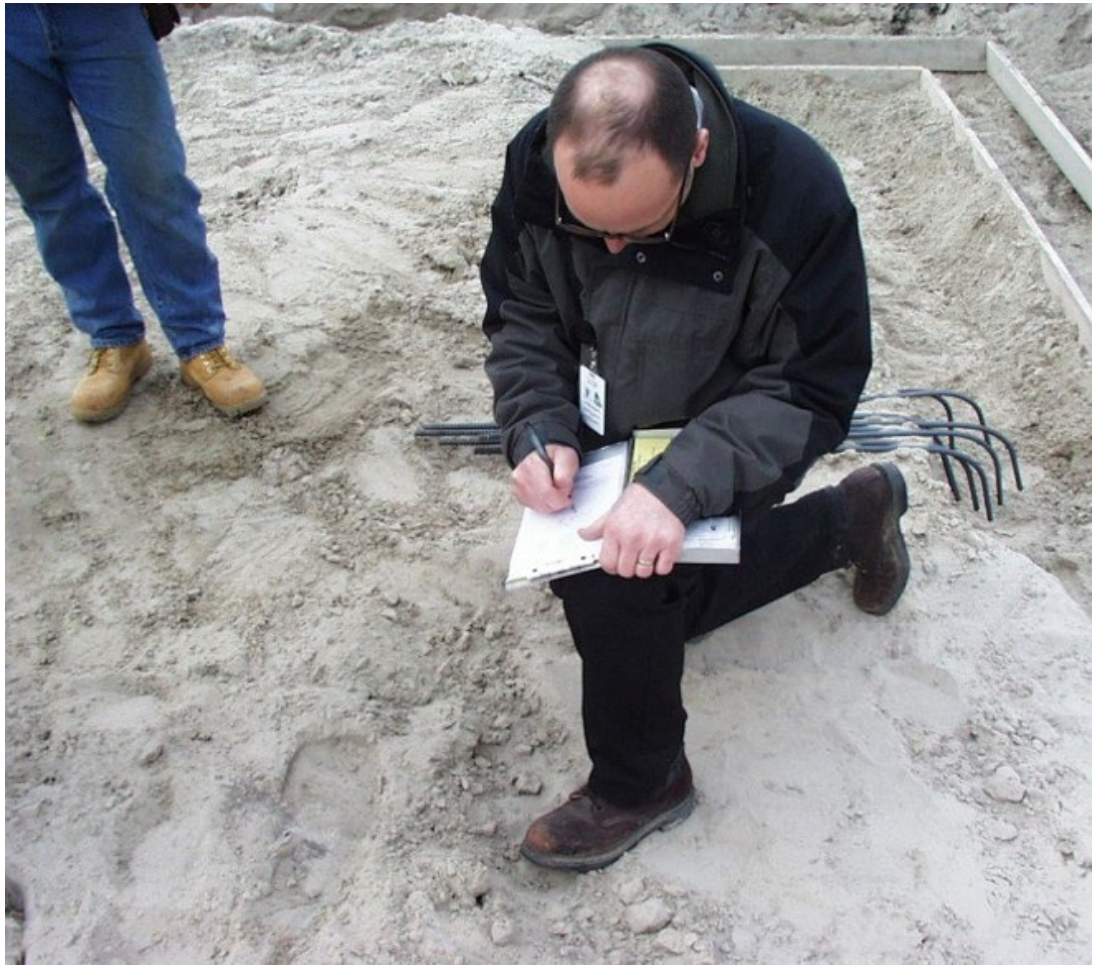

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Inspection Process

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Systematic Approach

- Top to bottom
- Interior, then Exterior

Focused Approach

- Limited items to inspect

Residential New Construction Inspection Guide

This checklist is intended to be used as a general guide when inspecting new residential homes and contains references applicable to the most common situations. Additional code sections, inspections, or variations to the process may be necessary based on specific conditions.

Footing Inspection

- ☐ Site address [R319]
- ☐ Setbacks to property lines (per local authority)
- ☐ Soil conditions [R401, R403.1.8]
- ☐ Footings:
  - ☐ Strip or pad footing width, thickness, slope, strength [R402.2, R403]
  - ☐ Deck footings [R507.3]
- ☐ Depth/frost coverage [R403.1.4]
- ☐ Rebar: per approved plans if specified

Foundation Wall: Cast-in-place (pre-pour) Inspection

- ☐ Forms: height/wall thickness [R404.1.3, R404.1.5]
- ☐ Form placement on footing, footing projections [R403.1.1]
- ☐ Reinforcement: vertical & horizontal rebar [R404.1.3]

Foundation Wall: Block or Cast-in-place (post-pour) Inspection

- ☐ Block: thickness, block arrangement [R404.1.2, R404.1.5]
- ☐ Waterproofing* [R406.2, RE402.1.1]
- ☐ Insulation*: draining/non-draining (6-mil poly slip sheet required for non-draining) [RE402.1, RE402.2.8]
- ☐ Walls braced for backfill [R404.1.7]
- ☐ Drain Tile: rock base, sock/fabric [R405]

Plumbing Rough-In Inspection

- ☐ Underground: visual & air test [P Chapter 7, P712.3]
- ☐ Above ground: visual & air test [P Chapter 7, P712.3]
- ☐ Supply piping: support, hot supplies insulated* [P Chapter 6, P313.3, RE403.4]
- ☐ Mixing valves [P408.3]
- ☐ Tile shower pan [P408.5 – 408.7]

Slab Inspection/Radon (pre-pour) [MR 1303.2402]

- ☐ Gas permeable material (washed rock)
- ☐ Soil-gas membrane/6 Mil Poly
- ☐ Radon Tee (or use interior drain tile)

Mechanical Rough-In Inspection

- ☐ Supply & return ducting* [RE403.2.2, RE403.5.6, M603]
- ☐ Exhaust fans*: bath, kitchen, dryer, insulation [RE403.2.1, M501, M504, M505]
- ☐ Gas Lines: visual, air test, support [M305, FG406, FG407, FG408.4]
- ☐ Fireplace*: per manufacturer requirements [FG604]

Electrical Rough-In Inspection

- ☐ Verify completion by appropriate authority

Framing Inspection

- ☐ Water resistive barrier (House wrap) [R703.2]
- ☐ Flashing: drip cap, pan flashing, deck ledger flashing, foundation insulation flashing, other [R703.4, R903.2, R507.2.4]
- ☐ Roof covering: sheathing, venting, step flashing, ice barrier [Table R503.2.1.1(1), R803.2, R806, R903.2, R905.1.2]
- ☐ Wall bracing [R602.10]
- ☐ Wall sheathing [R316.5.12, R602.3, R604]
- ☐ Roof truss*: bearing, bracing, uplift restraint, fastening, energy heel [R802.10.3, R802.11, Table RE402.1.1 footnote J]
- ☐ Attic access opening [R807]
- ☐ Outlet in attic for future Radon fan [MN Rules 1303.2402 Subp. 6]
- ☐ Headers/beams/girders: load path, bearing, size [R301.1, R502.6, R602.7]
- ☐ Walls: stud height, spacing [R602.3.1]
- ☐ Columns, point loads, blocking: follow load paths [R301.1, R407]
- ☐ Floors (truss, I-joist, lumber): blocking, framing, bearing, subfloor [R404.1, R502, R503]
- ☐ Fenestrations*: sealing, tempered glazing, fall protection, U-factor, air leakage [R308, R609, RE402.3, RE402.4.3]
- ☐ Smoke/CO alarm locations [R314, R315]
- ☐ Stairway: rise, run, width, landings, total height [R311.7]
- ☐ Headroom clearance [R305.1]
- ☐ Hallway width [R311.6]

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- ☐ Treated sills and plates, anchorage [R317.1, R403.1.6, R404.1, R404.3]
- ☐ Boring & notching [R502.8, R602.6]
- ☐ Fireblocking & draftstopping [R302.11, R302.12]
- ☐ Radon piping installed & labeled [MN Rules 1303.2402 Subp. 5]
- ☐ Deck: ledger, posts, beam, joists, hangers, stairs [R507]

Lath Inspection (Adhered Masonry Veneer)

- ☐ Water-resistive barrier [R703.7.3, R703.12.3]
- ☐ Lath fastening [R703.7.1]
- ☐ Flashing, weep screed [R703.4, 703.12.2]
- ☐ Clearance [703.12.1]

Insulation Inspection

- ☐ Air barrier* [RE402.4]
- ☐ Vapor retarder* [R702.7]
- ☐ Insulation: foundation, walls, rim joist, floor, concealed attics, window/door jambs* [RE402]
- ☐ Penetrations sealed* (Fireblocking) [R302.11]

Mechanical Final Inspection

- ☐ Furnace* [RE403.5, FG303, FG304, FG306, FG307, FG310, FG409.5, FG411, FG503, FG610]
- ☐ Water heater* [RE403.4.2, FG303, FG304, FG306, FG310, FG409.5, FG411, FG503, FG Chapter 5]
- ☐ A/C unit* [RE403.3, RE403.5.17, RE403.6, M307, M1101.10]
- ☐ ERV/HRV* [RE403.5.5, M501.3.1]
- ☐ Gas fireplace [M501.3.1]
- ☐ Vent terminations, hoods, locations [RE403.5.11, M401.4, M501.3.1]
- ☐ Intake & exhaust outlets labeled [RE403.5.15]
- ☐ Gas connections & sediment traps [M408.4, M411.1]
- ☐ Supply & return air grills [M603.18]

Plumbing Final

- ☐ Manometer test [P712.5]
- ☐ Fixtures set [P Chapter 4, P712.5]
- ☐ Dishwasher high loop or air gap [P414.3]
- ☐ Water hammer devices [P609.10]
- ☐ Water softener: bonding jumper, air gap [P611]
- ☐ Shower surround height [R307.2]
- ☐ Backwater valve accessible [P710.6]
- ☐ Plumbing vent roof caps removed

Electrical Final Inspection

- ☐ Verify completion by appropriate authority

Building Final Inspection

- ☐ Site address [R319]
- ☐ Smoke & CO Alarms [R314, R315]
- ☐ Guards & handrails [R312.1, R311.7.8]
- ☐ Window fall protection [R312.2]
- ☐ Attic access weatherstripped and insulated* [RE402.2.4, Table RE402.4.1.1]
- ☐ Gypsum: dwelling-garage separation, under stair protection, basement ceiling [R302.6, R302.7, R302.13]
- ☐ Mechanical Room: 80sf max unprotected and blocked to subfloor [R302.13 Exception 3]
- ☐ Finishes meet smoke/flame spread requirements [R302.9]
- ☐ Radon system labeled [MN Rules 1303.2402 Subp. 5.E]
- ☐ Sump pit lid sealed (if used for Radon) [MN Rules 1303.2402 Subp. 4.E]
- ☐ Basement floor slab sealed to foundation wall; other concrete joints sealed. [MN Rules 1303.2402 Subp. 4.B]
- ☐ Garage/dwelling separation: door, wall/ceiling gypsum [R302.6]
- ☐ Roof venting [R806]
- ☐ Siding: installed per manufacturer, flashing, distance to grade [R703.3, R703.4, R317.1]
- ☐ Deck: decking, guards, handrails, lateral load connectors [R507]
- ☐ Patio door: blocked or guard installed if a deck is not present [R312]
- ☐ Final grading [R401.3, R404.1.6]
- ☐ Energy Compliance Certificate* [RE401.3]
- ☐ Blower door test* [RE402.4.1.2]
- ☐ Insulation installation certificate* [RE303.1.1]
- ☐ Required vegetation & landscaping (per local authority)
- ☐ Required hardcover: driveway & sidewalk (per local authority)
- ☐ Issuance of Certificate of Occupancy if all items are complete [MN Rules 1300.022

Code Section References:

R: 2020 Minnesota Residential Code

RE: 2015 Minnesota Residential Energy Code

P: 2020 Minnesota Plumbing Code

M: 2020 Minnesota Mechanical Code

FG: 2020 Minnesota Fuel Gas Code

* Denotes inspections that also relate to requirements located in the MN Residential Energy Code.

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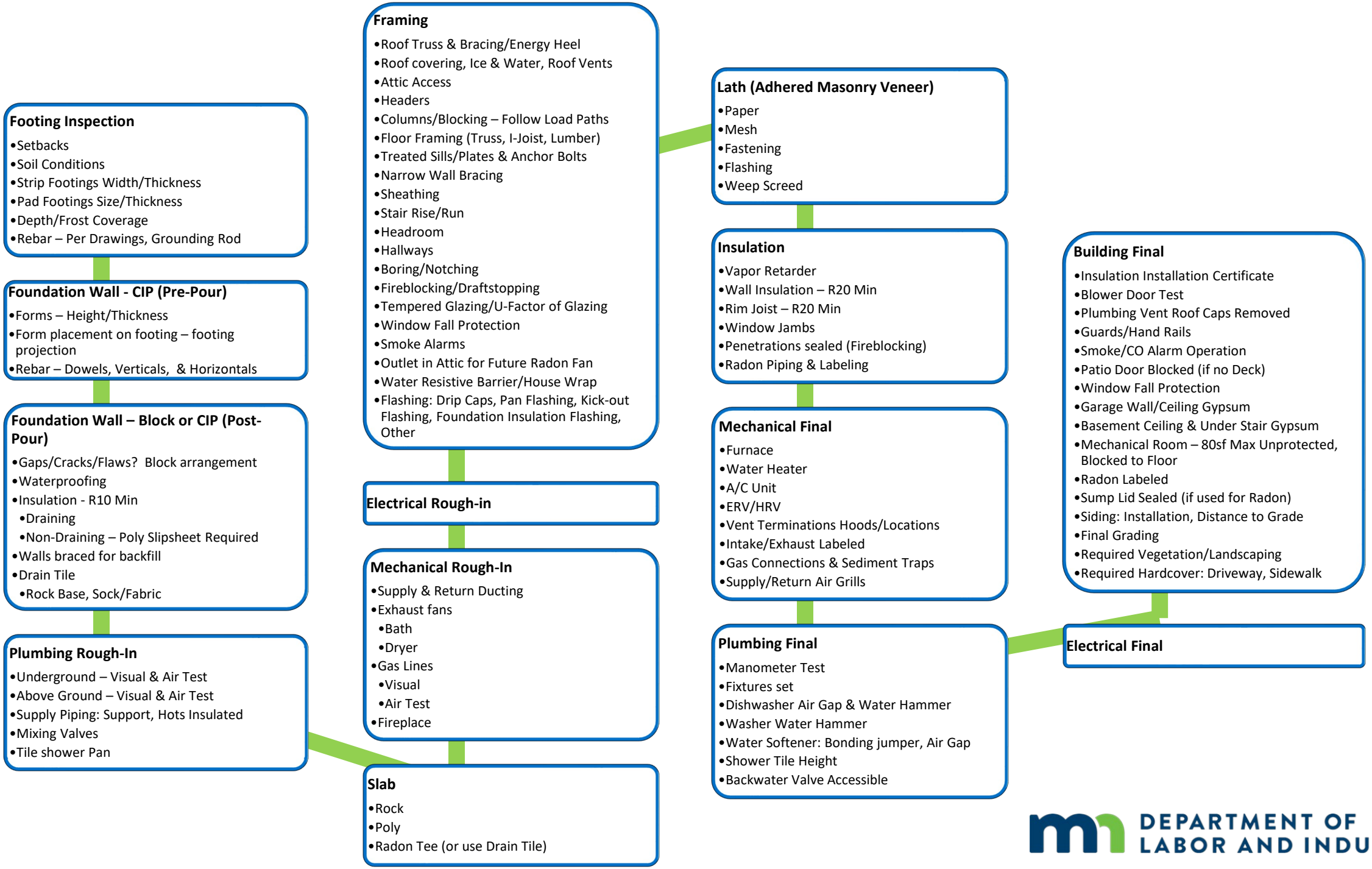
Footings

Footing Inspection

- ☐ Site address [R319]
- ☐ Setbacks to property lines (per local authority)
- ☐ Soil conditions [R401, R403.1.8]
- ☐ Footings:
- ☐ Strip or pad footing width, thickness, slope, strength [R402.2, R403]
- ☐ Deck footings [R507.3]
- ☐ Depth/frost coverage [R403.1.4]
- ☐ Rebar: per approved plans if specified



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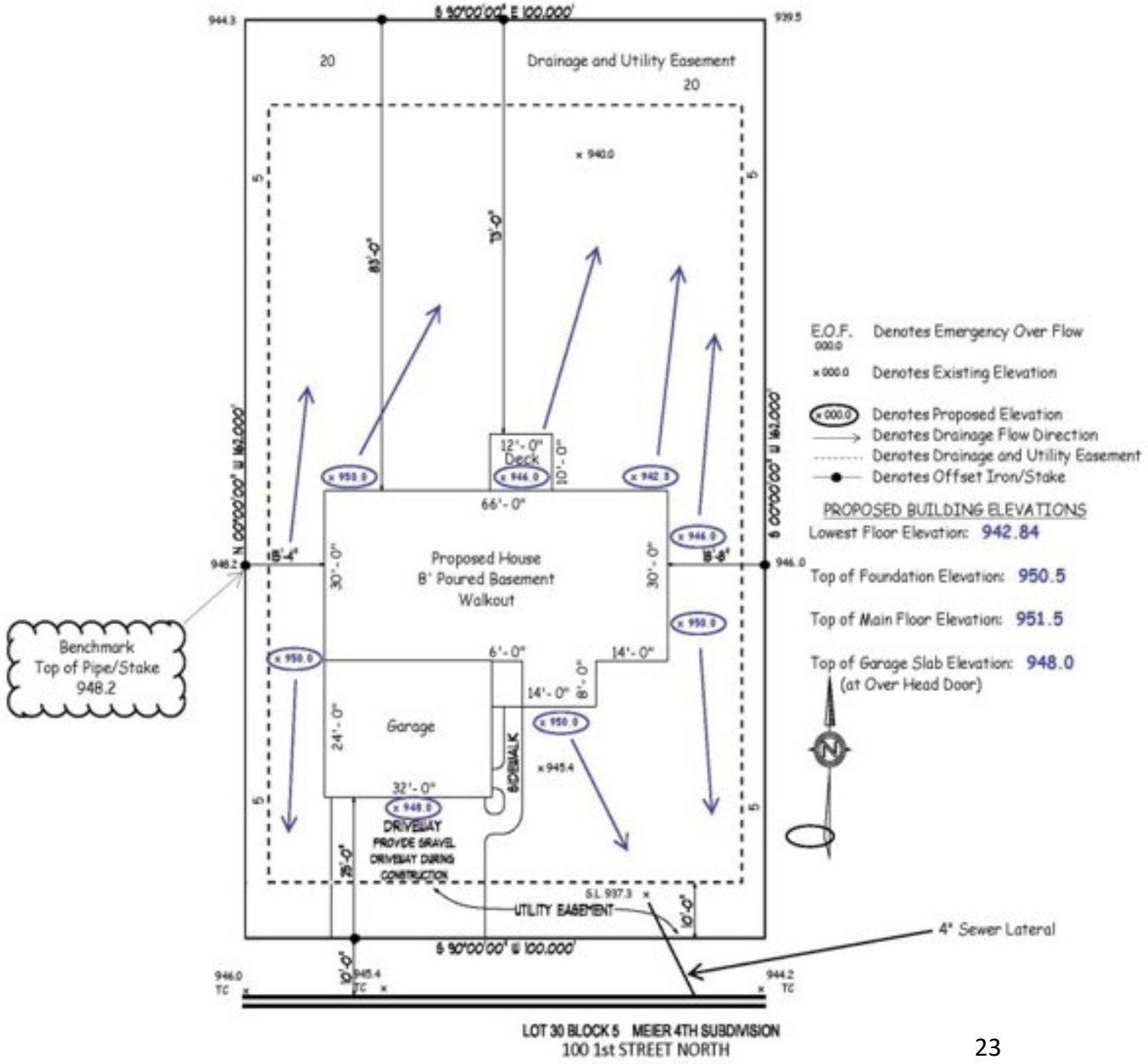
Footings - Site Address

- Site address shall be posted at each job site.

Footings - Setbacks

MN Rules 1300.0130, Subp. 4

Verify setbacks are according to approved site plan.



Footings – Soil Conditions

- Footings shall be supported on undisturbed natural soils or engineered fill.

Footings – Soils Conditions

Type of soil:

- Undisturbed original material.
- Compacted fill.

Footings – Soil Conditions

Bearing capacity of soil:

- Appropriate for footing design.
- Typically 1,500 – 2,000 pounds per square foot (PSF)

Footings – Soil Conditions

Forms free of illicit materials:

- Frost.
- Ice.
- Standing water.
- Vegetation or organic materials.

Footings - Layout

MN Rules 1300.0130, Subp. 4

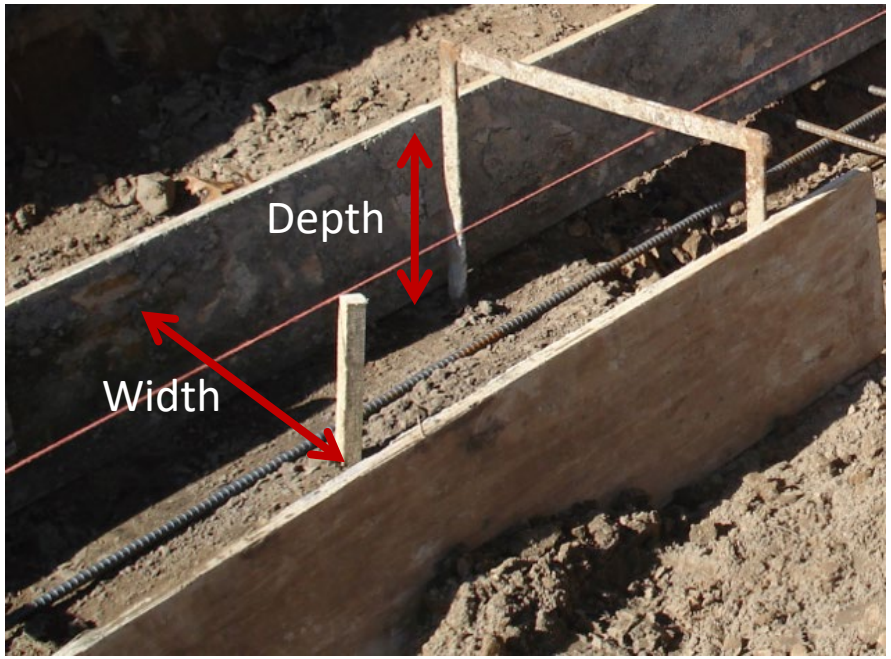
Verify that the footings match the approved plans:

- Layout.
- Point load locations (pads).

Footings - Dimensions

MN Rules 1303.1600, Subp. 1

- Frost depth:
  - 5’-0” in Zone I.
  - 3’-6” in Zone II.
- Measure for proper depth and width of footings.



Footings - Construction

Slope:

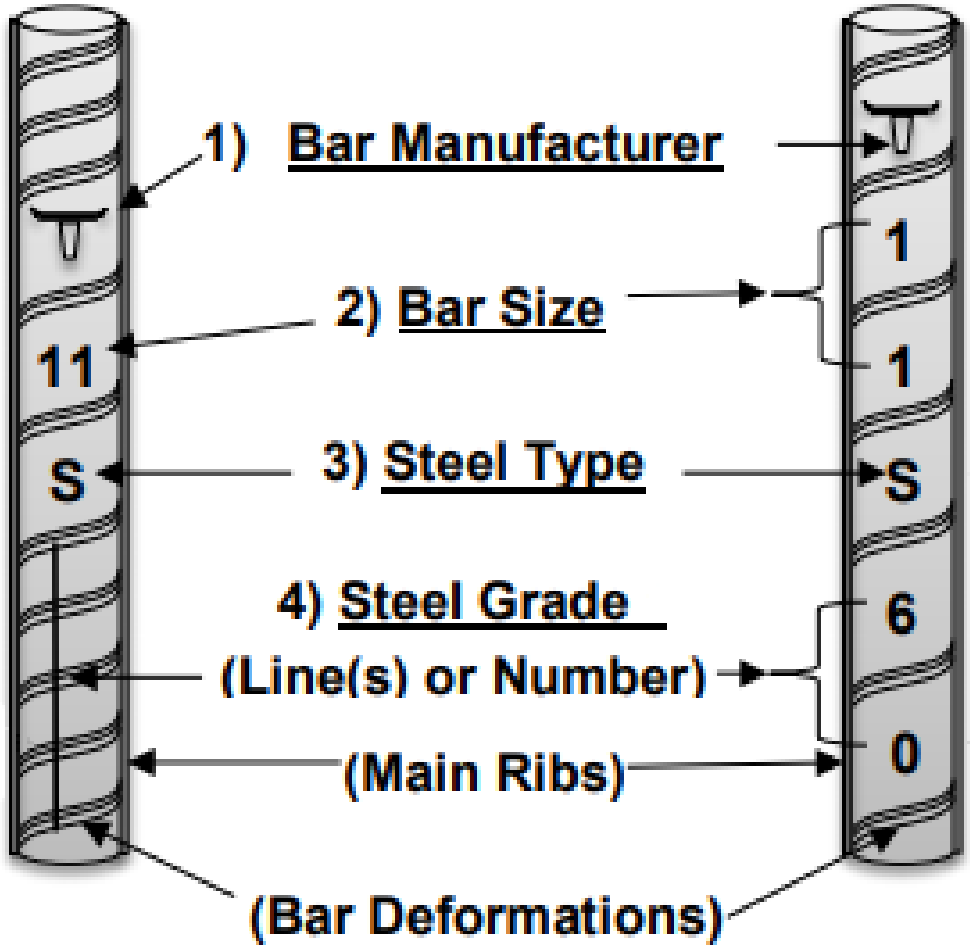
- The top surface of footings shall be level.
- The bottom surface of footings shall not have a slope exceeding one unit vertical in 10 units horizontal (10 percent slope).
- Stepped footings.

Footings - Rebar Identification

If the design calls for horizontal steel, does it specify the grade of steel and diameter?

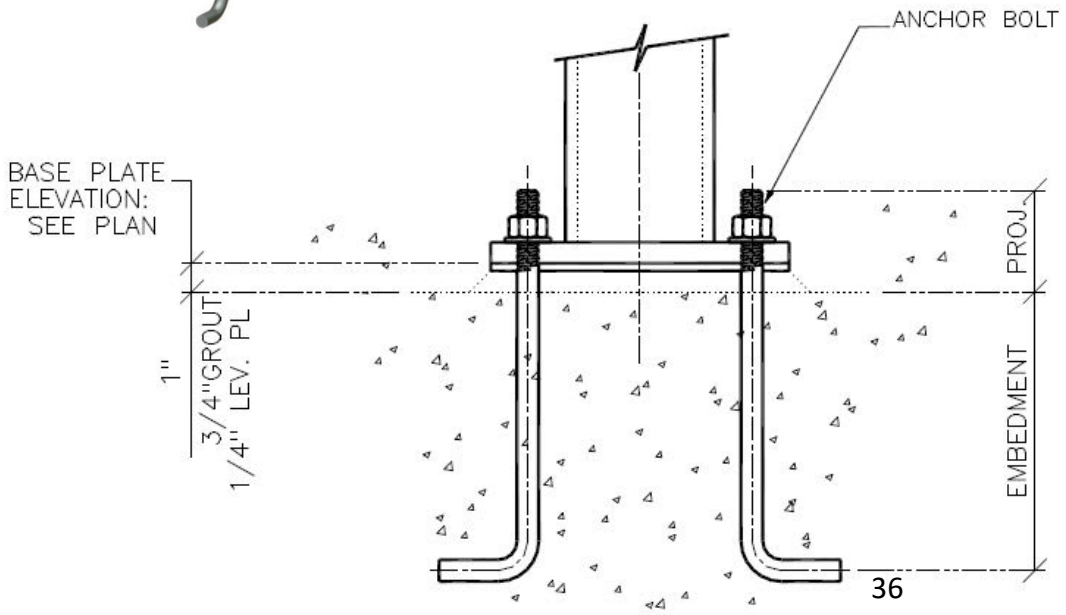
Bar marks:

1) Manufacturer.
2) Bar size.
3) Steel Type.
4) Grade 60 must also show “60” or one line for 60,000 psi strength.



Footings - Rebar Terms

- Tie.
- Chair.
- Bearing plate & embedded anchors.
- Lap.



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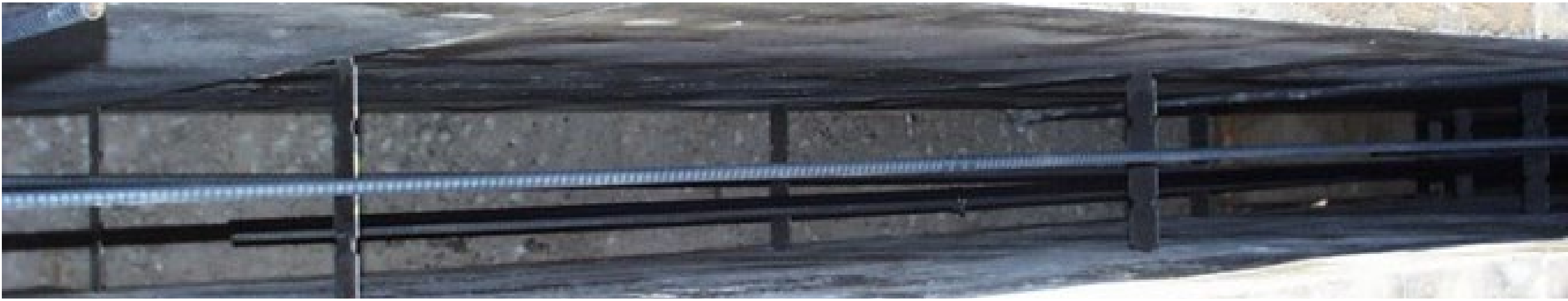
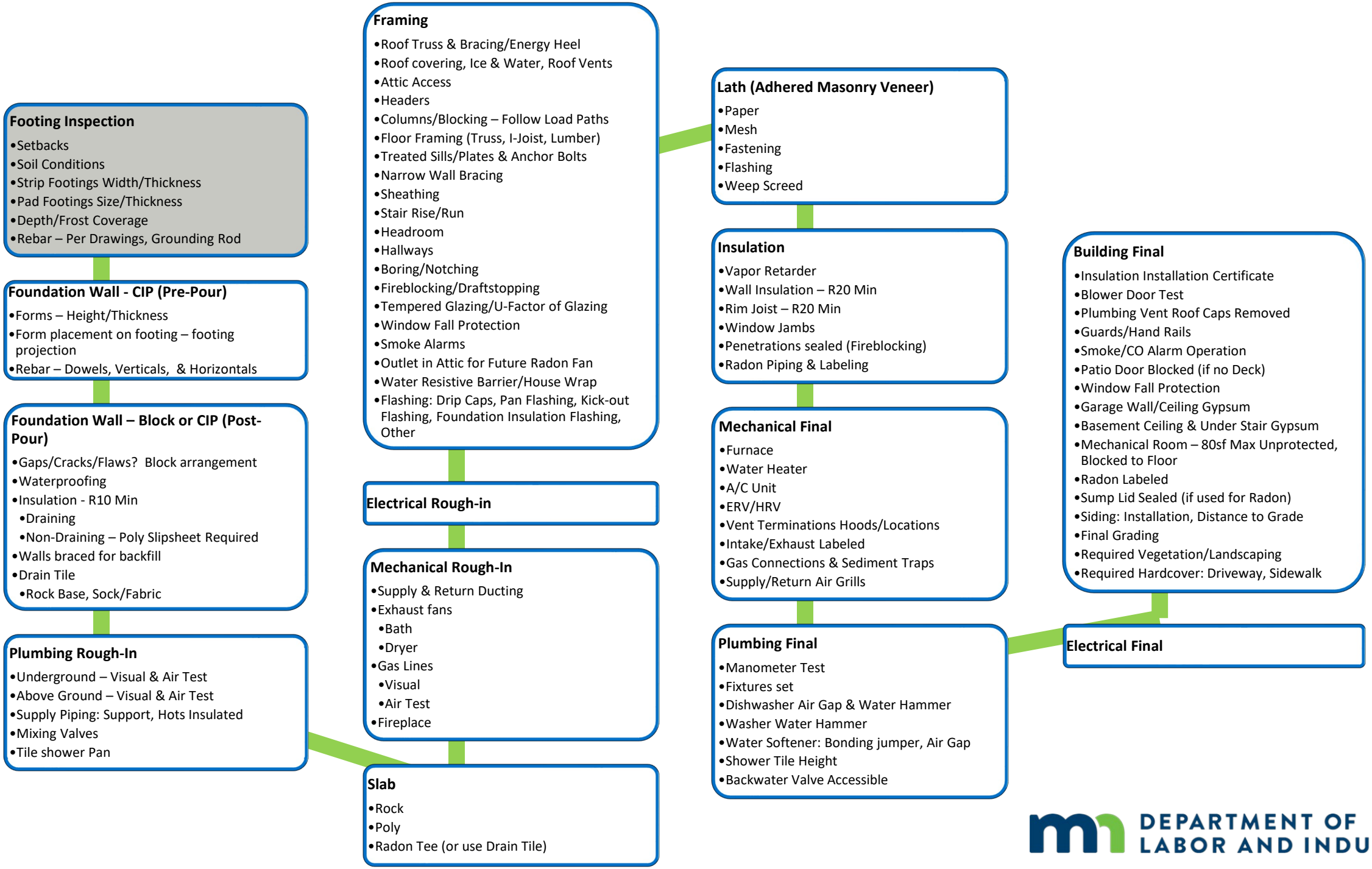


Foundation Wall: CIP (pre-pour) Poured Wall Inspection

Foundation Wall: Cast-in-place (pre-pour) Inspection

- ☐ Forms: height/wall thickness [R404.1.3, R404.1.5]
- ☐ Form placement on footing, footing projections [R403.1.1]
- ☐ Reinforcement: vertical & horizontal rebar [R404.1.3]



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Foundation Walls

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MN Rules 1300.0130, Subp. 2

- When a foundation system is proposed and approved by the local building official, verify the method of installation with the approval documents. These documents may include test data, manufacturer's installation instructions, an Evaluation Services Report, or engineering.

Cast-in-Place (CIP)/Poured

Concrete Masonry Unit (CMU)/Block

Foundation Walls - Reinforcement

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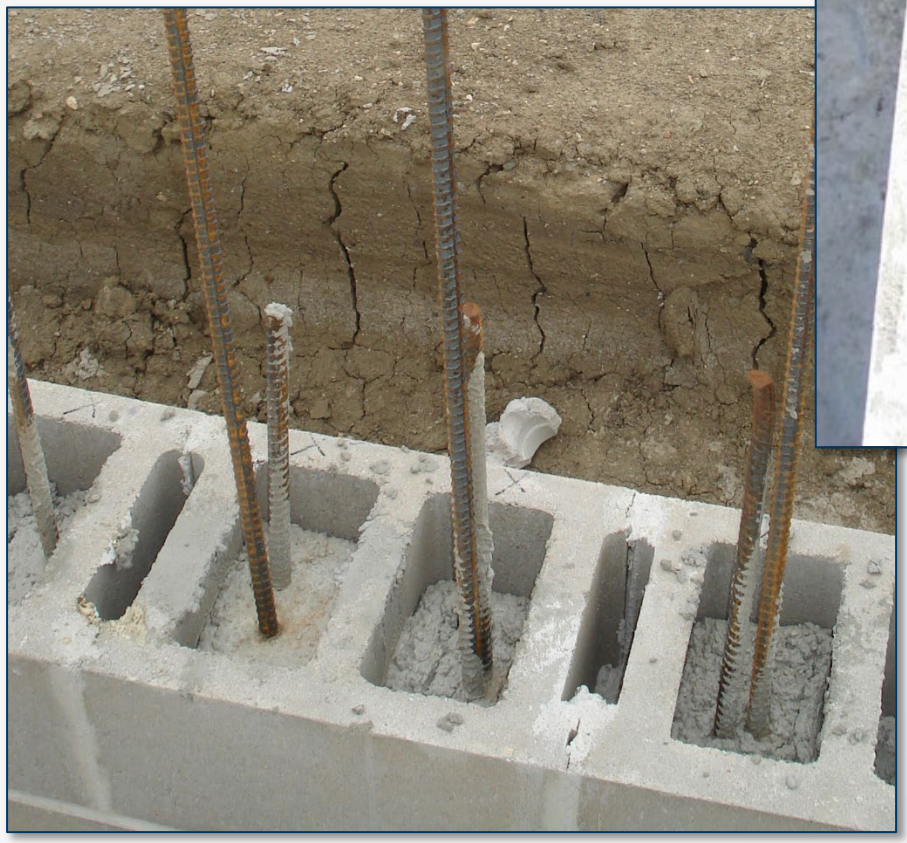
R404.1.1

- Why?
  - Strength
- When?
  - Unbalanced fill/pressure
- Where?
  - Vertical
  - Horizontal
  - Distance to face of wall
- What Type & Size?
  - Grade



Foundation Walls (CIP)

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R403.1.1

- Form height & wall thickness.
- Location of forms on the footing (footing projection).
  - Footings project beyond the face of the foundation wall at least 2 inches, but not more than the thickness of the footing. (R403.1.1)

Foundation Walls - Reinforcement (CIP)

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R404.1.2.2

- Bar location and spacing:
  - Code book tables, or
  - Standard Foundation Engineering Document

Foundation Wall - Reinforcement

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R404.1.3.3.7.5
Table R608.5.4(1)

- Proper lap for any required horizontal steel reinforcing.

TABLE R608.5.4(1)
LAP SPLICE AND TENSION DEVELOPMENT LENGTHS

	BAR SIZE NO.	YIELD STRENGTH OF STEEL, f_y- psi (MPa)	
		40,000 (280)	60,000 (420)
		Splice length or tension development length (inches)	
Lap splice length-tension	4	20	30
	5	25	38
	6	30	45
Tension development length for straight bar	4	15	23
	5	19	28
	6	23	34
Tension development length for: a.90-degree and 180-degree standard hooks with not less than $2^1/_2$ inches of side cover perpendicular to plane of hook, and b.90-degree standard hooks with not less than 2 inches of cover on the bar extension beyond the hook.	4	6	9
	5	7	11
	6	8	13
Tension development length for bar with 90-degree or 180-degree standard hook having less cover than required in Items a and b.	4	8	12
	5	10	15
	6	12	18

For SI: 1 inch = 25.4 mm, 1 degree = 0.0175 rad, 1 pound per square inch = 6.895 kPa.

Foundation Wall - Reinforcement

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R404.1.3.3.7.5
Table R608.5.4(1)

- Proper lap for any required horizontal steel reinforcing.

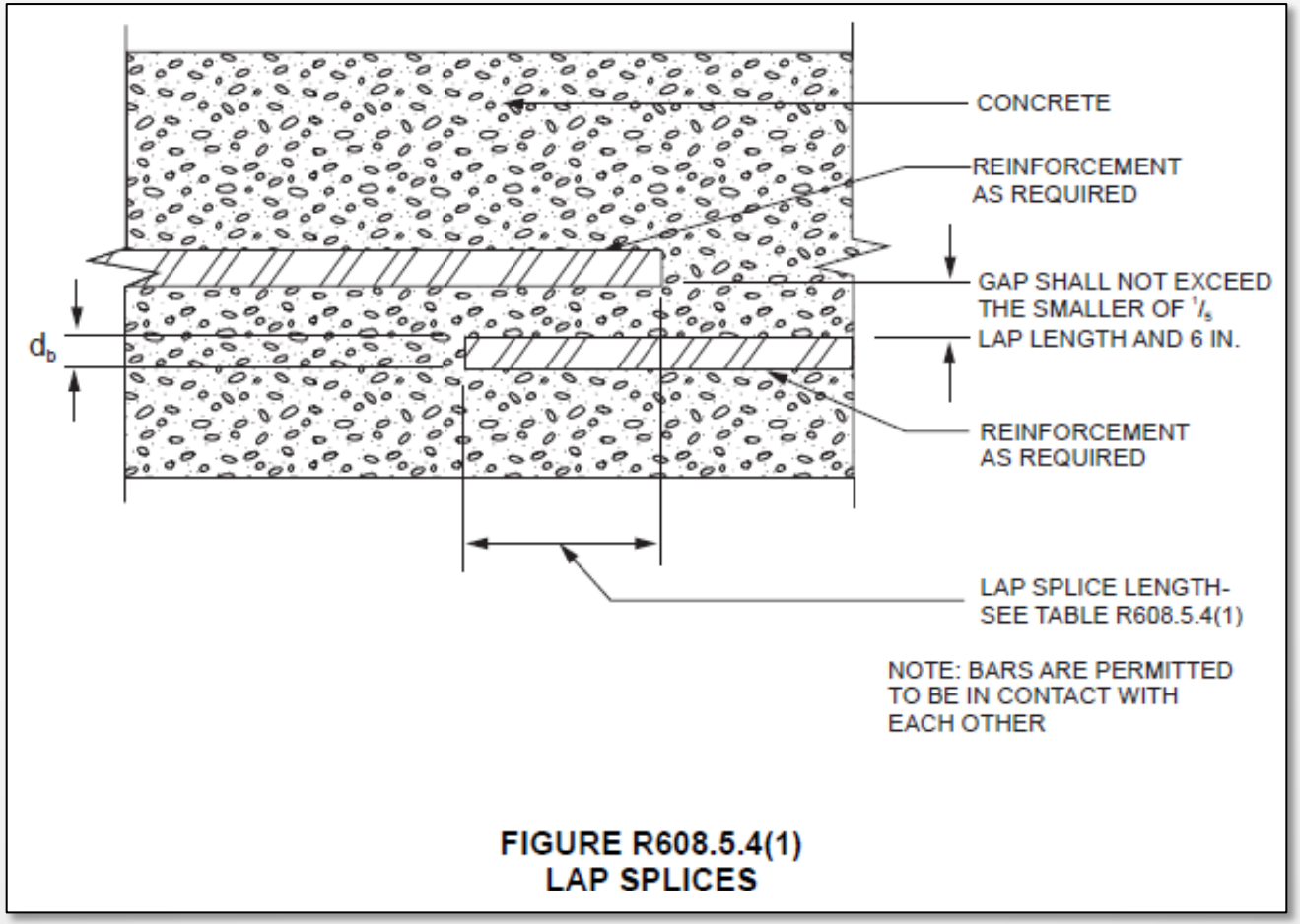


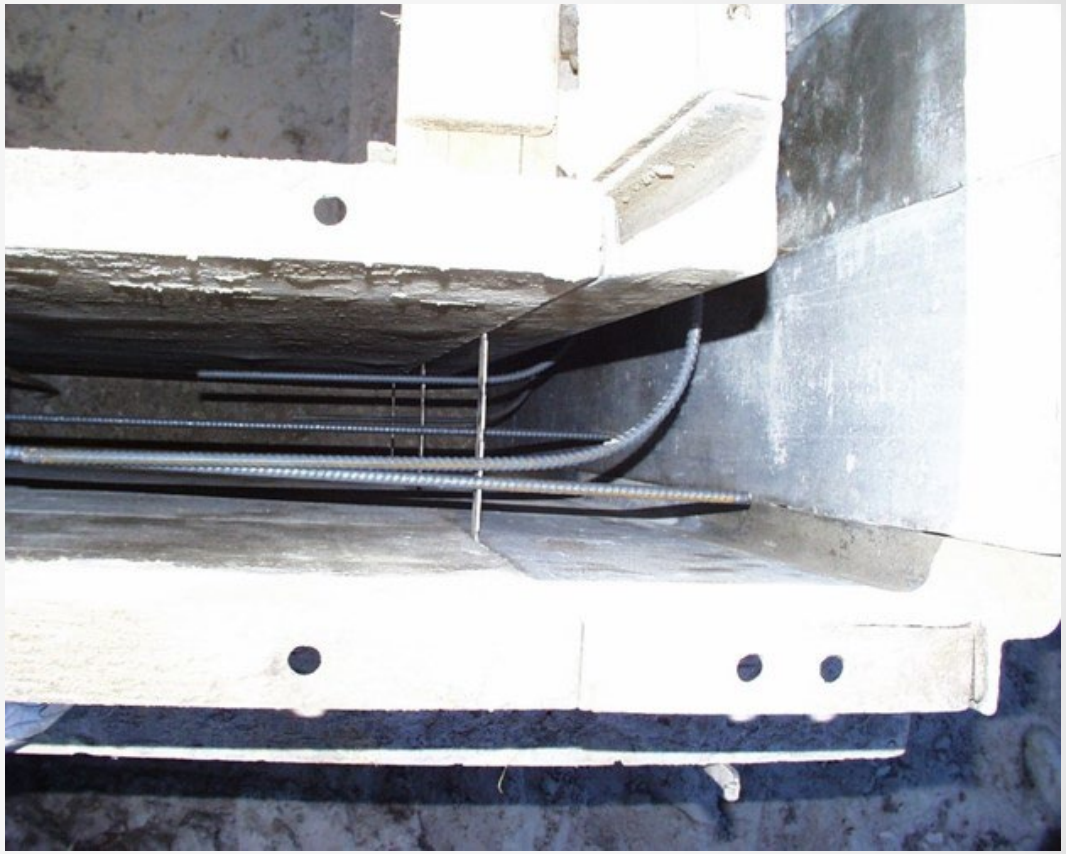
FIGURE R608.5.4(1)
LAP SPLICES

Foundation Walls - Formwork

DEPARTMENT OF LABOR AND INDUSTRY

R404.1.2.3.5

- Forms to be plumb and level.



- Forms are oiled prior to installation.

Foundation Walls – Stepped Footings

DEPARTMENT OF LABOR AND INDUSTRY

R404.1.2.3.6.1

Stepped footing foundation.

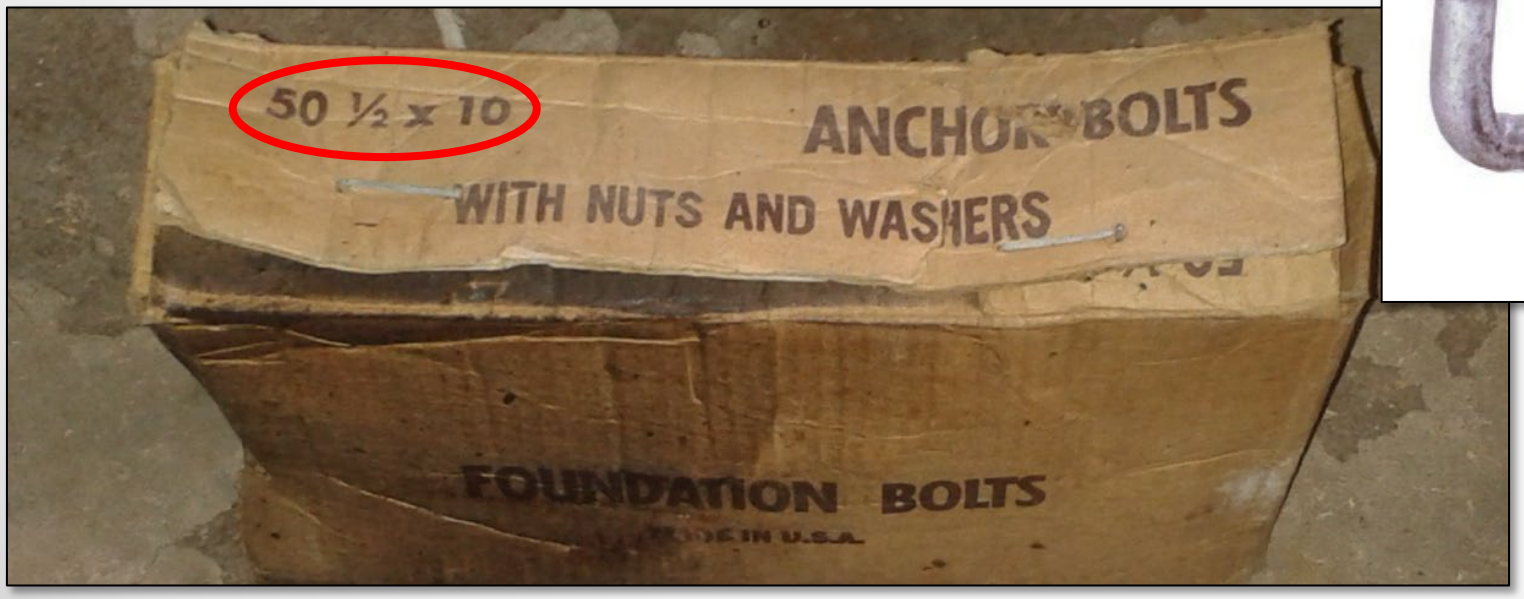
- Dowels, if required, are to be installed and tied in place.

Foundation Wall – Anchor Bolts (1 of 3)

DEPARTMENT OF LABOR AND INDUSTRY

R403.1.6

- Pre-pour, post-pour, framing – address the bolts at each of these 3 inspections.
- At *this* inspection, check that anchor bolts or straps are onsite.
  - Look at bolts - min 1/2” bolt, long enough for 7” embedment.
- Spacing/locations to be checked later…



Concrete Placement

- Following the poured wall inspection:
- If you just finished your footing inspection, and the ready-mix concrete shows up, you might consider watching at the placement procedure…

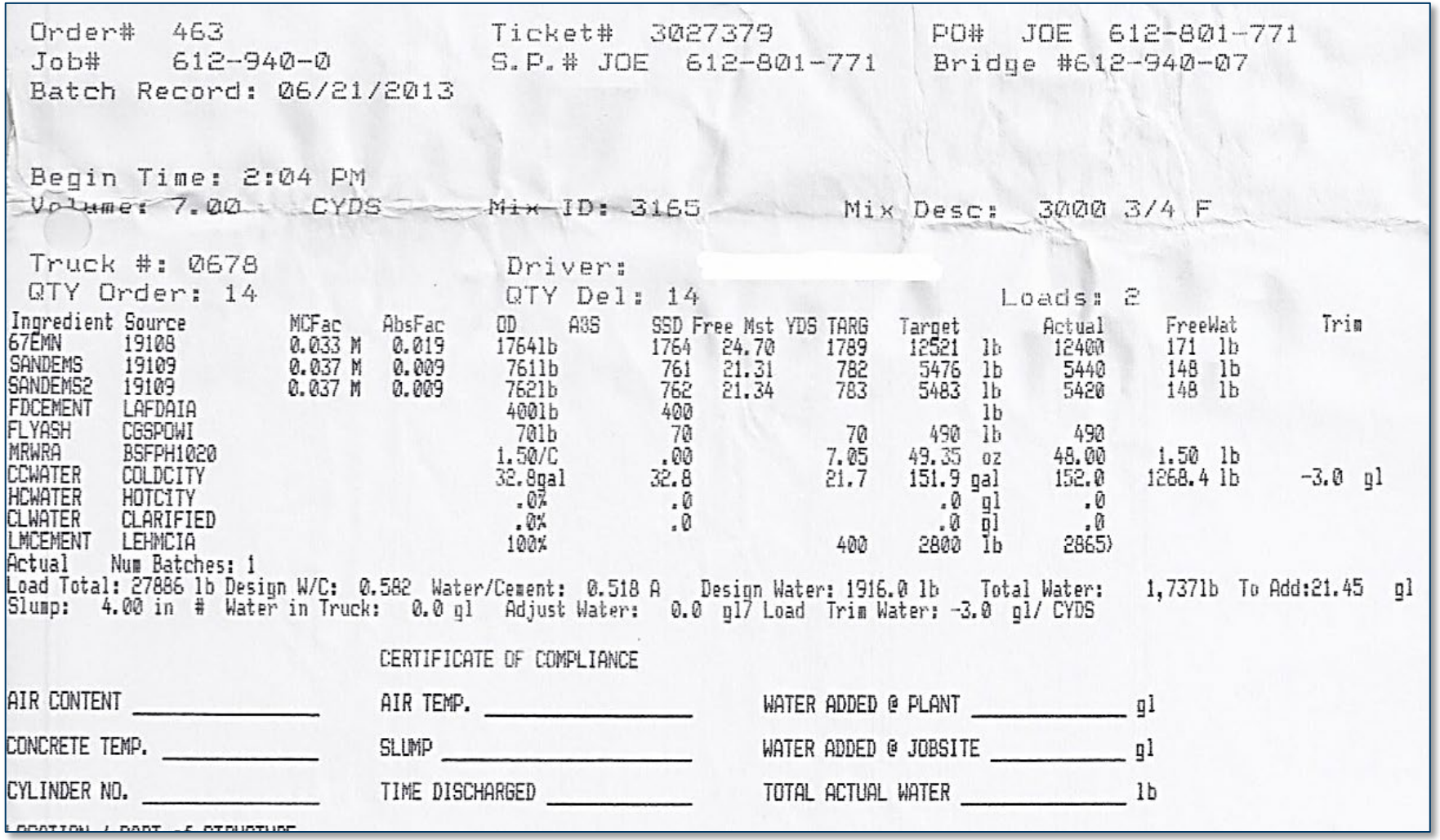
Footings – Concrete Placement

Ready-mix concrete:

- Trip ticket to identify concrete mix proportions Minimum Compressive Strength per Table R402.2. (Not for slab on grade or post footings.)
- Air entrainment, if required, 5 to 7% (for concrete that will be exposed to freezing and thawing during construction).
- Travel time and drum rotation 90 minutes and 300 revolutions maximum (ASTM C94 or C685).

Footings – Concrete Placement

- Required "Batch Ticket" information.



Order# 463 Ticket# 3027379 PO# JOE 612-801-771
Job# 612-940-0 S.P.# JOE 612-801-771 Bridge #612-940-07
Batch Record: 06/21/2013

Begin Time: 2:04 PM
Volume: 7.00 CYDS Mix ID: 3165 Mix Desc: 3000 3/4 F

Truck #: 0678 Driver:
QTY Order: 14 QTY Del: 14 Loads: 2

Ingredient	Source	MCFac	AbsFac	OD	A3S	SSD	Free Mst	YDS	TARG	Target		Actual	FreeWat	Trim
67EMN	19108	0.033 M	0.019	1764lb		1764	24.70		1789	12521	lb	12400	171 lb	
SANDEMS	19109	0.037 M	0.009	761lb		761	21.31		782	5476	lb	5440	148 lb	
SANDEMS2	19109	0.037 M	0.009	762lb		762	21.34		783	5483	lb	5420	148 lb	
FDCEMENT	LAFDAIA			400lb		400					lb			
FLYASH	CGSPOWI			70lb		70			70	490	lb	490		
MRWRA	BSFPH1020			1.50/C		.00			7.05	49.35	oz	48.00	1.50 lb	
CCWATER	COLDCITY			32.8gal		32.8			21.7	151.9	gal	152.0	1268.4 lb	-3.0 gl
HCWATER	HOTCITY			.0%		.0				.0	gl	.0		
CLWATER	CLARIFIED			.0%		.0				.0	gl	.0		
LMCEMENT	LEHMCIA			100%					400	2800	lb	2865)		

Actual Num Batches: 1
Load Total: 27886 lb Design W/C: 0.582 Water/Cement: 0.518 A Design Water: 1916.0 lb Total Water: 1,737lb To Add:21.45 gl
Slump: 4.00 in # Water in Truck: 0.0 gl Adjust Water: 0.0 gl7 Load Trim Water: -3.0 gl/ CYDS

CERTIFICATE OF COMPLIANCE

AIR CONTENT _____ AIR TEMP. _____ WATER ADDED @ PLANT _____ gl

CONCRETE TEMP. _____ SLUMP _____ WATER ADDED @ JOBSITE _____ gl

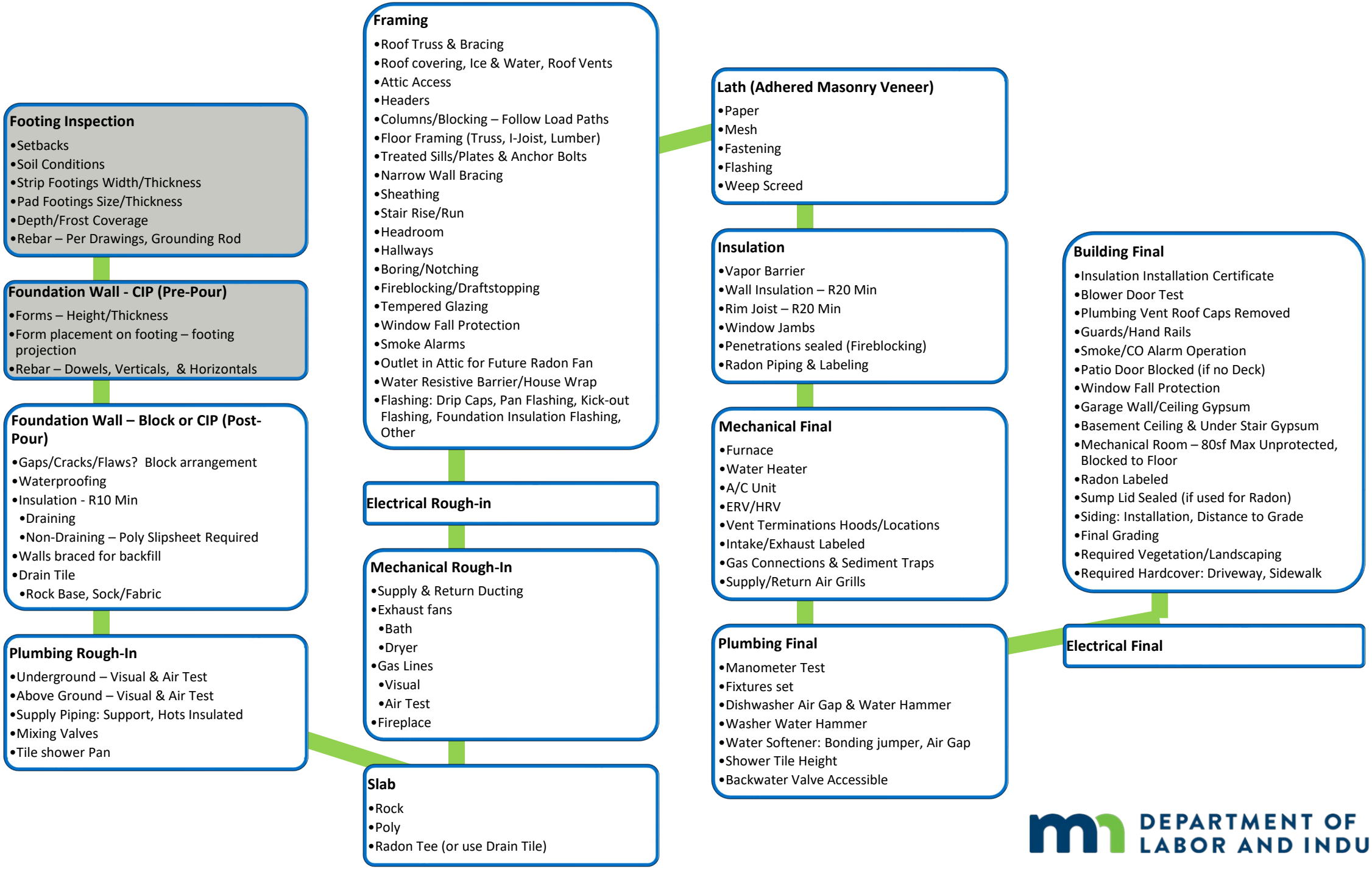
CYLINDER NO. _____ TIME DISCHARGED _____ TOTAL ACTUAL WATER _____ lb

DEPARTMENT OF LABOR AND INDUSTRY

Foundation Wall: Block/CIP (post-pour) Waterproofing/Drain Tile Inspection

Foundation Wall: Block or Cast-in-place (post-pour) Inspection

- ☐ Block: thickness, block arrangement [R404.1.2, R404.1.5]
- ☐ Waterproofing* [R406.2, RE402.1.1]
- ☐ Insulation*: draining/non-draining (6-mil poly slip sheet required for non-draining) [RE402.1, RE402.2.8]
- ☐ Walls braced for backfill [R404.1.7]
- ☐ Drain Tile: rock base, sock/fabric [R405]



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Waterproofing/Drain Tile – Anchor Bolts (2 of 3)

R403.1.6

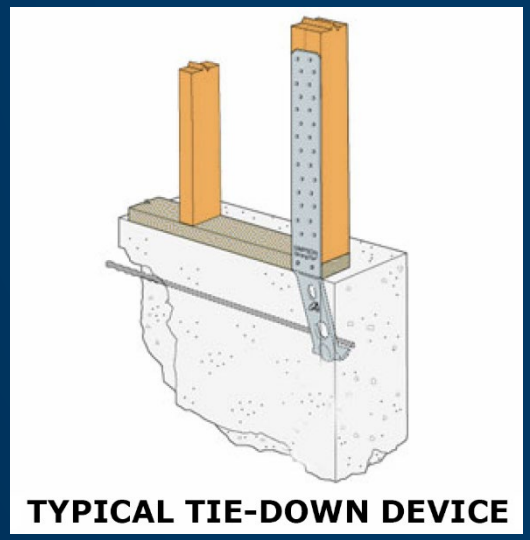
- 6’ max OC.
- At least 1” of grout from the inside face of the masonry and the bolt.
- Placement of anchor straps according to the manufacturer’s specifications.
- When vertical reinforcing is required (rebar), bolts must be within 8”.

Waterproofing/Drain Tile – Hold-downs

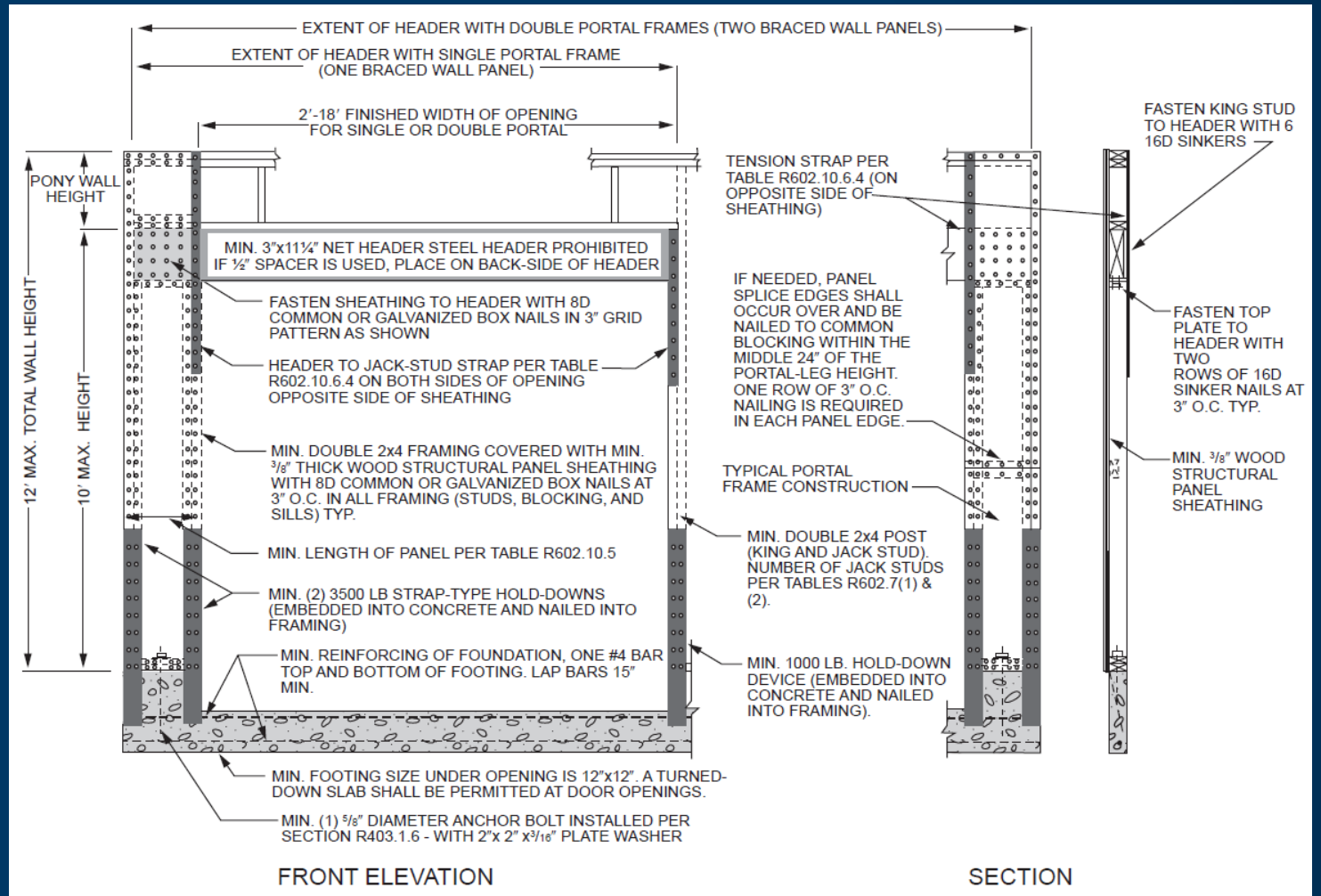
R602.10.6.2

Wall Bracing - Portal Framing:

- Verify hold-downs are installed.
- Remaining items will be reviewed at framing inspection.



TYPICAL TIE-DOWN DEVICE



4 mm, 1 foot = 304.8 mm.

FIGURE R602.10.6.2
METHOD PFH—PORTAL FRAME WITH HOLD-DOWNS

Waterproofing/Drain Tile – Hold-downs

R602.10.6.2

Wall Bracing - Portal Framing:

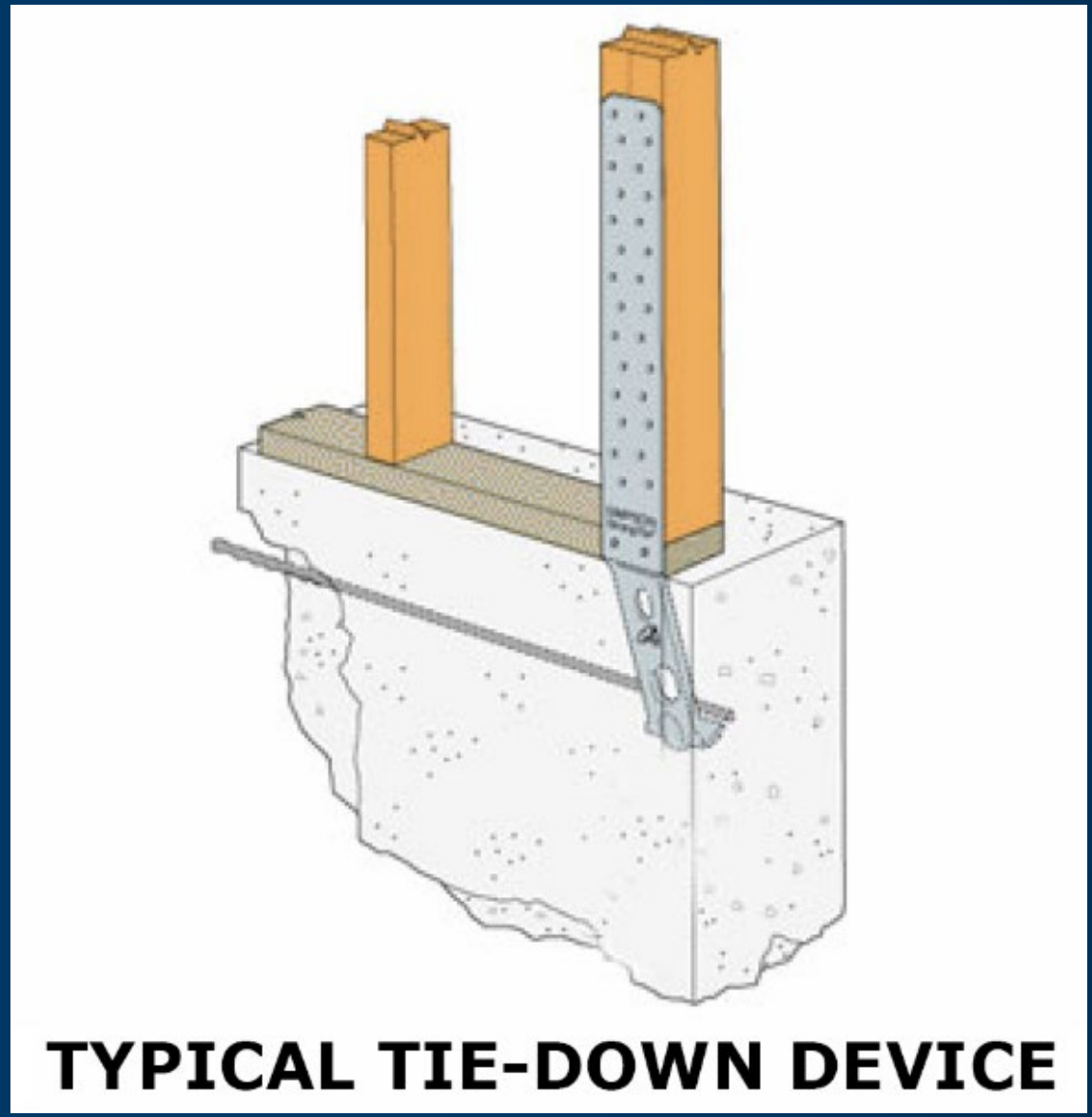
- These are installed incorrectly. They should be on the exterior of the wall.

Waterproofing/Drain Tile – Hold-downs

R602.10.6.2

Wall Bracing - Portal Framing:

- Hold-downs must be installed on exterior.
- For Simpson LSTHD & STHD, stemwall/curb must be 6-8” min thickness depending on the application.



Waterproofing Materials

R406.2 & RE402.1.1 #1

- Type and location of foundation waterproofing.
  - 8 prescriptive materials
  - Alternates?
- Must be installed from the top of the footing, up wall, **across top of wall,** and follow the manufacturer's installation instructions.

Waterproofing/Drain Tile – Foundation Insulation

RE402.2.8

- Total of R-15, minimum R-10 on the exterior of the foundation. (More in energy program)
- Is the foam tested to be buried or installed in this manner (check manufacturer's installation instructions)?

Waterproofing/Drain Tile – Foundation Slip Sheet

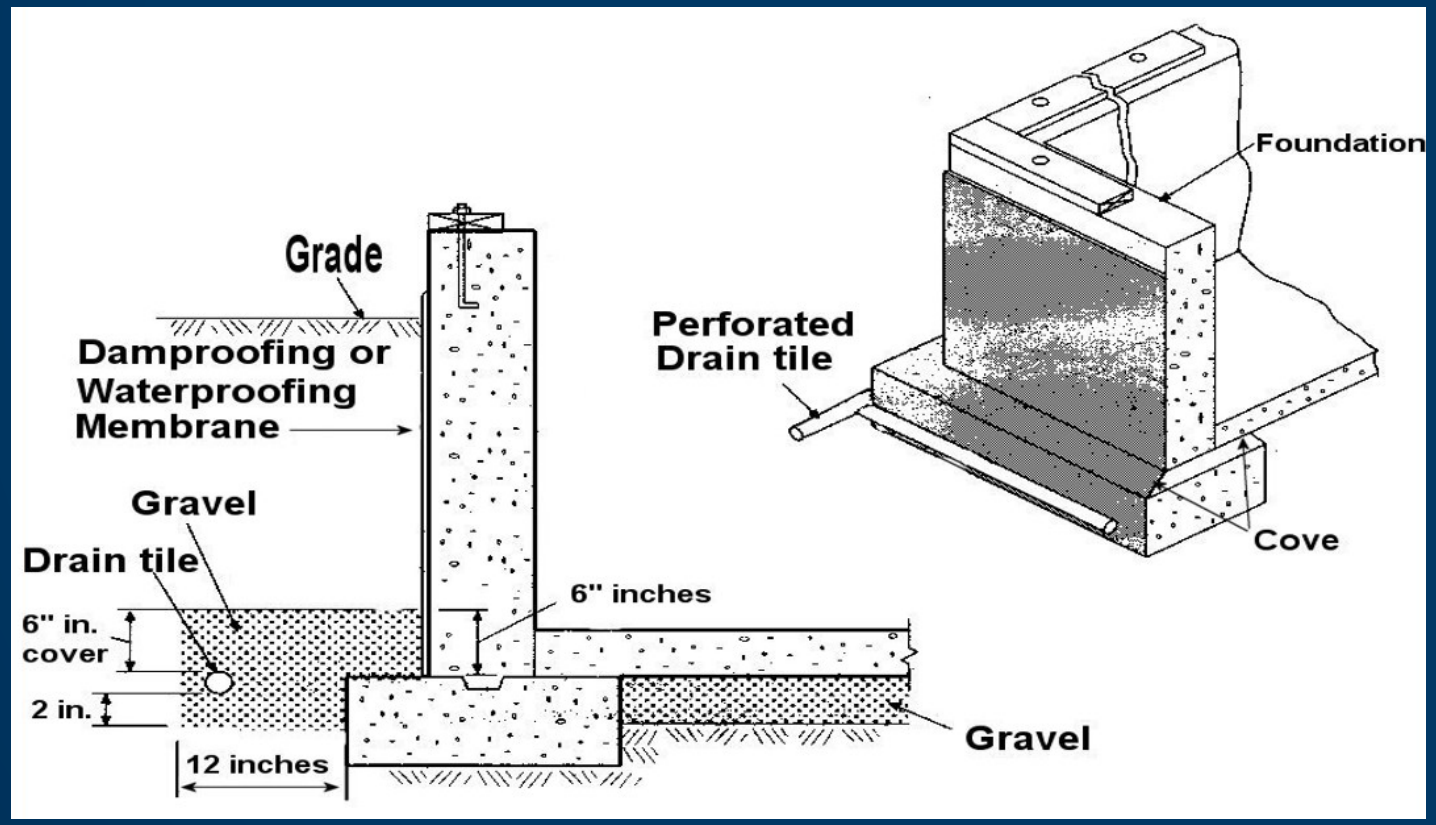
RE402.1.1.3

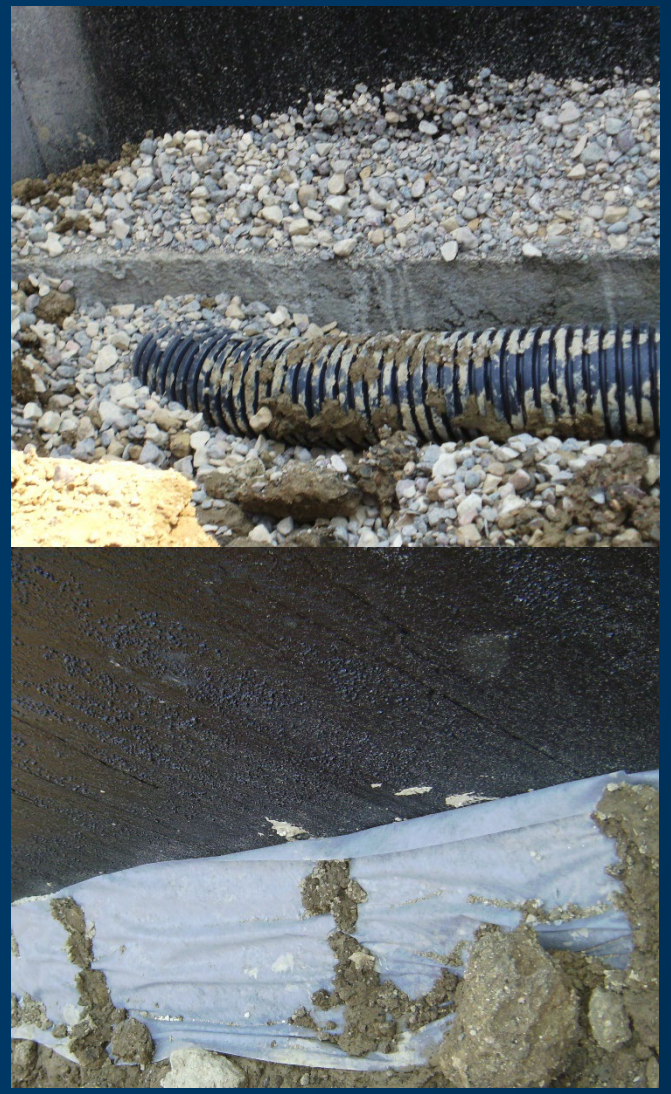
- *Any* insulation assembly installed on the exterior of the foundation walls or on the perimeter of slabs-on-grade that does not permit bulk water drainage shall be covered with a 6-mil polyethylene slip sheet over the entire exterior surface.

Waterproofing/Drain Tile

R405.1

- Drains shall be provided around all concrete or masonry foundations that retain earth and enclose **habitable** or **usable** spaces located below grade.





Waterproofing/Drain Tile - Backfill

R404.1.7

- Backfill shall not be placed against the wall until the wall has sufficient strength and has been anchored to the floor above, or has been sufficiently braced to prevent damage by the backfill.
- ***Exception:*** Bracing is not required for walls supporting less than 4’ of unbalanced backfill.

Plumbing Rough-in Inspection (Underground)

Plumbing Rough-In Inspection

- ☐ Underground: visual & air test [P Chapter 7, P712.3]
- ☐ Above ground: visual & air test [P Chapter 7, P712.3]
- ☐ Supply piping: support, hot supplies insulated* [P Chapter 6, P313.3, RE403.4]
- ☐ Mixing valves [P408.3]
- ☐ Tile shower pan [P408.5 – 408.7]

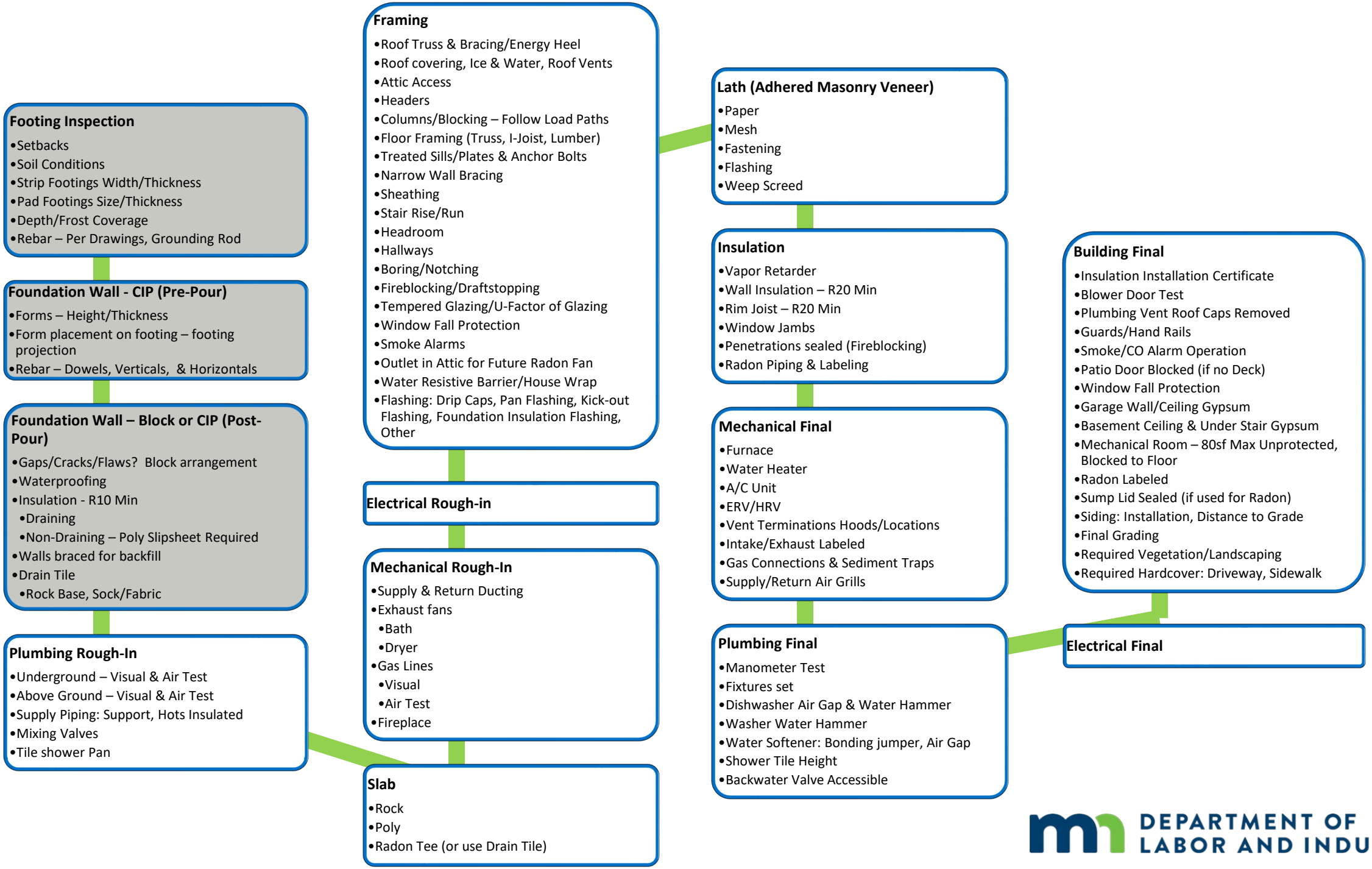
Underground Plumbing of a Custom Residence in Evergreen, CO - EVstudio

DEPARTMENT OF LABOR AND INDUSTRY

Slab Inspection/Radon (pre-pour)

Slab Inspection/Radon (pre-pour) [MR 1303.2402]

- ☐ Gas permeable material (washed rock)
- ☐ Soil-gas membrane/6 Mil Poly
- ☐ Radon Tee (or use interior drain tile)



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Slab/Radon (Subfloor Prep)

MN Rules 1303.2401, Subp. 2

The gas-permeable layer shall consist of one of the following:

- A uniform layer of clean aggregate, a minimum of 4” thick. The aggregate shall consist of material that will pass through a 2” sieve and be retained by a ¼” sieve.
- A uniform layer of sand (native or fill), a minimum of 4” thick, overlain by a layer or strips of geotextile drainage matting designed to allow the lateral flow of soil gases.
- Other materials, systems or floor designs if the material, system, or floor design is professionally engineered to provide depressurization under the entire soil-gas membrane.

Slab/Radon (Subfloor Prep)

MN Rules 1303.2401, Subp. 2

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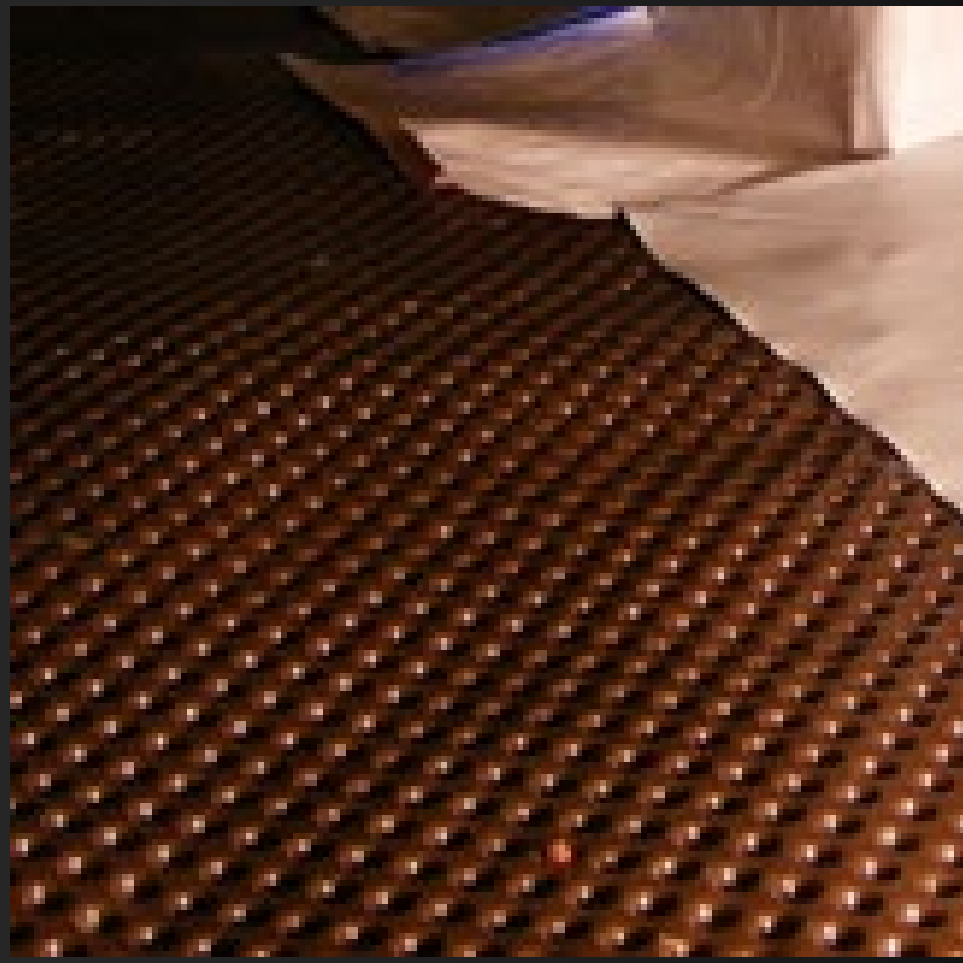
- Other materials, systems or floor designs if the material, system, or floor design is professionally engineered to provide depressurization under the entire soil-gas membrane.



Slab/Radon (Vent Pipe)

MN Rules 1303.2402, Subp. 3

Two Options:

- Tee beneath slab.
  - Add one 10’ section of perforated pipe in each direction.
  - Connect vent pipe within aggregate layer.
- Sump Bucket (Drain Tile)
  - Cover must be sealed/gasketed & designed to accommodate vent pipe

Slab/Radon (Gas Permeable Barrier)

MN Rules 1303.2402, Subp. 2

A continuous membrane of 6-mil (0.15 mm) polyethylene, 3 mil (0.075 mm) cross-laminated polyethylene, or other equivalent material used to retard the flow of soil gases into a building:

- Installed prior to casting the concrete slab.
- Cover the entire floor area.
- Seams lapped at least 12”.

Slab/Radon (Gas Permeable Barrier)

MN Rules 1303.2402, Subp. 2

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Slab/Radon (Gas Permeable Barrier)

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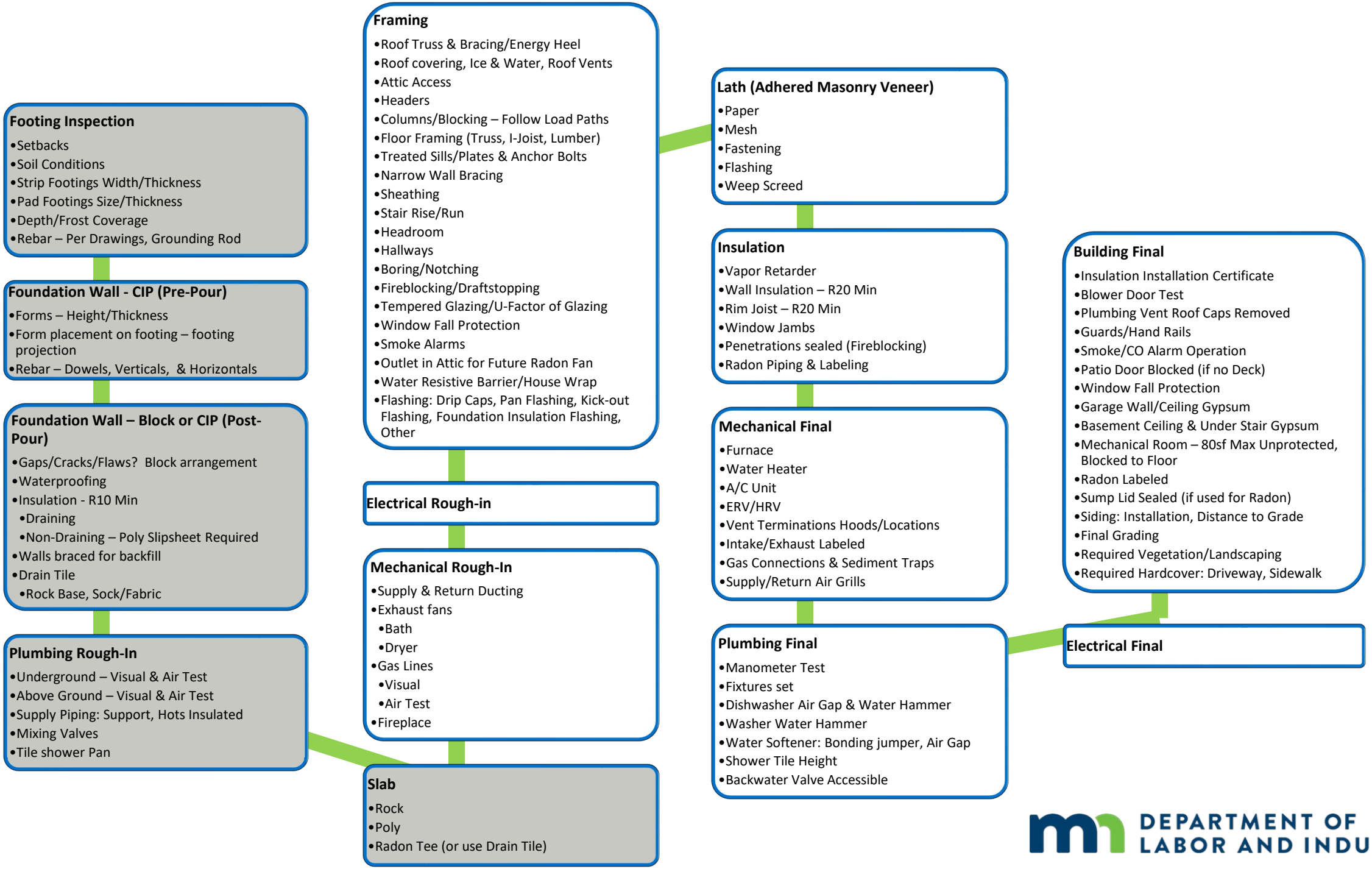
Mechanical Rough-In Inspection

Mechanical Rough-In Inspection

- ☐ Supply & return ducting* [RE403.2.2, RE403.5.6, M603]
- ☐ Exhaust fans*: bath, kitchen, dryer, insulation [RE403.2.1, M501, M504, M505]
- ☐ Gas Lines: visual, air test, support [M305, FG406, FG407, FG408.4]
- ☐ Fireplace*: per manufacturer requirements [FG604]



DEPARTMENT OF LABOR AND INDUSTRY

Gas Fireplaces – Rough-in

- Fireblocking.
- Gas line.
  - Pressure test – 25# min pressure, ½ hour min duration.
  - More detail provided in Fuel Gas presentation.
- Manufacturer's installation instructions.
  - Venting.
  - Clearance to combustibles.

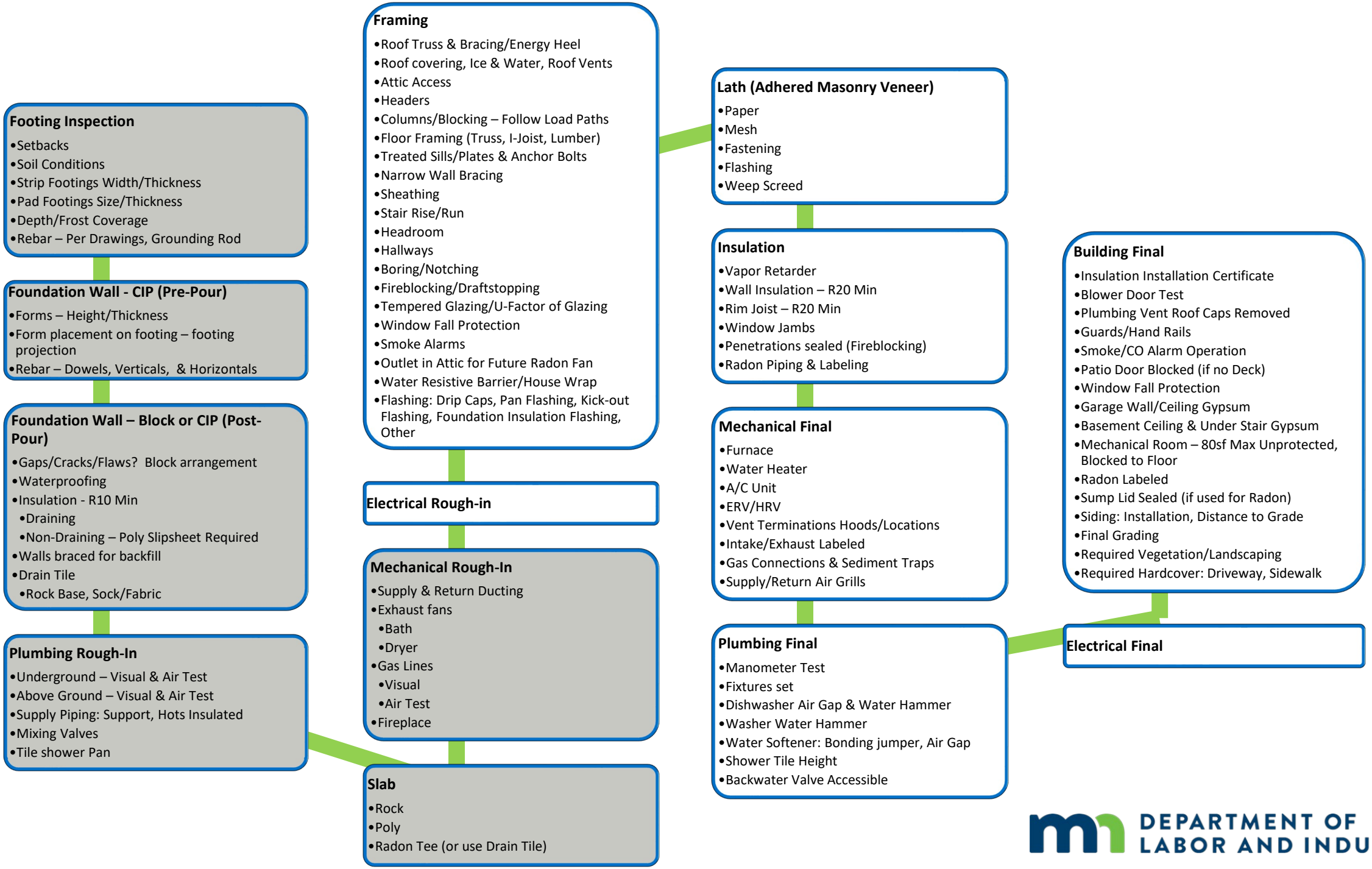
R302.11, IFGC 406.4 and R1004.1

DEPARTMENT OF LABOR AND INDUSTRY

Electrical Rough-In Inspection

Electrical Rough-In Inspection

☐ Verify completion by appropriate authority

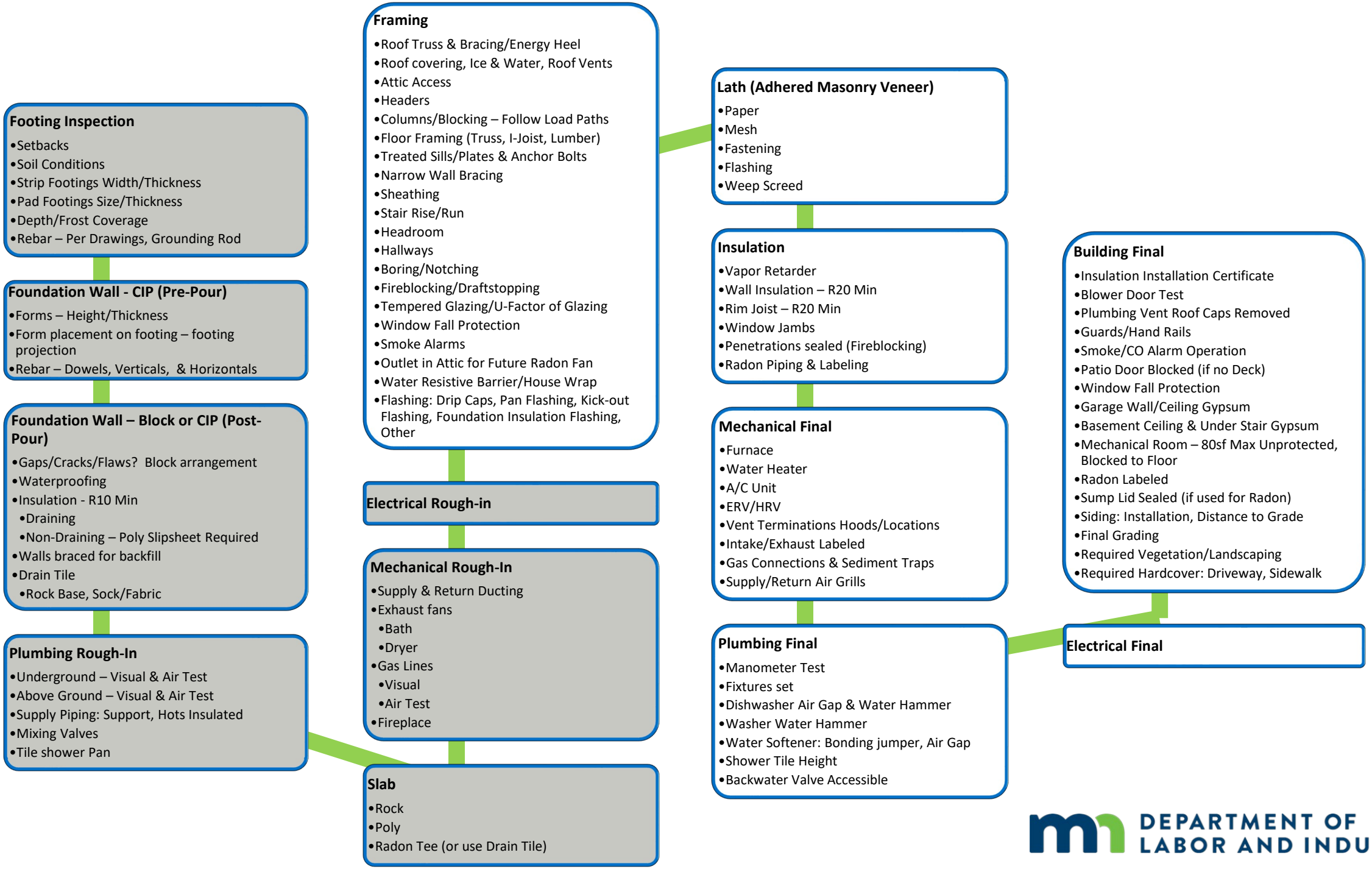


DEPARTMENT OF LABOR AND INDUSTRY

Framing

Framing Inspection

- ☐ Water resistive barrier (House wrap) [R703.2]
- ☐ Flashing: drip cap, pan flashing, deck ledger flashing, foundation insulation flashing, other [R703.4, R903.2, R507.2.4]
- ☐ Roof covering: sheathing, venting, step flashing, ice barrier [Table R503.2.1.1(1), R803.2, R806, R903.2, R905.1.2]
- ☐ Wall bracing [R602.10]
- ☐ Wall sheathing [R316.5.12, R602.3, R604]
- ☐ Roof truss*: bearing, bracing, uplift restraint, fastening, energy heel [R802.10.3, R802.11, Table RE402.1.1 footnote J]
- ☐ Attic access opening [R807]
- ☐ Outlet in attic for future Radon fan [MN Rules 1303.2402 Subp. 6]
- ☐ Headers/beams/girders: load path, bearing, size [R301.1, R502.6, R602.7]
- ☐ Walls: stud height, spacing [R602.3.1]
- ☐ Columns, point loads, blocking: follow load paths [R301.1, R407]
- ☐ Floors (truss, I-joist, lumber): blocking, framing, bearing, subfloor [R404.1, R502, R503]
- ☐ Fenestrations*: sealing, tempered glazing, fall protection, U-factor, air leakage [R308, R609, RE402.3, RE402.4.3]
- ☐ Smoke/CO alarm locations [R314, R315]
- ☐ Stairway: rise, run, width, landings, total height [R311.7]
- ☐ Headroom clearance [R305.1]
- ☐ Hallway width [R311.6]
- ☐ Treated sills and plates, anchorage [R317.1, R403.1.6, R404.1, R404.3]
- ☐ Boring & notching [R502.8, R602.6]
- ☐ Fireblocking & draftstopping [R302.11, R302.12]
- ☐ Radon piping installed & labeled [MN Rules 1303.2402 Subp. 5]
- ☐ Deck: ledger, posts, beam, joists, hangers, stairs [R507]



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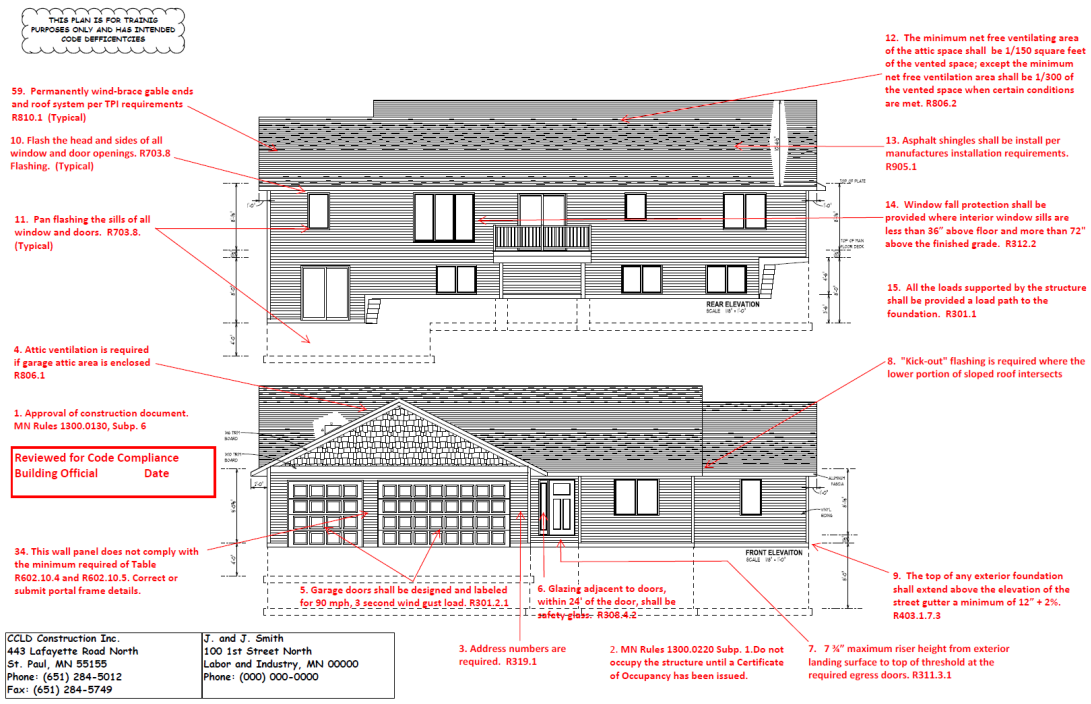
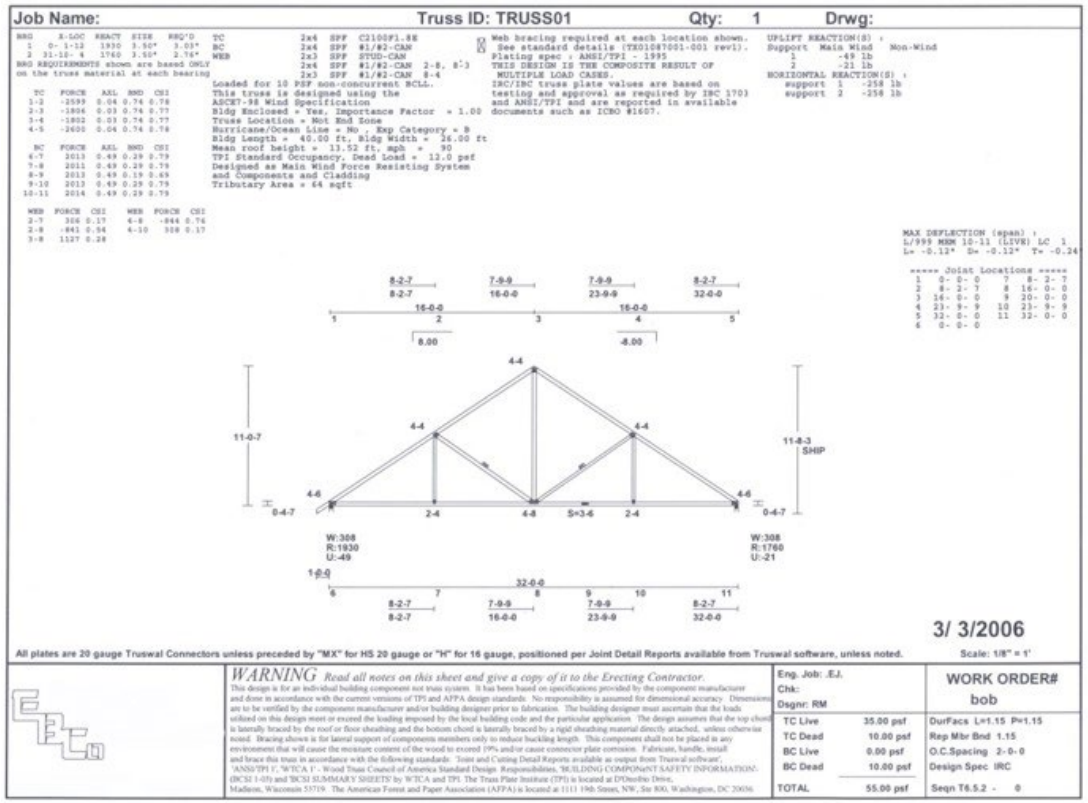
Framing

DEPARTMENT OF LABOR AND INDUSTRY

MN Rules 1300.0130, Subp. 2



Do you have the approved plan set?



Do you have a copy of the truss specs?

Framing

Overall goal:

- Structurally complete.
- The structure is weather tight.
  - Windows installed.
  - Roofing completed.
  - Water resistive barrier installed.

Framing – Water-Resistive Barrier

DEPARTMENT OF LABOR AND INDUSTRY

R703.2

- Water-Resistive Barrier (WRB) / House wrap
  - Vertical laps 2”, horizontal 6” min.
  - Manufacturers installation instructions.
- Flashing
  - Drip cap, pan flashing, deck ledger, kick-out, others
  - Roof Covering

Framing – Flashing

DEPARTMENT OF LABOR AND INDUSTRY

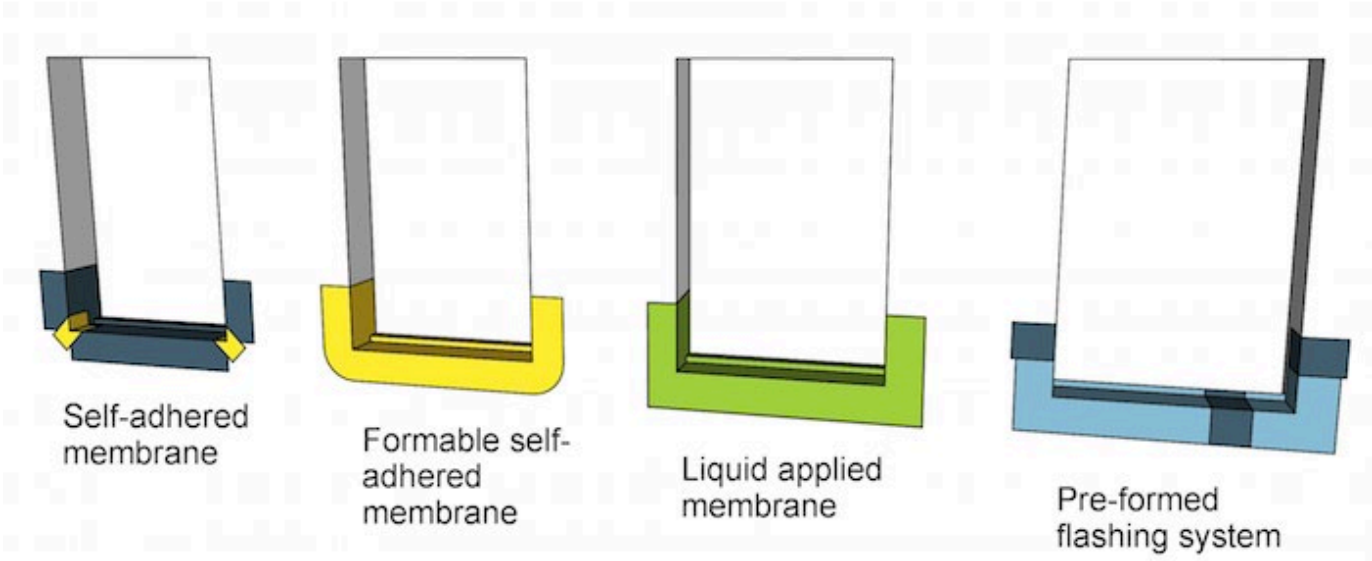
R703.2

- Flashing
  - Drip cap
    - Windows
    - Doors
    - Foundation foam
    - Deck Ledger
  - Pan flashing
  - Kick-out
  - Step
  - Others

Framing – Window Installation

Pan Flashing

- Sloped Sill?
  - Maybe…
- Back dam?
  - Not required by code
- Window Replacement?
  - Not required by code
- Follow manufacturer's instructions

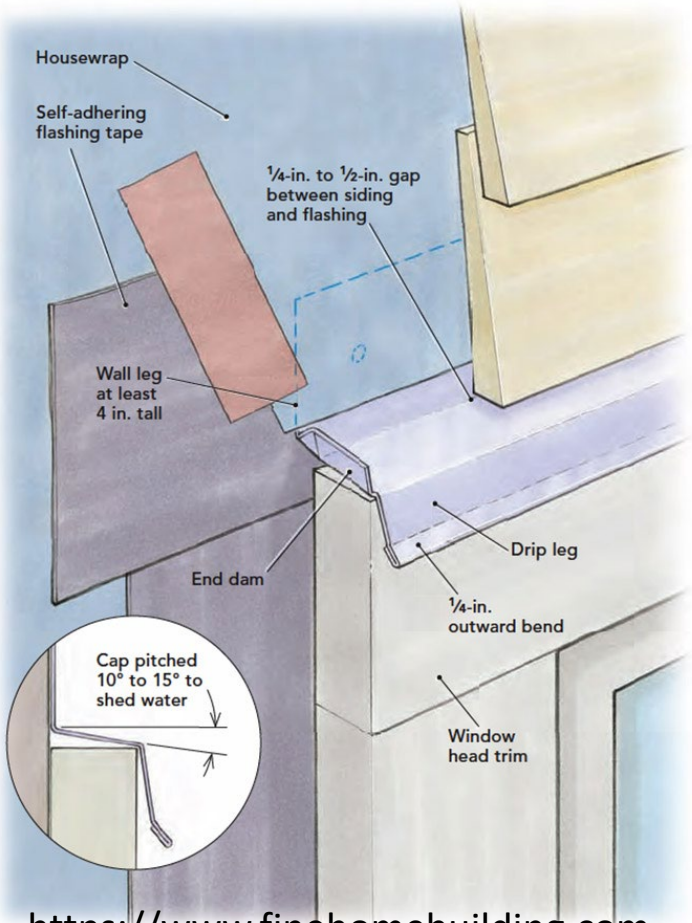


https://dorken.com/insights/energy-efficiency/rain-penetration-systems/

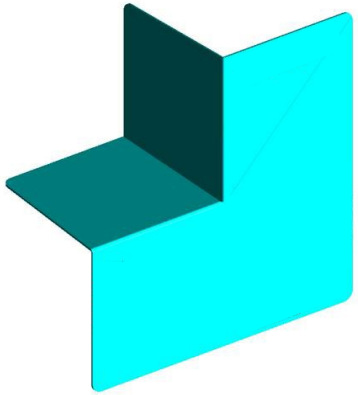
Framing – Window Installation

DEPARTMENT OF LABOR AND INDUSTRY

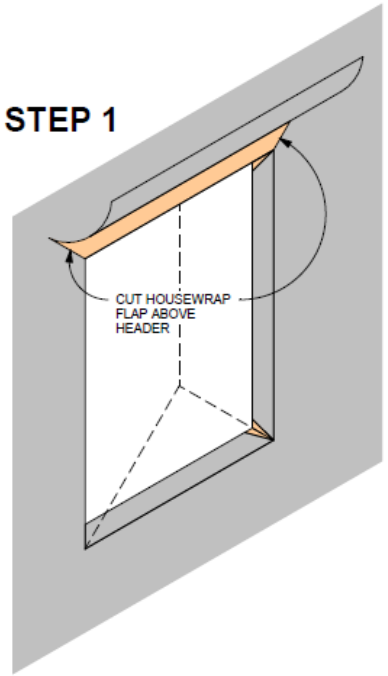
R703.8



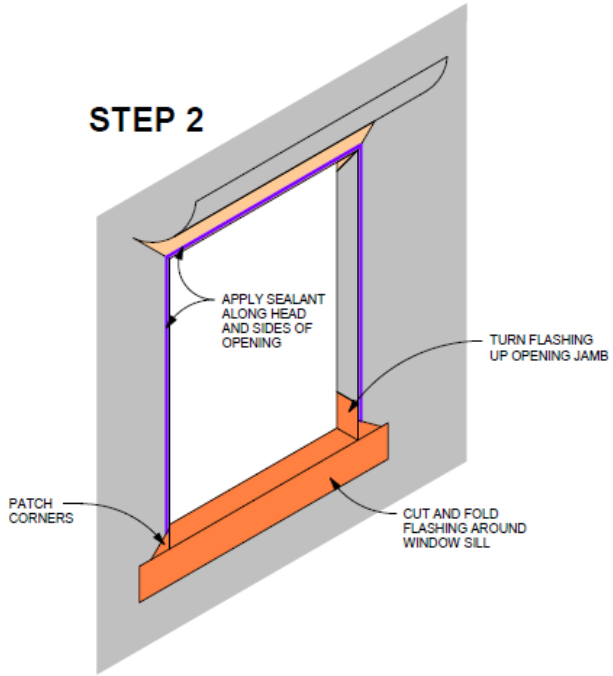
https://www.finehomebuilding.com/2016/11/29/adding-head-flashing



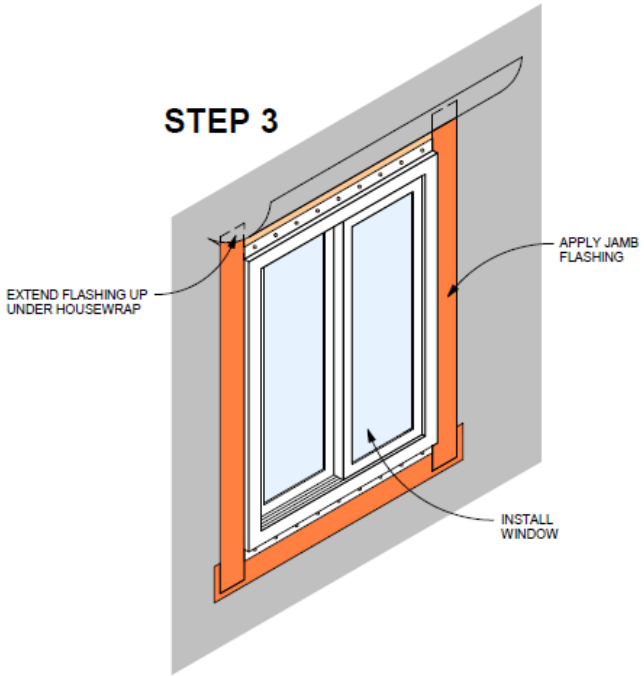
STEP 1



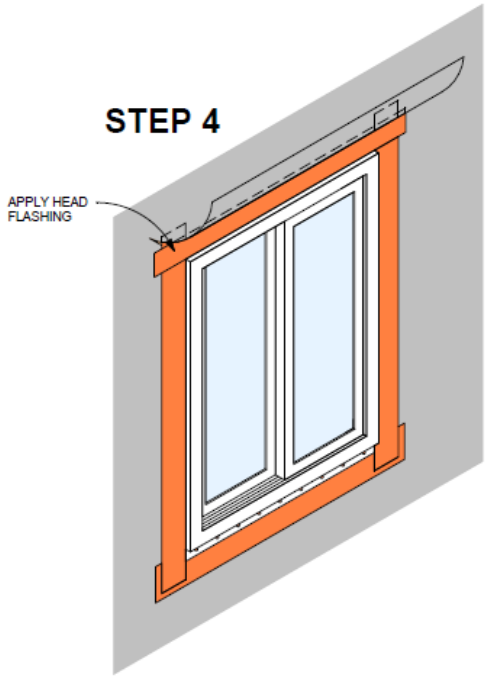
STEP 2



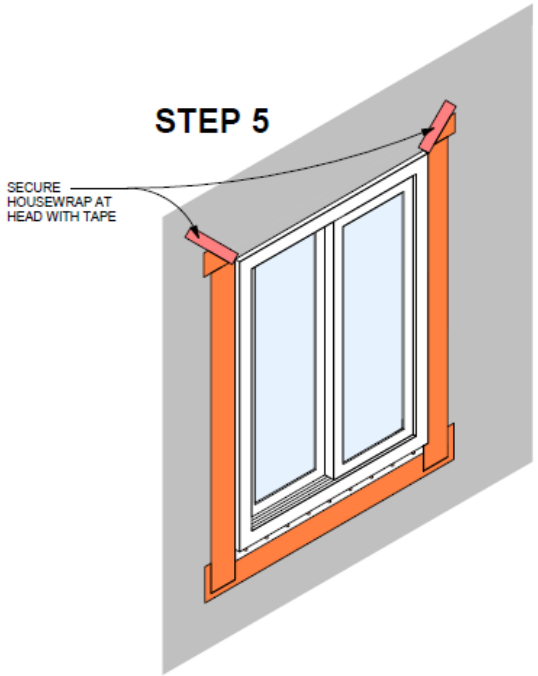
STEP 3



STEP 4



STEP 5



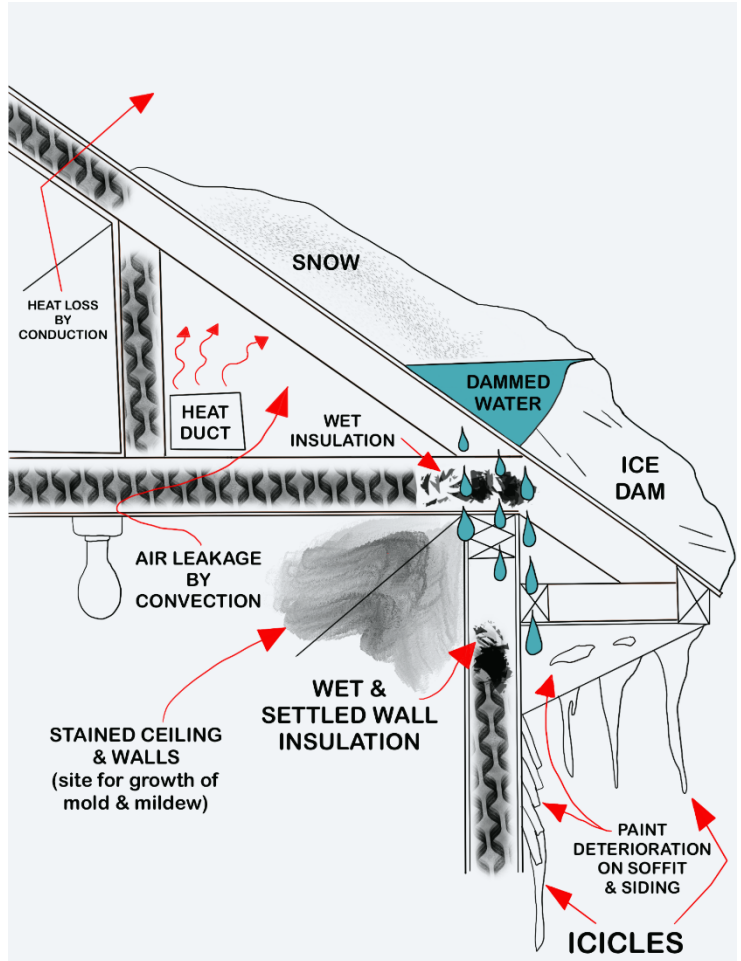
Framing – Roof Covering

DEPARTMENT OF LABOR AND INDUSTRY

R905.1.2

Ice Barrier

- 24” *inside* the exterior wall line
- *Exception:* Detached accessory structures not containing conditioned floor area.



https://extension.umn.edu/protecting-home-rain-and-ice/dealing-and-preventing-ice-dams

Framing – Roof Covering

- Roof assemblies shall be applied in accordance with Chapter 9 and the manufacturer's installation instructions.
- Asphalt shingles shall meet the classification requirements of Table R905.2.4.1(1) for the appropriate maximum basic wind speed.
- Ice & water shield – 24" inside the exterior wall line.
  - Exception: Detached accessory structures not containing conditioned floor area.

Framing – Wall Bracing & Sheathing

DEPARTMENT OF LABOR AND INDUSTRY

R602.10

Wall Bracing:

- Review wall bracing plans
- Sheathing, nails
- Hold-downs, straps
- End conditions

Sheathing:

- Type
- Fastening

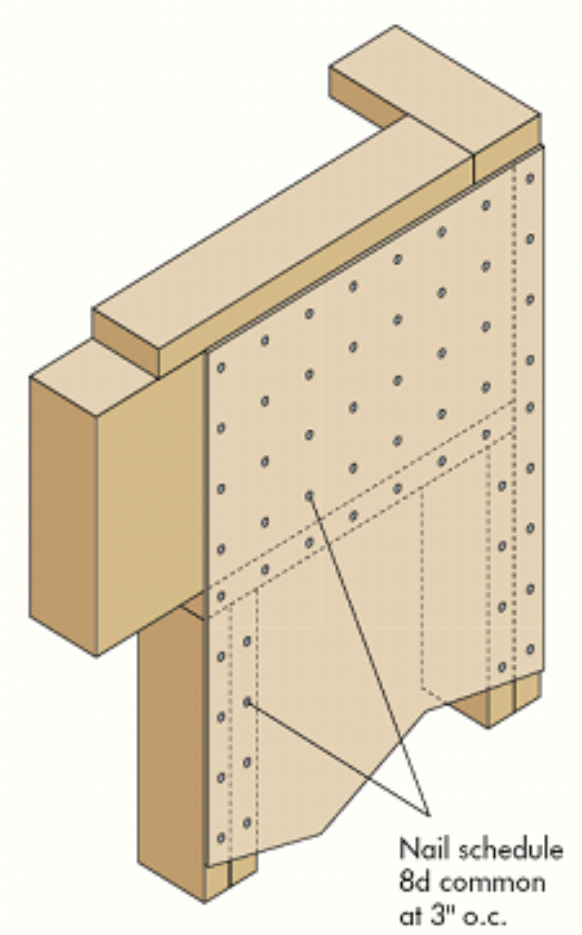
Framing – Wall Bracing

DEPARTMENT OF LABOR AND INDUSTRY

R602.10.6.2

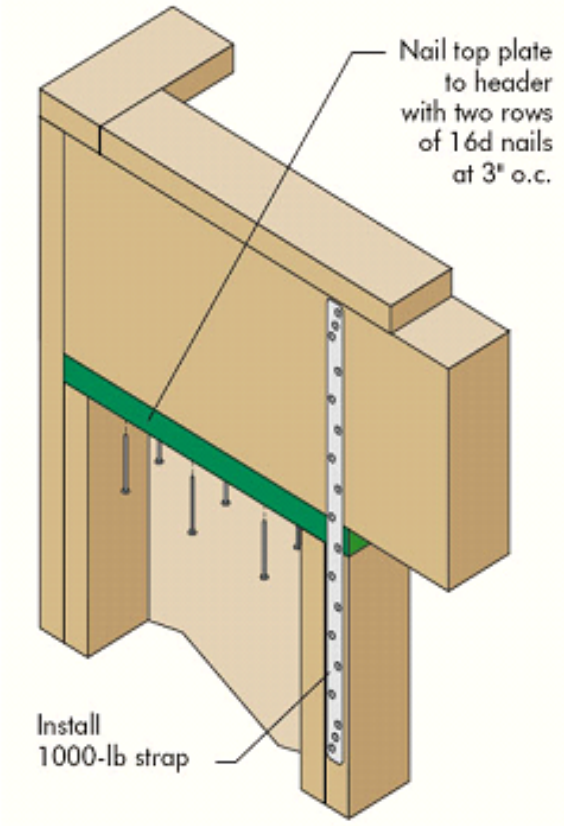
Portal Framing:

- Use correct method – PFH, PFG, CS-PF
- Nailing patterns
- Hold-downs
- Straps



SHEATHING-TO-HEADER
NAILING PATTERN FOR PORTAL FRAMES

SHEATHING-TO-HEADER
NAILING PATTERN FOR PORTAL FRAMES



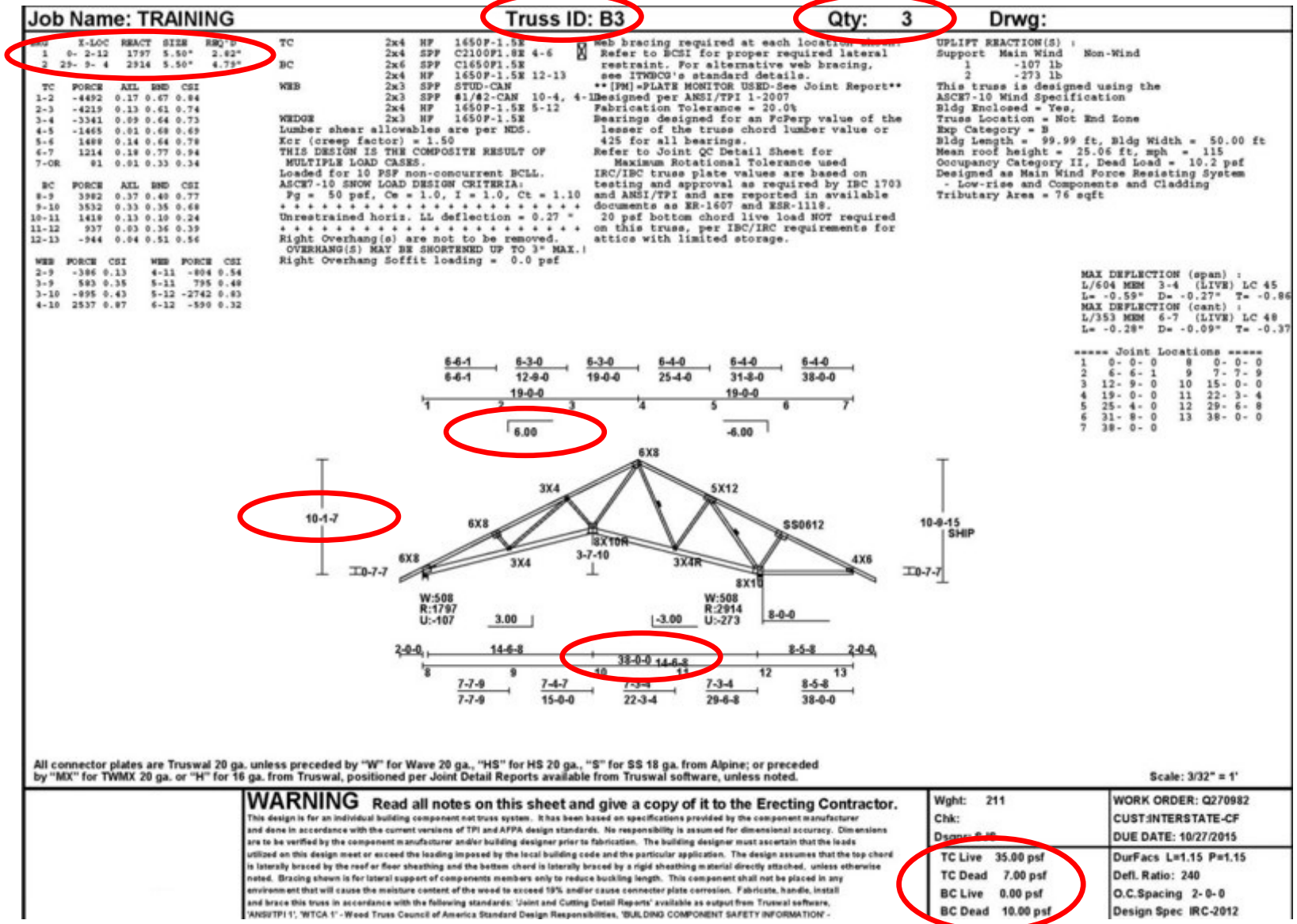
HEADER ATTACHMENT
REQUIREMENTS FOR PORTAL FRAMES

R802.10

Framing – Roof Truss

Roof Truss Basics

1. Truss ID.
2. Quantity.
3. Length.
4. Height.
5. Slope.
6. Required bearing widths.
7. Design loads as applicable.
   - 7.1 Top chord live & dead loads.
   - 7.2 Bottom chord live & dead loads.
   - 7.3 Concentrated loads.



R802.10.1

Framing – Roof Truss

8. Permanent lateral bracing.

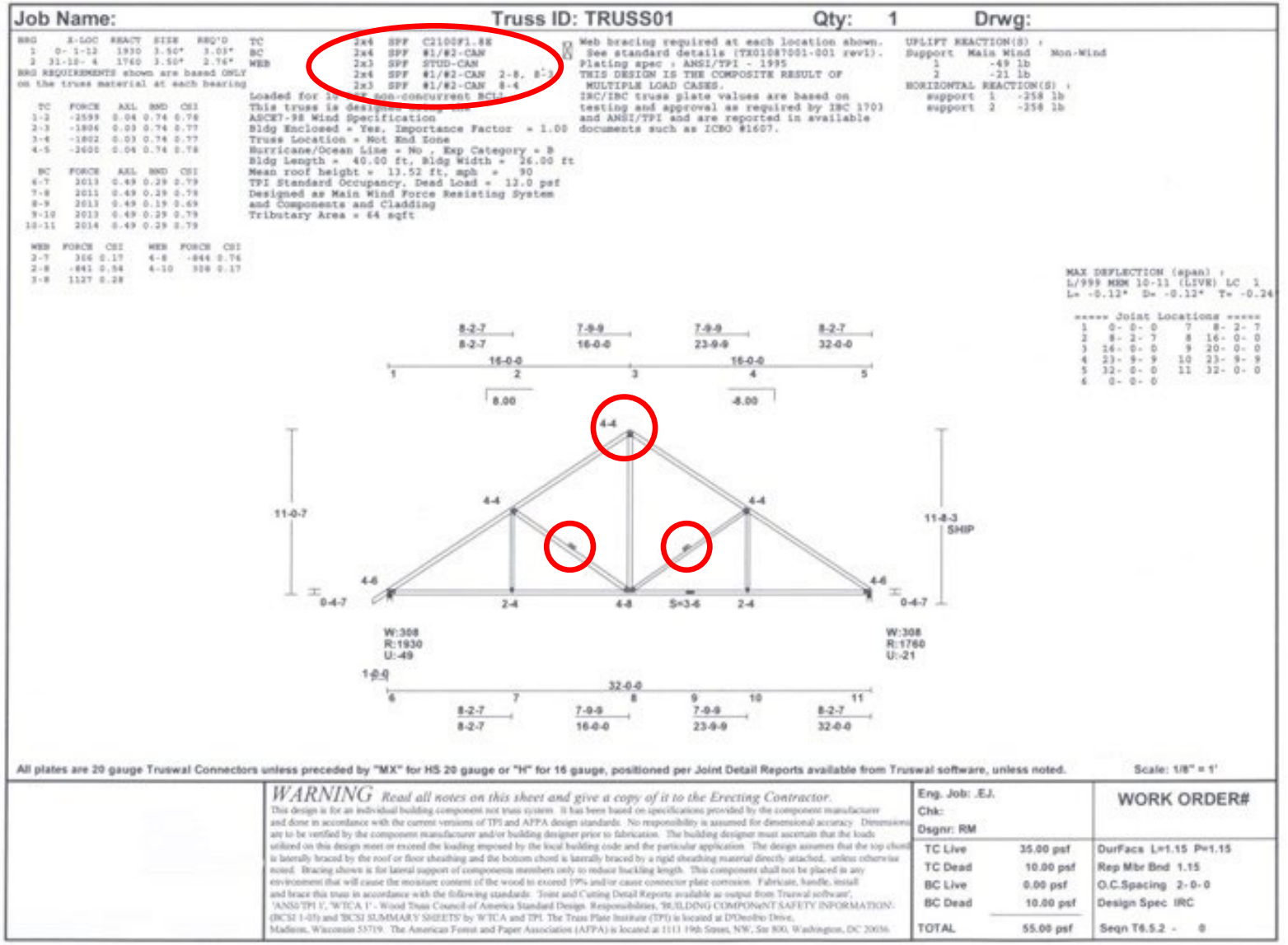
   8.1 Continuous.

   8.2 T-Bracing.

9. Gusset plates (e.g. size, thickness or gage) and location.

10. Lumber size, species, and grade for each member.

11. Building Component Safety Information Documentation (BCSI).



R802.10.1

Framing – Truss Drawings

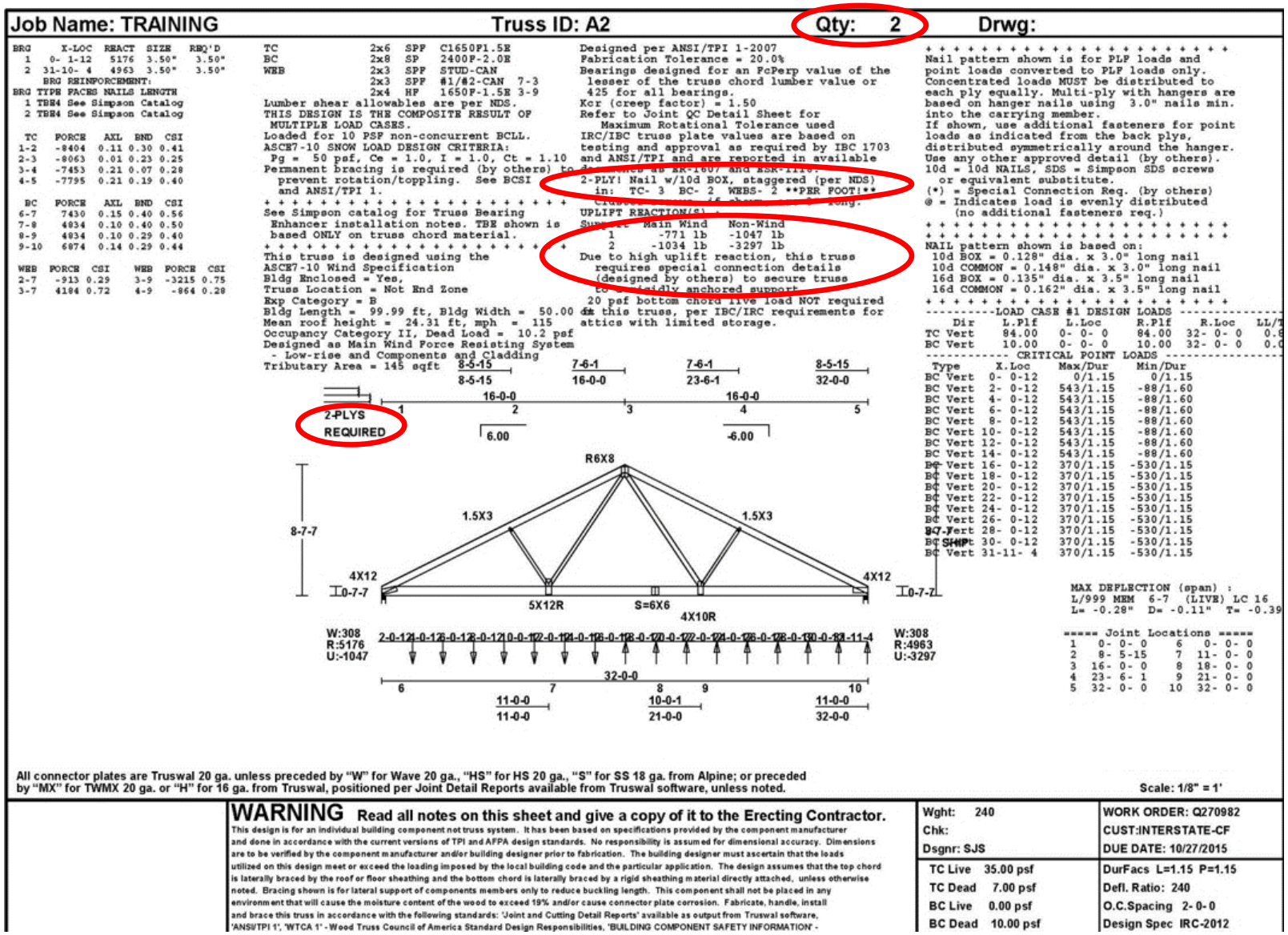
9. Connection requirements for:

   9.1 Truss to girder-truss.

   9.2 Truss ply to ply.

   9.3 Unique applications.

   9.4 Field splices (e.g. “Piggy Back” truss).



R802.10.1

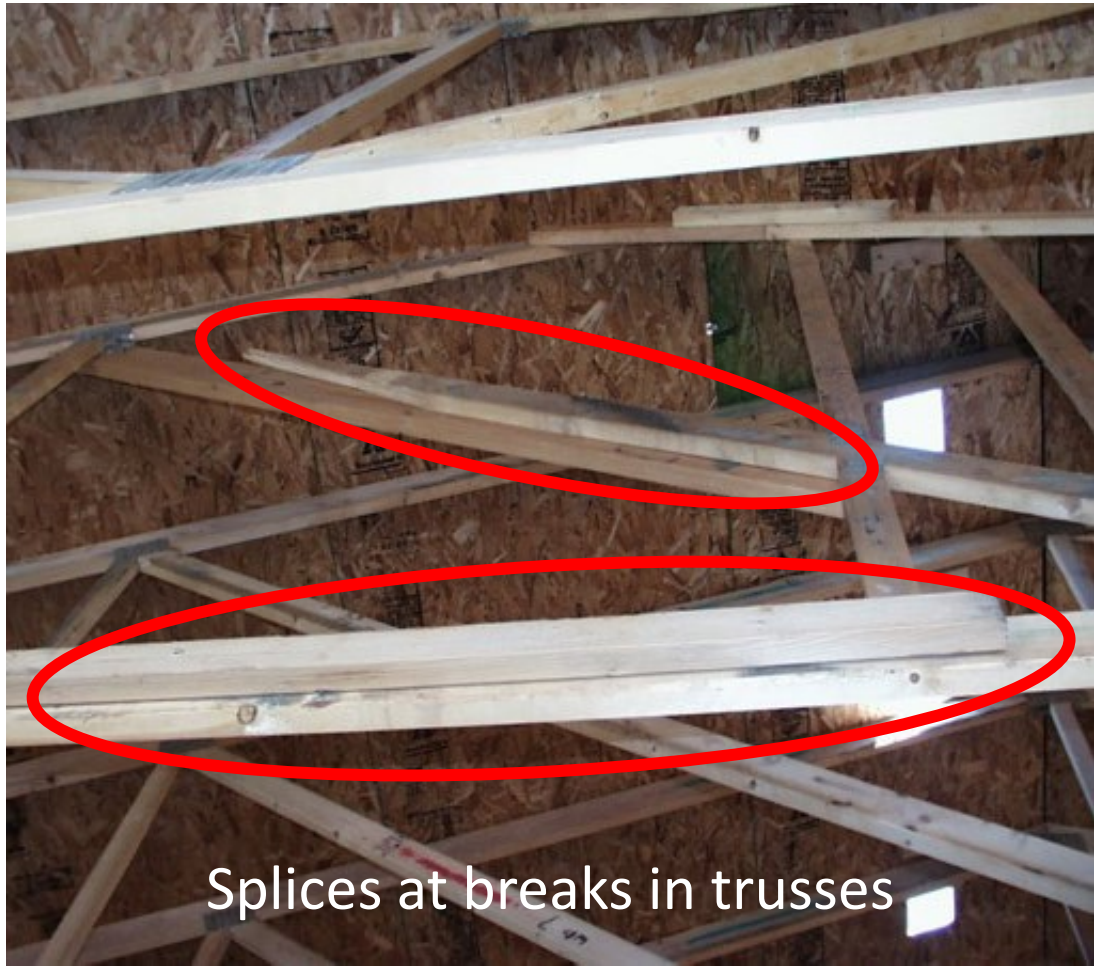
Framing – Truss Drawings

Framing – Roof Framing

DEPARTMENT OF LABOR AND INDUSTRY

R802.10.4

- Truss members shall not be cut, notched, drilled, spliced or otherwise altered in any way without the approval of a registered design professional.

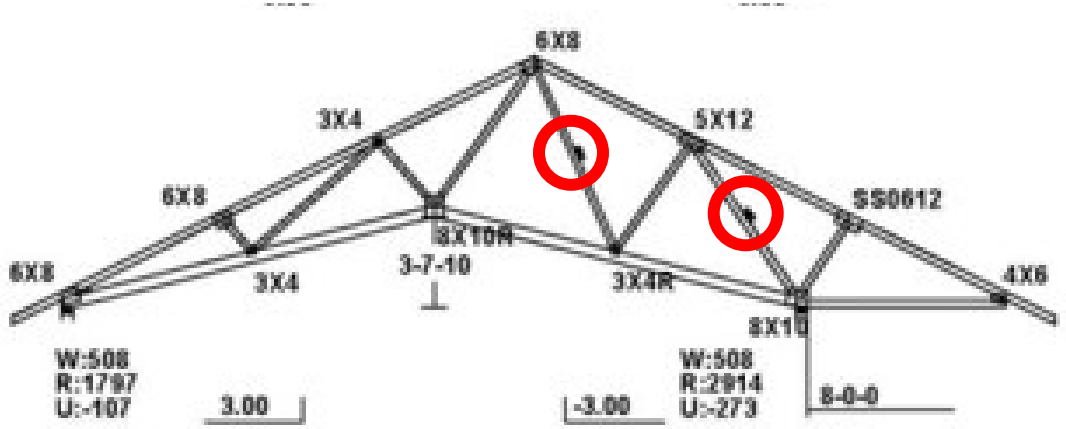


Framing – Truss Bracing

DEPARTMENT OF LABOR AND INDUSTRY

R802.10.3

- Trusses shall be braced to prevent rotation and provide lateral stability in accordance with the requirements specified in the construction documents.



Framing – Truss Bracing

DEPARTMENT OF LABOR AND INDUSTRY

R802.10.2

- Continuous lateral bracing.

Framing – Truss Bracing

DEPARTMENT OF LABOR AND INDUSTRY

R802.10.3

- Connection of lateral bracing to gable end.

- Verify size and nailing of lateral bracing.

Framing – Truss Uplift

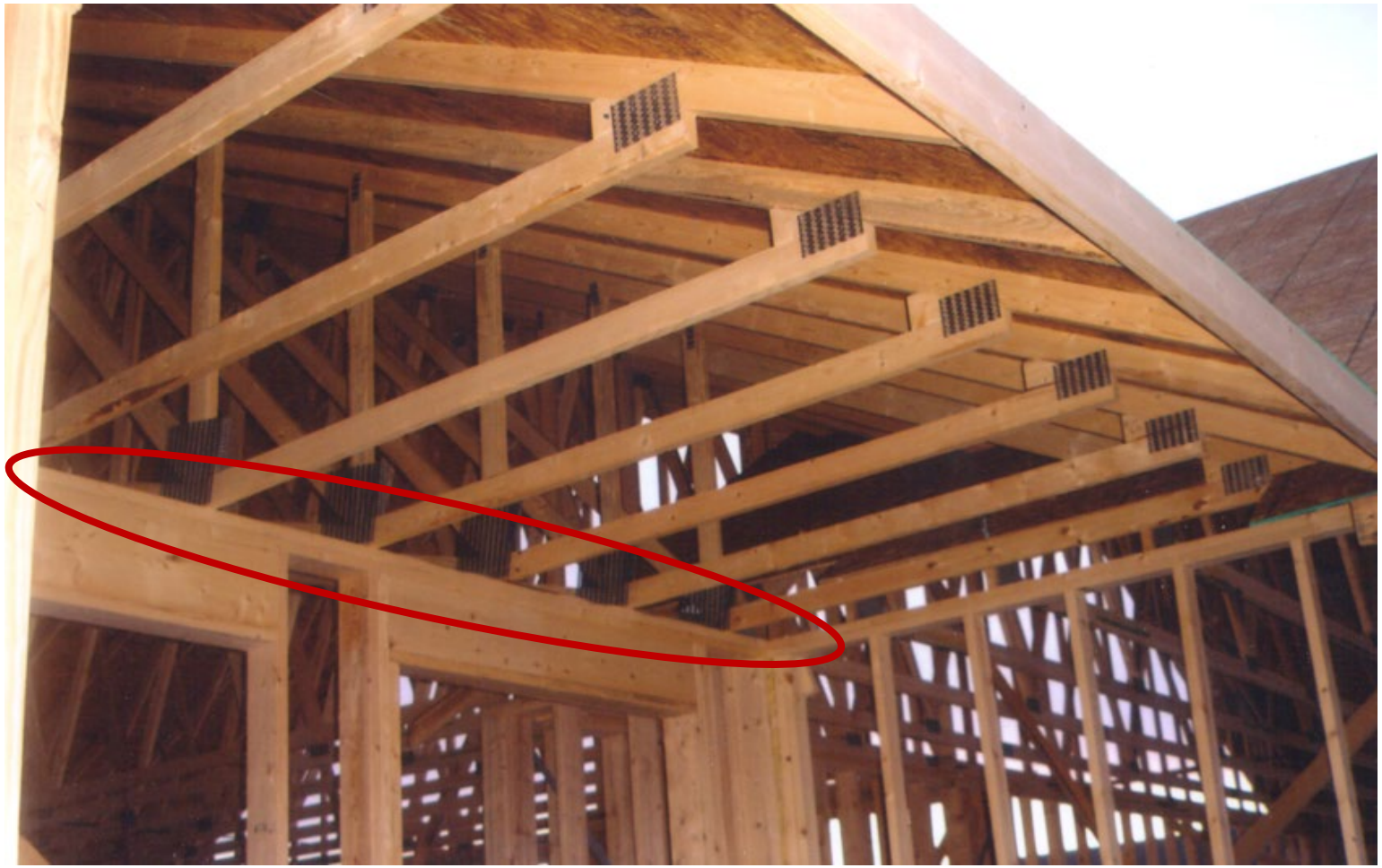
DEPARTMENT OF LABOR AND INDUSTRY

R802.11.1.2

- Trusses shall be attached to supporting wall assemblies by connections capable of resisting uplift forces as specified on the truss design drawings. Uplift forces shall be permitted to be determined as specified by Table R802.11, if applicable, or as determined by accepted engineering practice.

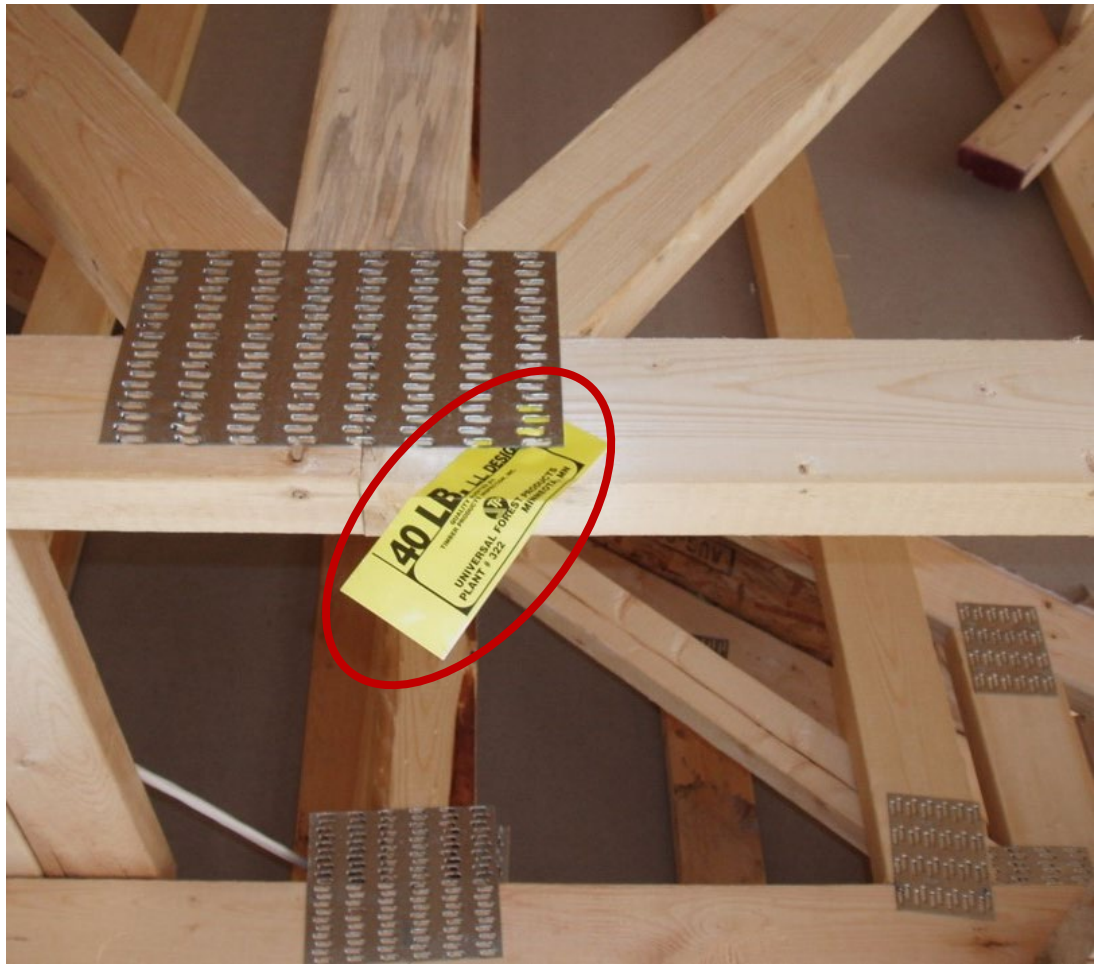
Framing – Truss Bearing

- Verify bearing location of the cantilever.



Framing – Truss Bearing

- Design loads.
- Point load locations.



Framing – Roof Framing

DEPARTMENT OF LABOR AND INDUSTRY

- Verify the gable end roof sheathing is supported per the truss manufacturer.

Framing – Attic Access

DEPARTMENT OF LABOR AND INDUSTRY

- Minimum 22” x 30”.
- Minimum unobstructed headroom of 30”.

Framing – Radon (Future Fan)

DEPARTMENT OF LABOR AND INDUSTRY

MN Rules 1303.2402, Subp. 6

- Electrical circuit terminating in a box for future active system (fan).
- Power source may not be installed in conditioned space, basement, or crawl space.

Framing – Headers

Table R502.5 (1, 2)

- Built-up header, two pieces with spacer. Centered front to back in wall.
- 16d at 16 inches o.c. along each edge.
- Verify number of jack studs per tables R502.5(1) & R502.5(2) or direction by manufacturer of engineered lumber.

Framing – Load Paths

DEPARTMENT OF LABOR AND INDUSTRY

Table R502.5

- Full width bearing under all headers, girders and beams to foundation or footing.

Framing – Load Paths

- Follow the large loads down to footing/foundation.
- The construction of buildings and structures in accordance with the provisions of this code shall result in a system that provides a complete load path that meets all requirements for the transfer of all loads from their point of origin through the load-resisting elements to the foundation.

Framing – Wall Framing

- Studs spacing per plans (ie: 16” on center)
- Approved lumber identified by a grade mark to be used.

Framing – Wall Framing

DEPARTMENT OF LABOR AND INDUSTRY

Table R602.3(1)

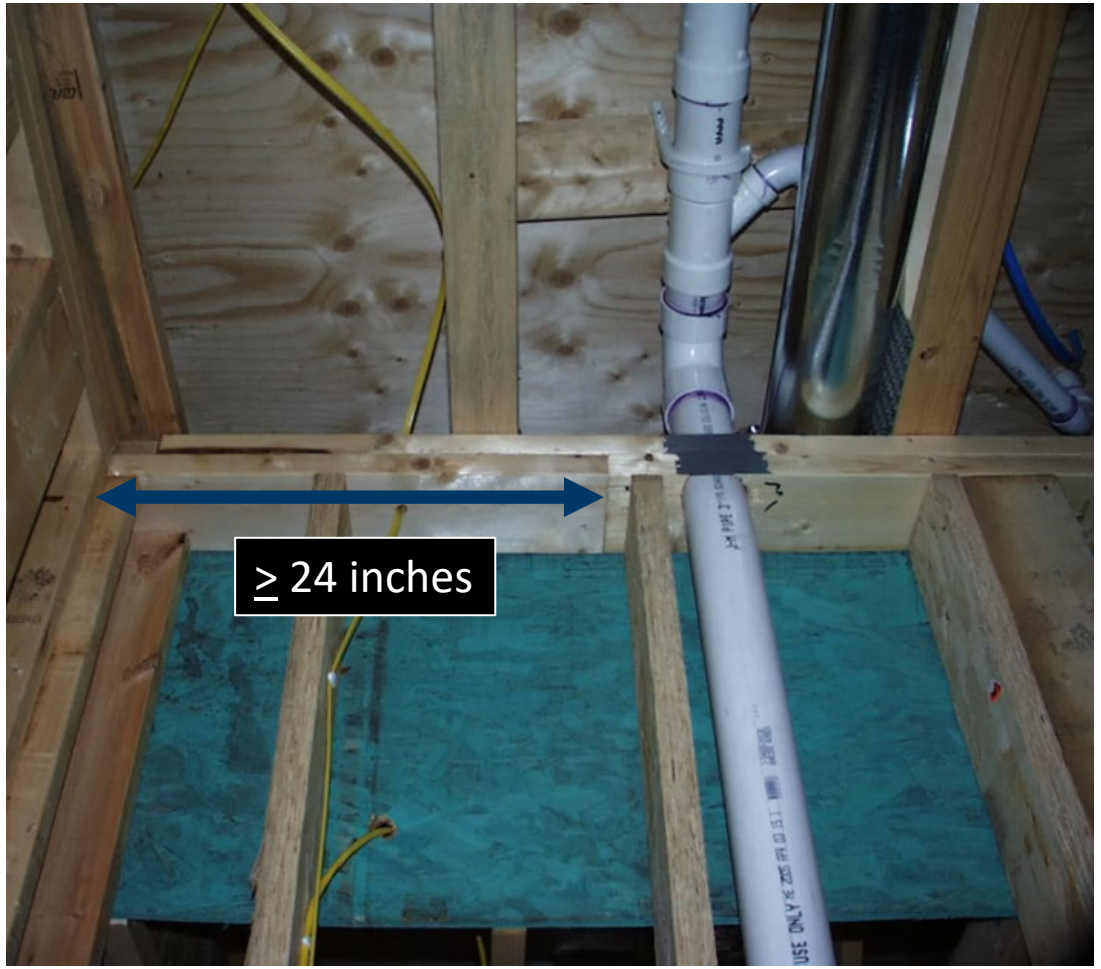
- Double top plate overlapping at corners
- Plate to plate:
  - 10d at 24” o.c.
- Top plate to stud:
  - 2-16d nails.
- Stud to plate:
  - 3-8d or 2-16d nails.

Framing – Wall Framing

DEPARTMENT OF LABOR AND INDUSTRY

R602.3.2

- End joints shall be offset at least 24 inches.
- Joints in plates need not occur over studs. Plates shall be not less than 2 inches nominal thickness and have a width at least equal to the width of the studs.



Framing – Wall Framing

DEPARTMENT OF LABOR AND INDUSTRY

Figure R602.3(2)

- Built-up corner studs.
- 10d at 24 inches o.c.
- Typical exterior corner framing for continuous wood structural panel sheathing.

Framing – Wall Framing

- Wall sheathing nailing:
- Wall bracing panel layout.
- End conditions.
- 1/2 inch wood structural panel wall sheathing requires:
  - 6d common nails at 6” o.c. at edges and 12” o.c. at intermediate supports. Table R602.3(1)
  - Or, staples as per Table R602.3(2), “Alternate Attachments.”

Framing – Scissor Truss & Tall Walls

DEPARTMENT OF LABOR AND INDUSTRY

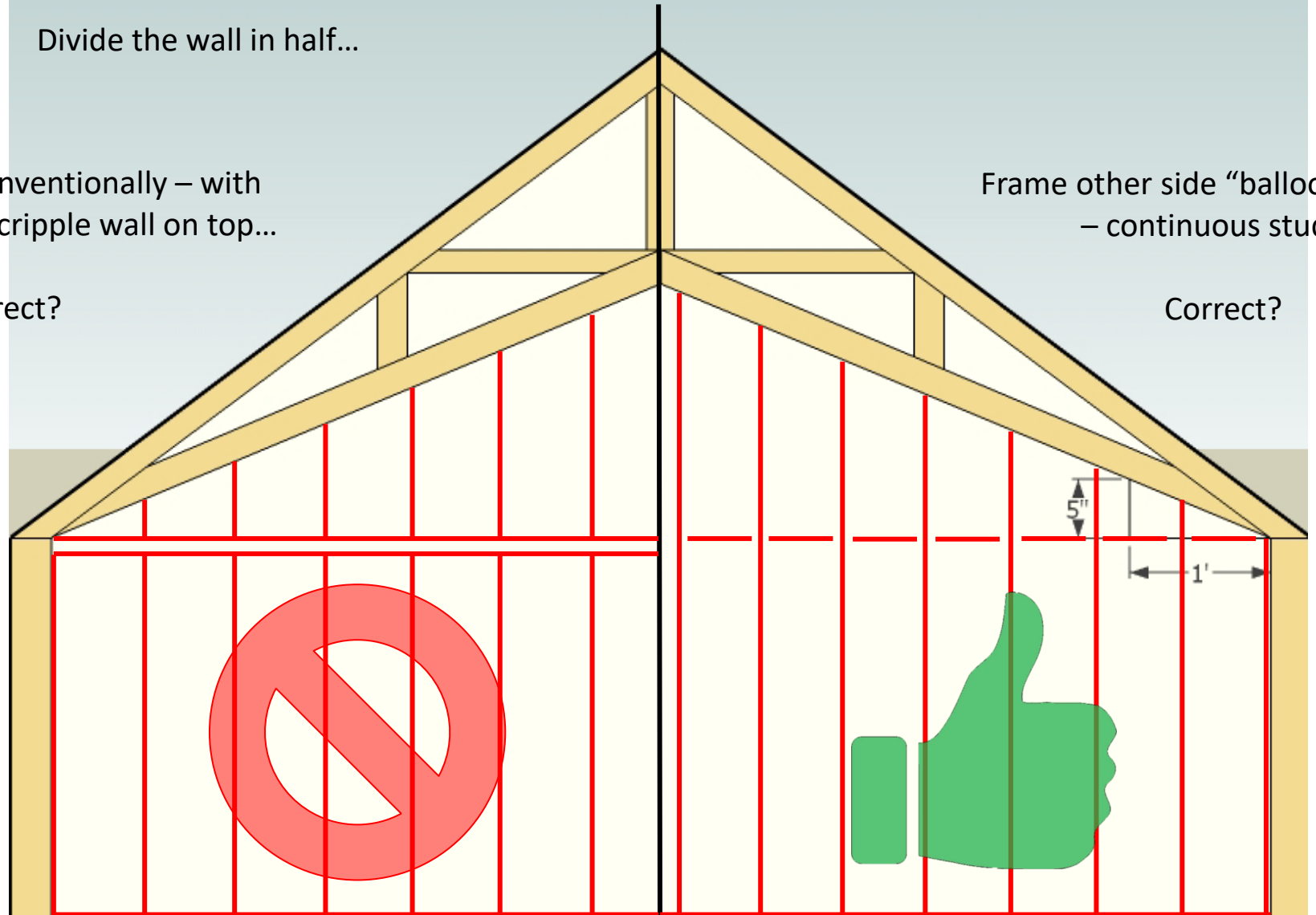
R802.10, 602.3

Divide the wall in half…

Frame one side conventionally – with double top plate & cripple wall on top…

Correct?

Hinge point is weak to resist wind load



Frame other side “balloon” fashion – continuous studs…

Correct?

May need fireblocking along plate line for dropped ceiling

Framing – Notching and Boring

DEPARTMENT OF LABOR AND INDUSTRY

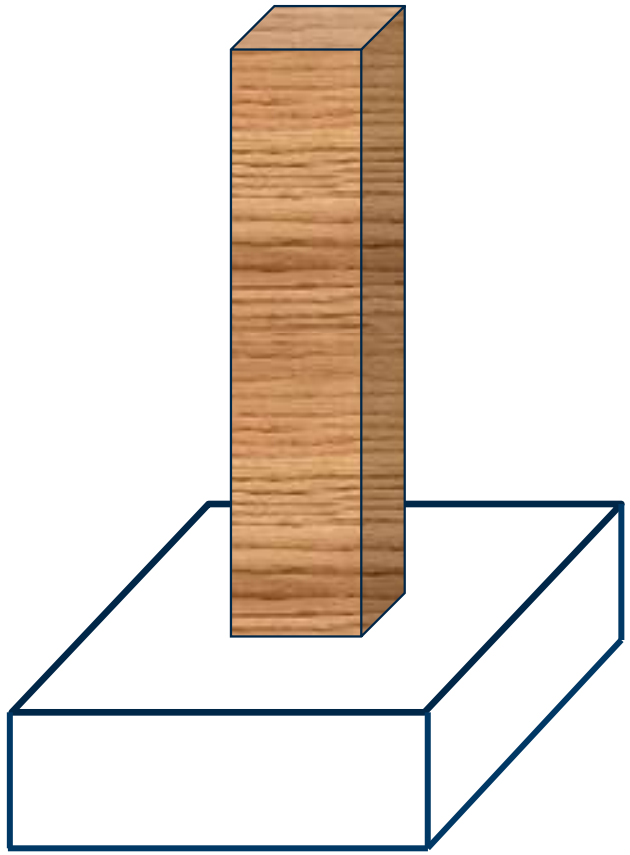
R602.6.1

Drilling and notching:

- Straps?
- Bearing support?
- Notches?

Framing - Columns

- Verify size, length, bearing on footing/foundation

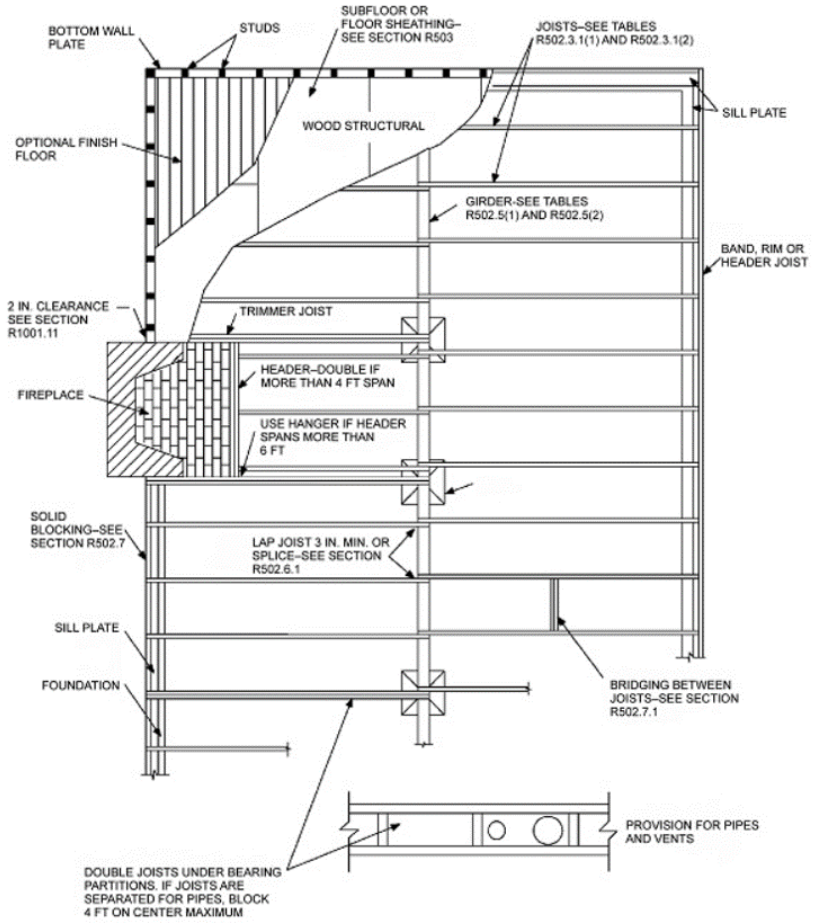


Framing – Floor Joists

DEPARTMENT OF LABOR AND INDUSTRY

R602.6.1

- Joists framing from opposite sides over a bearing support:
  - Lap a minimum of 3”
  - Nailed together with a minimum 3 - 10d face nails.



Framing – Floor Joists

DEPARTMENT OF LABOR AND INDUSTRY

R502.6.2

- Joists shall be:
  - Supported laterally at the ends by full-depth solid blocking not less than 2” nominal in thickness;
  - Attachment to a full-depth header, band or rim joist,
  - Or to an adjoining stud or shall be otherwise provided with lateral support to prevent rotation.

Framing – Floor Joists

DEPARTMENT OF LABOR AND INDUSTRY

R502.6

- The ends of each joist, beam or girder shall have not less than:
  - 1-1/2” of bearing on wood or metal,
  - 3” on masonry or concrete,
  - Or approved joist hangers.

Framing – Floor Joists

DEPARTMENT OF LABOR AND INDUSTRY

R404.1, 4, Table 404.1(1) footnotes e, f)

- The floor shall be blocked perpendicular to the floor joists.
  - Why?
- Blocking shall be full depth within 3 joist spaces of the foundation wall.
- Floor sheathing shall be fastened to blocking.
- Blocking shall be installed within 8” of an anchor bolt location.

Framing – Engineered Floor Joists

DEPARTMENT OF LABOR AND INDUSTRY

R404.1, 4

- Truss – Strongbacks per truss manufacturer and Building Component Safety Information (BCSI).

Framing – Engineered Floor Joists

DEPARTMENT OF LABOR AND INDUSTRY

- I-Joists - Follow same code requirements as dimensional lumber – Table 404.1(1)

TABLE R404.1(1)
MAXIMUM ANCHOR BOLT AND BLOCKING SPACING FOR SUPPORTED FOUNDATION WALL

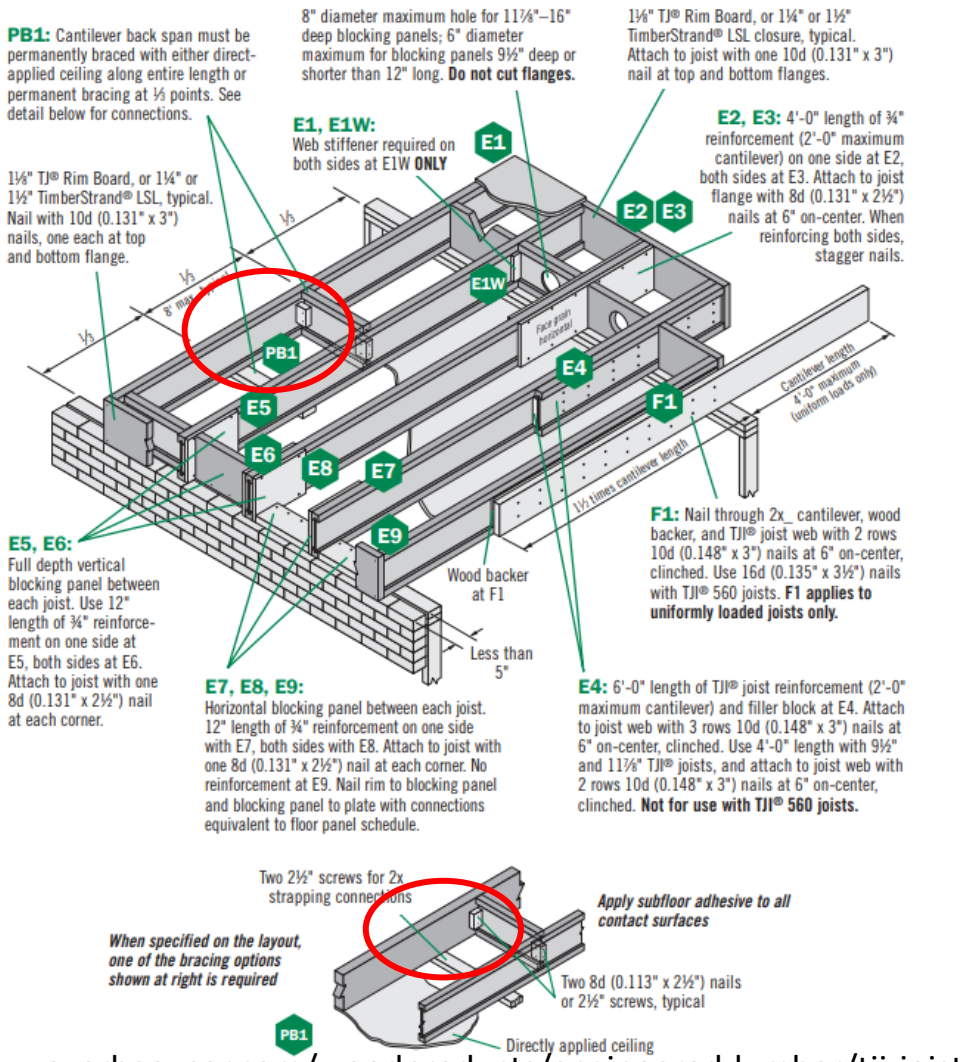
MAX. WALL HEIGHT	MAX. UNBALANCED BACKFILL HEIGHT	SOIL CLASSES	SOIL LOAD (pcf/ft)	TOP OF WALL REACTION (plf)[b]	1/2" DIAMETER ANCHOR BOLT SPACING (inches)[a]	SPACING OF BLOCKING PERPENDICULAR TO FLOOR JOISTS (inches)
8′-0"	7′-4"	GW, GP, SW, & SP	30	250	72	60
		GM, GC, SM-SC, & ML	45	370	72	40
		SC, MH, ML-CL, & I-CL	60	490	48	30
9′-0"	8′-4"	GW, GP, SW, & SP	30	320	72	48
		GM, GC, SM-SC, & ML	45	480	48	32
		SC, MH, ML-CL, & I-CL	60	640	40	24

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. Sill plate shall be 2 x 6 minimum. Anchor bolt shall be minimum 0.5" diameter cast-in-place with 7" embed. Anchor bolt shall have a 2" diameter by 0.125" thick washer tightened and countersunk 0.25" into the top of the sill plate.

b. Minimum load to be used for sizing of accepted anchors or fasteners if bolts are not used.

CANTILEVER DETAILS



https://www.weyerhaeuser.com/woodproducts/engineered-lumber/tji-joists/

Framing – Fastener Schedule (Floors)

DEPARTMENT OF LABOR AND INDUSTRY

Table R602.3(1)

Item	Elements	Fasteners	Spacing
24	Joist to sill or girder, toe nail	3-8d (2-1/2” x 0.113”)	--
25	Rim joist to top plate, toe nail (roof applications also)	8d (2-1/2” x 0.113”)	6” o.c.
26	Rim joist or blocking to sill plate, toe nail	8d (2-1/2” x 0.113”)	6” o.c.
27	1" × 6" subfloor or less to each joist, face nail	2-8d (2-1/2” x 0.113”) 2 staples 1-3/4”	--
28	2" subfloor to joist or girder, blind and face nail	2-16d (3-1/2” x 0.135”)	--
29	2" planks (plank & beam - floor & roof)	2-16d (3-1/2” x 0.135”)	At each bearing
30	Built-up girders and beams, 2-inch lumber layers	10d (3” x 0.128”)	Nail each layer as follows: 32" o.c. at top and bottom and staggered. Two nails at ends and at each splice.

Framing – Glazing (Hazardous Locations)

DEPARTMENT OF LABOR AND INDUSTRY

R308.4

Glazing Hazardous locations:

- 9 sf for individual pane of glass.
- Bottom edge less than 18”.
- Top edge more than 36”.
- Walking surface within 36”.
- Adjacent to doors

Framing – Glazing (Hazardous Locations)

Identification:

- Each pane of glazing installed in hazardous locations shall be provided with a manufacturer's designation, which is visible in the final installation. The designation shall be acid etched, sandblasted, ceramic-fired, laser etched, embossed, or be of a type which once applied cannot be removed.

Framing - Windows

DEPARTMENT OF LABOR AND INDUSTRY

Window Fall Protection:

- Where the lowest part of the opening of an operable window is located more than 72” above the finished grade the lowest part of the window opening shall be a minimum of ~~36~~” above the finished floor.
    - MS 326B.106, Subp. 7 – Change to 24” (less restrictive)
- Windows shall not permit openings that allow passage of a 4” sphere.
- Window opening control devices (WOCD).

Framing - Windows

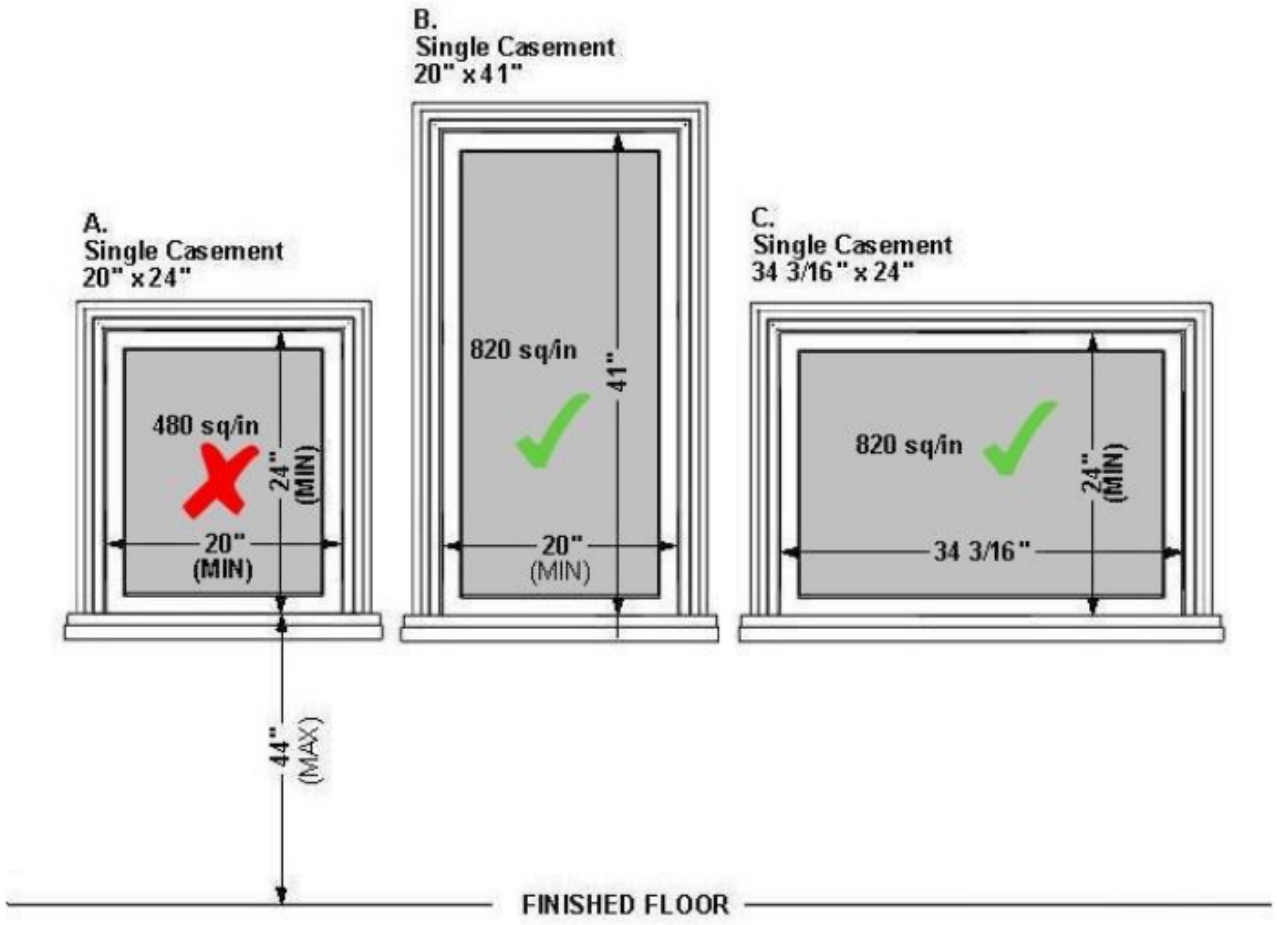
Emergency escape and rescue openings:

- New construction - Basements and every sleeping room shall have at least one operable emergency escape and rescue opening (EERO).
- Remodeling – *New* sleeping rooms.

Framing – Windows

Emergency escape and rescue:

- Net clear dimensions:
  - 24” minimum height.
  - 20” minimum width.
  - 44” maximum clear opening height above floor.
  - 5.7 SF *CLEAR*
    - (5.0 for Grade floor & below grade openings)



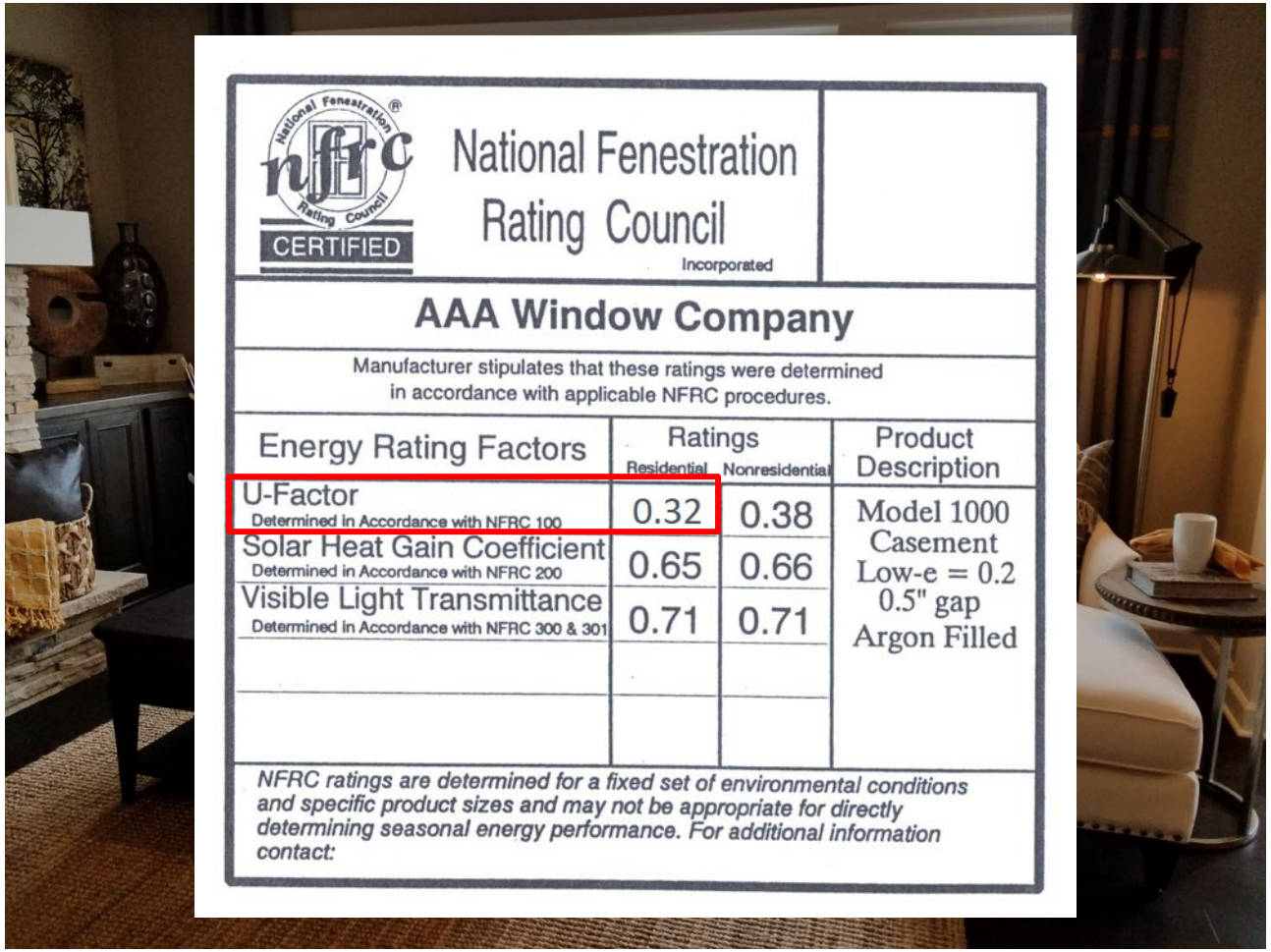
Framing – Window Energy Rating

DEPARTMENT OF LABOR AND INDUSTRY

Table RE402.1.3

Fenestration U-Factor:

- The U-Factor of the windows needs to comply with the submittal documents, energy code, and are required to bear an NFRC label.
- U-Factor $\leq$ 0.32



Framing – Smoke Alarms

DEPARTMENT OF LABOR AND INDUSTRY

R314.3

Smoke alarms shall be installed in the following locations:

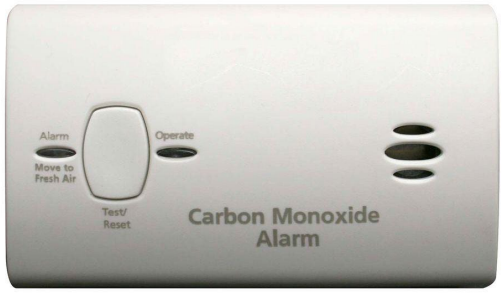
- In each sleeping room.
- Outside each separate sleeping area in the immediate vicinity of the bedrooms.
- On each additional story of the dwelling, including basements and habitable attics but not including crawl spaces and uninhabitable attics.
- Primary source of power – New vs. Remodeling.

Framing – Carbon Monoxide Alarms

DEPARTMENT OF LABOR AND INDUSTRY

R315.1

- Carbon monoxide alarms shall be installed when:
  - Fuel-fired appliances are installed.
  - Homes having attached garages.
- Carbon monoxide alarms shall be installed in the following locations:
  - Outside and within 10’ of bedrooms.
  - Each level containing bedrooms.



Framing - Stairs

DEPARTMENT OF LABOR AND INDUSTRY

R311.7.5

Stairway treads and risers:

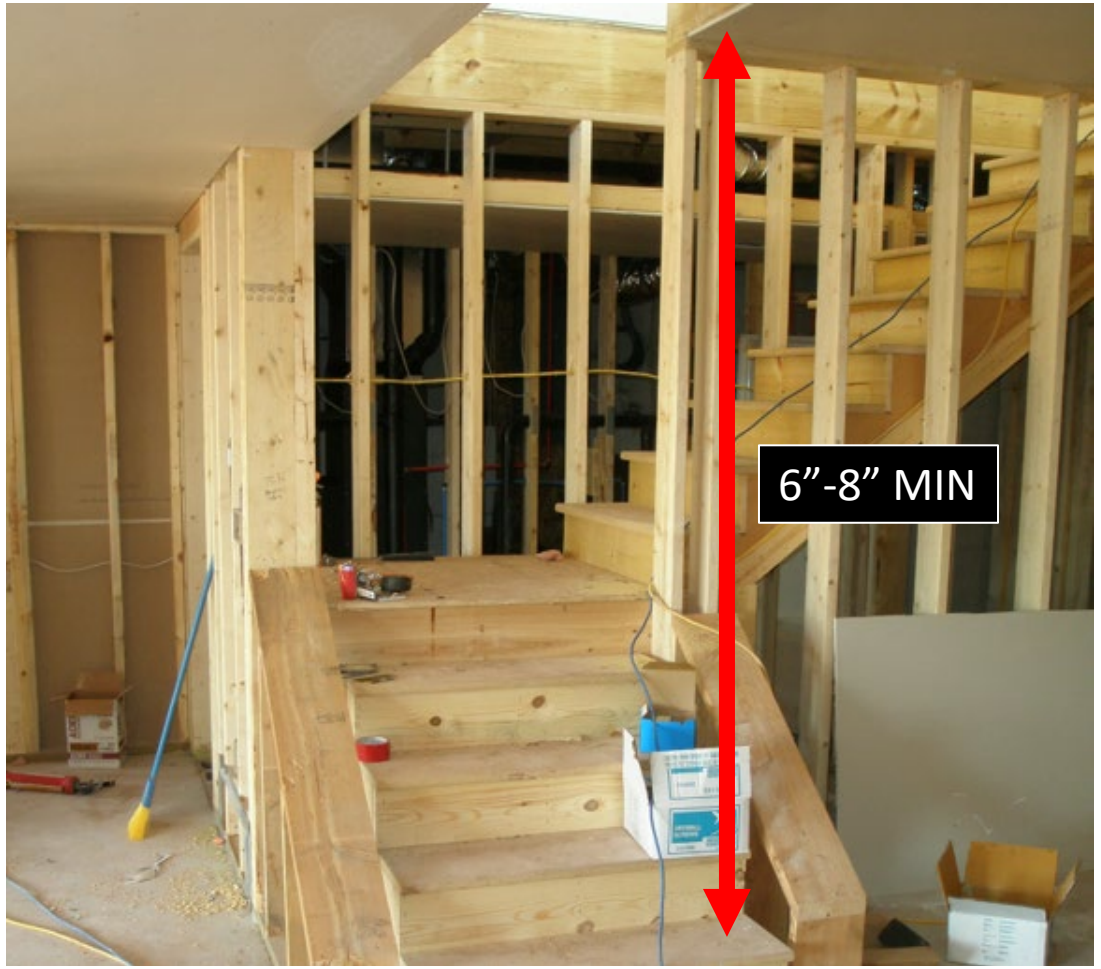
- Maximum rise 7-3/4 inches.
- Minimum tread depth 10 inches.
- 3/8 inch uniformity.

Framing - Stairs

DEPARTMENT OF LABOR AND INDUSTRY

R311.7.2

- The minimum headroom in all parts of the stairway shall not be less than **6’ 8”** measured vertically from the sloped line adjoining the tread nosing or from the floor surface of the landing or platform on that portion of the stairway.
- *Exception:* Existing basements – 6’4”



Framing - Stairs

Illumination:

- All stairs shall be provided with illumination.
- All interior and exterior stairways shall be provided with a means to illuminate the stairs, including the landings and treads.

Framing – Anchor Bolts (3 of 3)

DEPARTMENT OF LABOR AND INDUSTRY

Table R404.1(1), Footnote a

- Anchor bolts and washers countersunk, and bolts tightened.

Framing – Anchor Bolts (3 of 3)

DEPARTMENT OF LABOR AND INDUSTRY

R403.1.6, Table R404.1(1)

TABLE R404.1(1)
MAXIMUM ANCHOR BOLT AND BLOCKING SPACING FOR SUPPORTED FOUNDATION WALL

MAX. WALL HEIGHT	MAX. UNBALANCED BACKFILL HEIGHT	SOIL CLASSES[a]	SOIL LOAD (pcf/ft)	TOP OF WALL REACTION (plf)[e]	$^1/_2$" DIAMETER ANCHOR BOLT SPACING (inches)[b, c, d]	SPACING OF BLOCKING PERPENDICULAR TO FLOOR JOISTS (inches)[f]
8′-0″	7′-6″	GW, GP, SW, & SP	30	260	72	72
		GM, GC, SM, SM-SC, & ML	45	400	72	72
		SC, MH, ML-CL, & I-CL	60	530	48	48
9′-0″	8′-6″	GW, GP, SW, & SP	30	340	72	72
		GM, GC, SM, SM-SC, & ML	45	510	48	48
		SC, MH, ML-CL, & I-CL	60	680	32	32
10′-0″	9′-6″	GW, GP, SW, & SP	30	430	64	64
		GM, GC, SM, SM-SC, & ML	45	640	40	40
		SC, MH, ML-CL, & I-CL	60	860	24	24

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1.

b. Anchor bolts shall be cast-in-place with a minimum 7-inch embed. Where vertical reinforcing is required by other sections of this code, the anchor bolts shall be within 8 inches of the vertical reinforcing and are to be spaced as required by this table. Anchor bolts installed in masonry shall be grouted in place with not less than 1 inch of grout measured from the inside face of the masonry and the anchor bolt.

c. The sill plate shall be 2 x 6 minimum. Anchor bolts shall be placed at least $2^1/_2$ inches from the edge of the sill plate and the edge of the foundation wall.

d. Anchor bolts shall have a 2 inch by $^1/_8$ inch thick round or square washer tightened and countersunk $^1/_4$ inch into the top of the sill plate. Use of standard and noncountersunk washers is permitted where anchor bolt spacing is half the spacing required by this table.

e. Minimum load to be used for the sizing of accepted anchors or fasteners if anchor bolts are not used.

f. Perpendicular blocking shall be 2-by the full depth joists or an approved alternative full depth joist material that is installed in the first three joists spaces adjacent to the foundation wall. The blocking shall be connected to the sill plate with an approved fastener sized in accordance with Footnote e. The floor sheathing shall be nailed to the blocking through the subfloor with a minimum of 8d common ($2^1/_2$ x 0.131) nails at 3 inches on center or an equivalent connector. Blocking shall be installed within 8 inches of an anchor bolt location.

Framing – Decay Protection

Protection against decay:

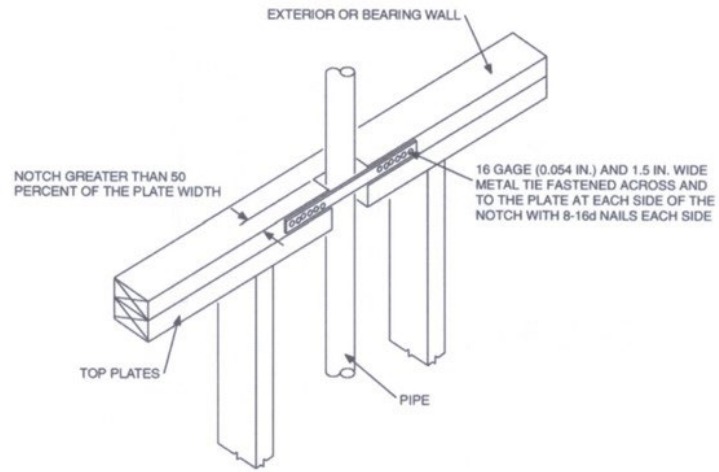
- What wood is being used?
- Where is it required?
- All wood framing members that rest on concrete or masonry exterior foundation walls and are less than 8” from the exposed ground.

Framing – Notching and Boring

DEPARTMENT OF LABOR AND INDUSTRY

R602.6.1

- When piping or ductwork is placed in or partly in an exterior wall, or interior load-bearing wall, necessitating cutting, drilling or notching of the top plate by more than 50% of its width, a galvanized metal tie of not less than 0.054” thick (16 ga.) and 1-1/2” wide shall be fastened to each plate across and to the plate at each side of the opening with not less than 8 16d nails at each side or equivalent.



Framing – Notching and Boring

DEPARTMENT OF LABOR AND INDUSTRY

- Maximum bored hole:
  - 40% of 3 1/2” = 1.40” (1-3/8”)
  - 40% of 5 1/2” = 2.20” (2-1/8”)
- Maximum notch:
  - 25% of 3 1/2” = 0.87” (7/8”)
  - 25% of 5 1/2” = 1.37” (1-3/8”)

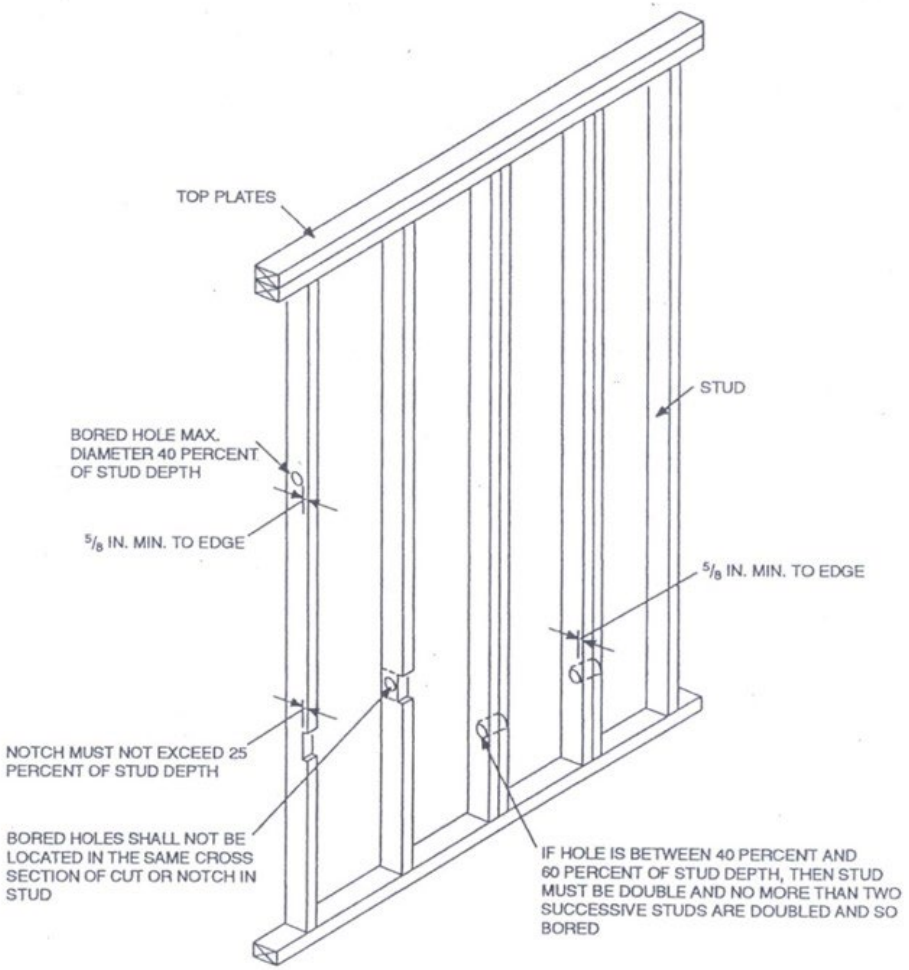


FIGURE R602.6(1)
NOTCHING AND BORED HOLE LIMITATIONS FOR EXTERIOR WALLS AND BEARING WALLS

Framing – Roof Framing

Roof Sheathing:

- Allowable spans: Table R503.2.1.1(1) or APA E30.
- Fastening: Table R602.3(1) or Alternate Table R602.3(2).
- 9” max unsupported gable overhang [R803.2.3].
- Example: 7/16” (24/16 rated) roof sheathing:
  - Span 24” with OR without edge support (clips).
  - 8d nails - 6” edges, 12” field.
  - Staples 15 ga. 1-3/4” long, 4 ” edges, 8” field.
  - Staples 16 ga. 1-3/4” long, 3” edges and 6” field.

Framing – Lumber

- Load-bearing dimension lumber shall be identified by a grade mark.
  - Mill number.
  - Grading Agency (Western Wood Products Association).
  - Kiln-Dried to meet Heat Requirements
  - Material Grade.
  - Species
  - ¼” Eased Edge

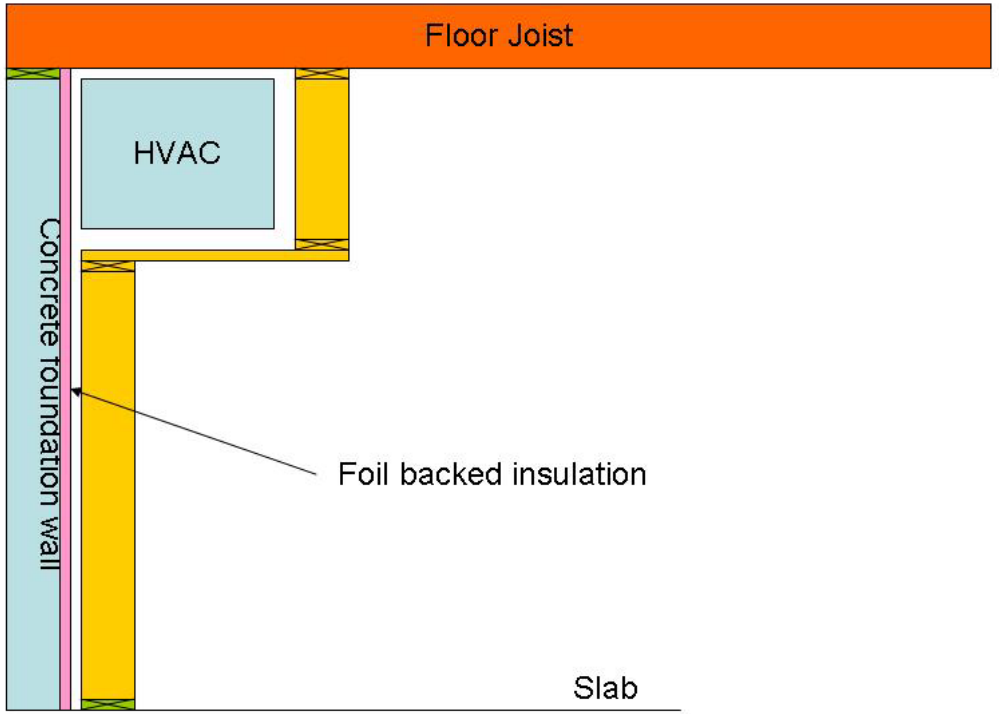
Framing – Fireblocking

Fireblocking required:

- Shall be provided to cut off all concealed draft openings (both vertical and horizontal) and to form an effective fire barrier between stories, and between a top story and the roof space.

Framing – Fireblocking

- Fire blocking shall be provided to cut off all concealed draft openings both vertical and horizontal and to form an effective fire barrier between framed wall and foundation. Every 10 Feet horizontally and top plate to be sealed.



Framing – Fireblocking

Common Materials:

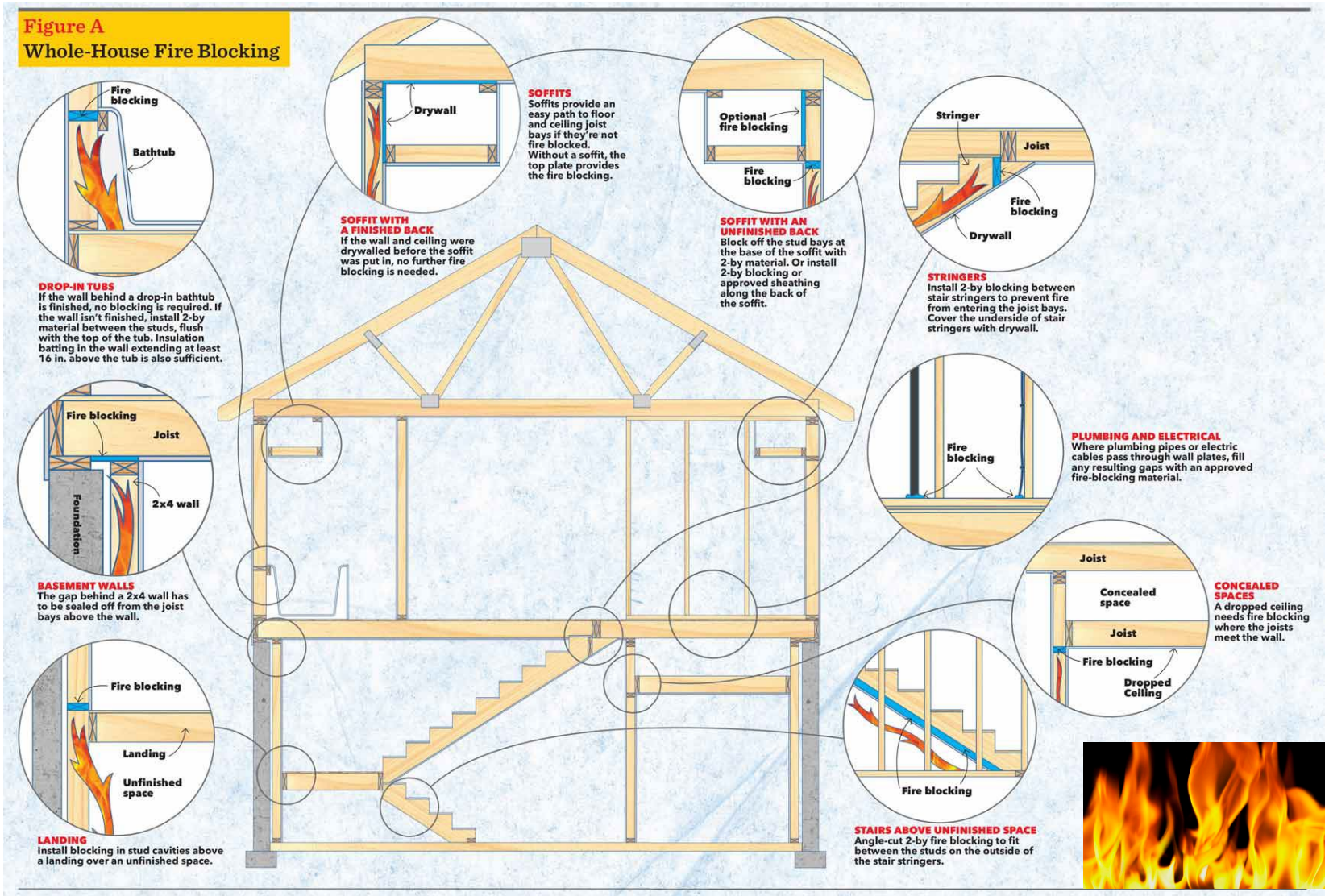
- 2x Lumber.
- 2 pieces of 1x (stagger joints).
- ¾” Plywood/OSB (must back joints with same).
- ½” Gypsum.
- Mineral Wool/Fiber Glass.
- Other *approved* materials.
- Material must be securely installed.

https://runlevel-6.github.io/blog/2013/04/30/basement-upgrade-creating-the-new-hangout/

Framing – Fireblocking

DEPARTMENT OF LABOR AND INDUSTRY

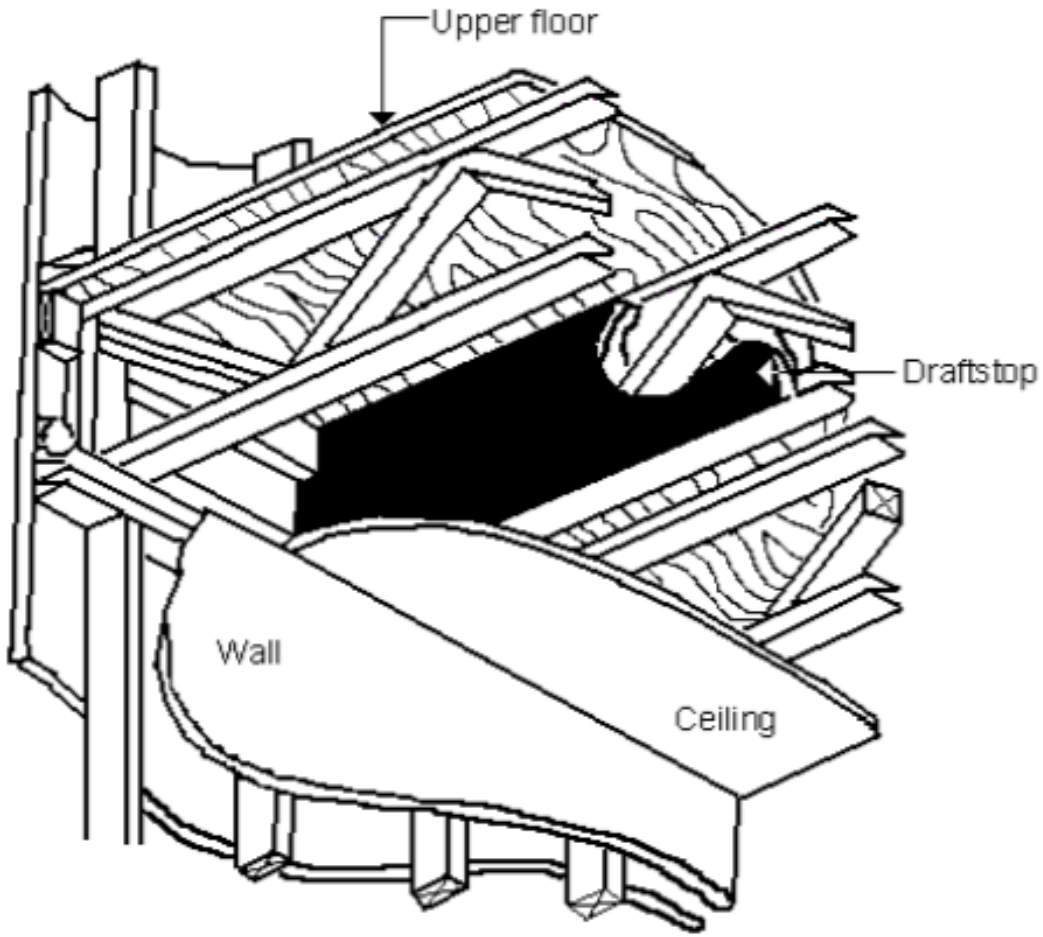
R302.11



https://www.familyhandyman.com/smart-homeowner/fire-blocking-basics-what-every-homeowner-needs-to-know/

Framing – Draftstopping

- Slows spread of fire in open web floor truss.
- 1,000sf max areas.
- Approximately equal sized areas.
- Material
  - ½” Gypsum.
  - 3/8” wood structural panels.
  - Other *approved* material.



Framing – Radon (Vent Pipe)

DEPARTMENT OF LABOR AND INDUSTRY

MN Rules 1303.2402, Subp. 5, E

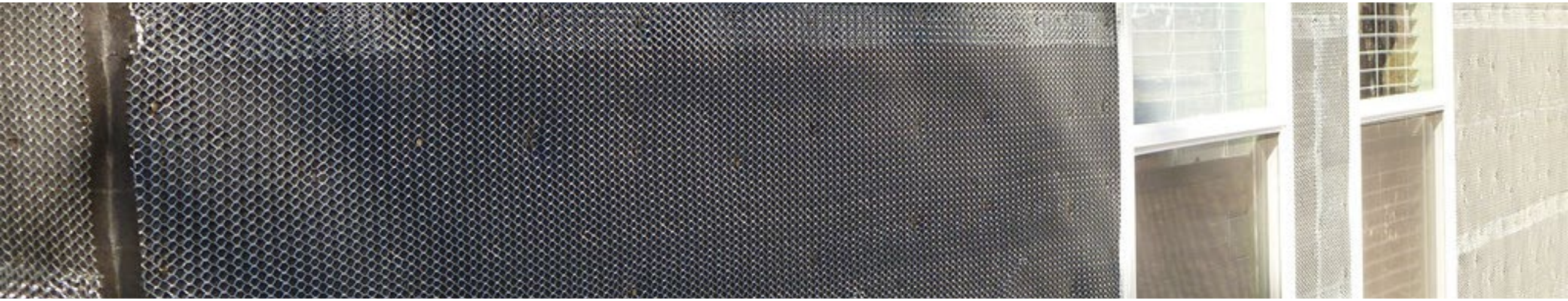
- All radon vent pipes shall be identified with at least one label on each floor and in accessible attics. The label shall read: “Radon Gas Vent System.”

Framing – Air Leakage

- The building thermal envelope shall be constructed to limit air leakage.

http://www.symhome.net/blog/2009/09/attention-to-detail-sill-sealer/

DEPARTMENT OF LABOR AND INDUSTRY

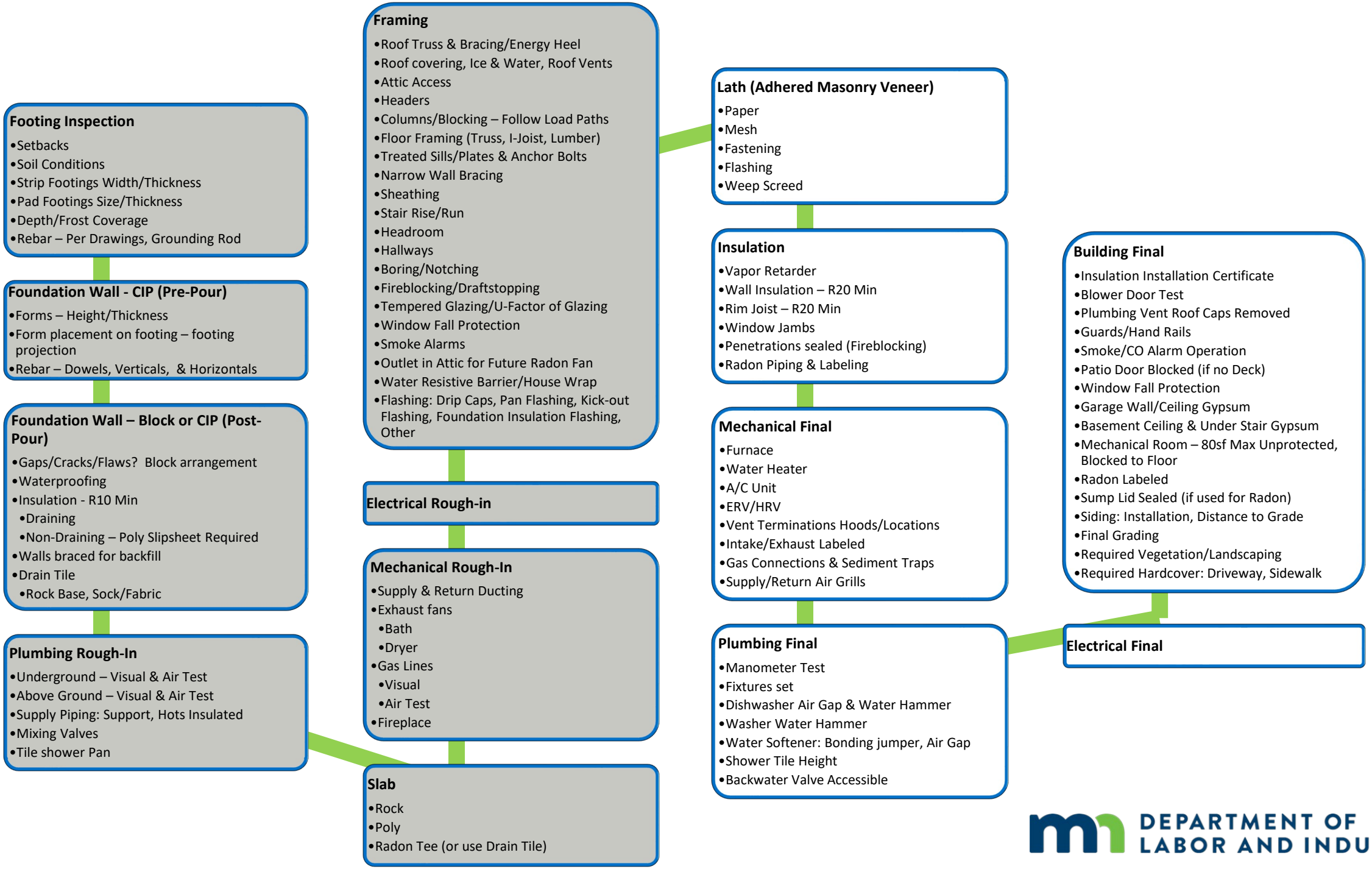


Lath Inspection (Adhered Masonry Veneer)

Lath Inspection (Adhered Masonry Veneer)

- ☐ Water-resistive barrier [R703.7.3, R703.12.3]
- ☐ Lath fastening [R703.7.1]
- ☐ Flashing, weep screed [R703.4, 703.12.2]

Clearance [703.12.1]



DEPARTMENT OF LABOR AND INDUSTRY

Lath – Wire Mesh/Expanded metal

R703

- Water-resistive barrier:
  - 15 pound felt – 2 layers when installed over wood sheathing. Must meet:
    - Water resistance not less than 60 min Grade D paper.
    - Vapor permeance not less than No.15 felt.
    - *Exception* – 1 layer if drainage plane provided
- Lath:
  - Cups up
  - Staple – 7/16” 16 ga
  - Nail – 7/16” 11 ga

Lath – Wire Mesh

R703

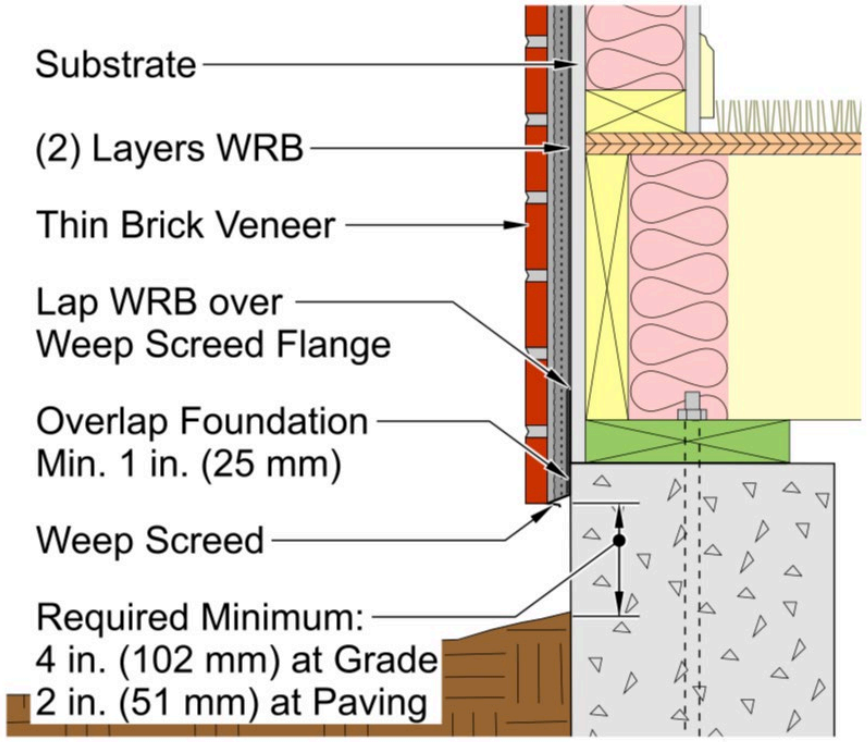
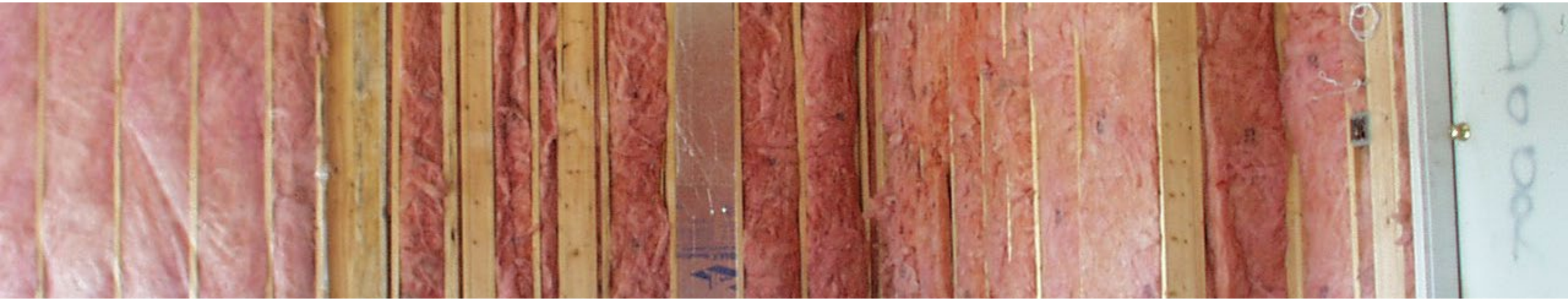


Figure 6
Foundation Detail and Required Clearances
BRICK INDUSTRY ASSOCIATION

- Flashing:
  - At projection from siding.
  - Windows and doors.
- Weep screed:
  - 4 inches above earth.
  - 2 inches above paved surface.
- Masonry Veneer Manufacturer's Association (MVMA) Installation Guide
- The Brick Industry Association

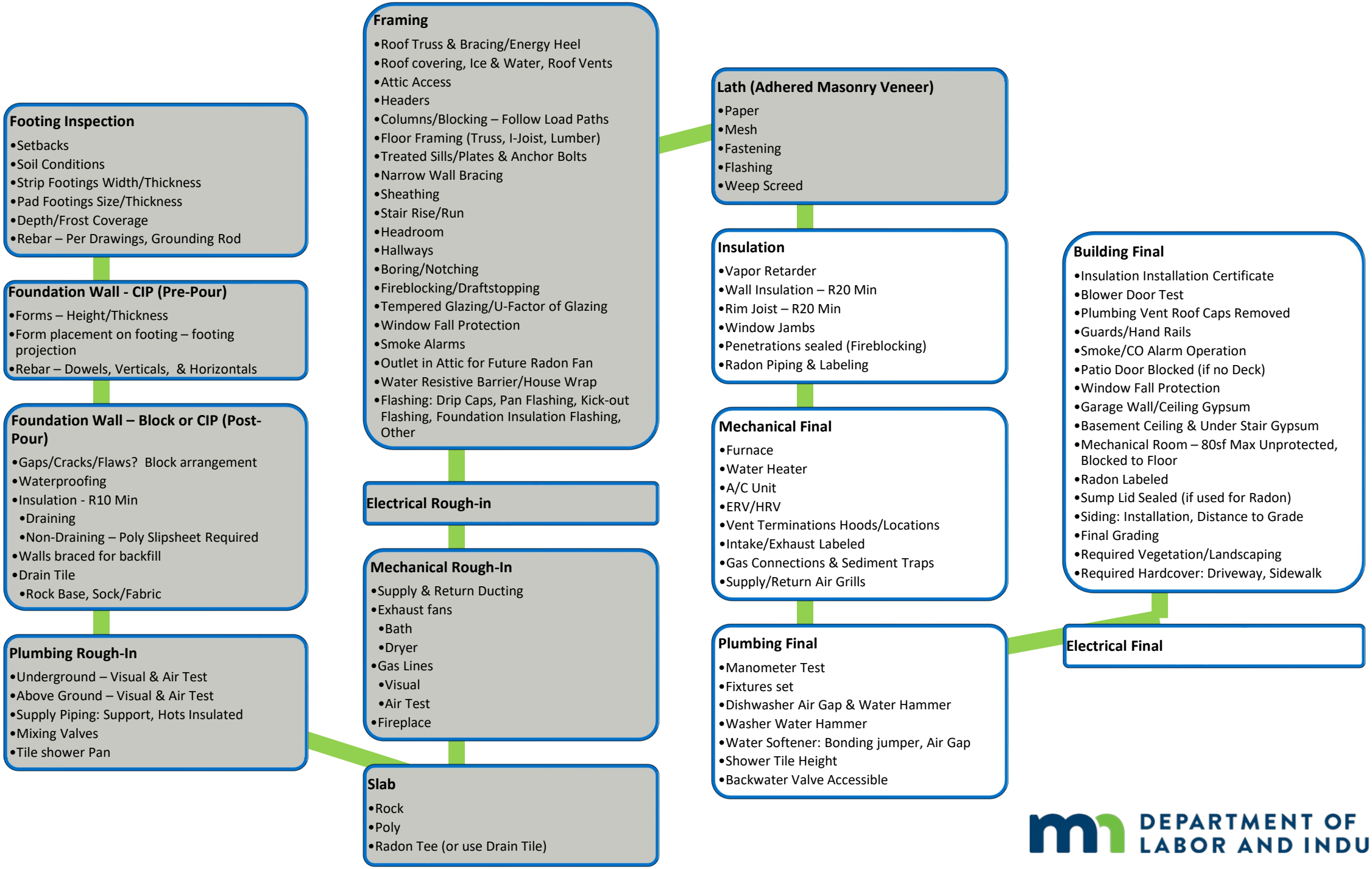
DEPARTMENT OF LABOR AND INDUSTRY



Insulation

Insulation Inspection

- ☐ Air barrier* [RE402.4]
- ☐ Vapor retarder* [R702.7]
- ☐ Insulation: foundation, walls, rim joist, floor, concealed attics, window/door jambs* [RE402]
- ☐ Penetrations sealed* (Fireblocking) [R302.11]



DEPARTMENT OF LABOR AND INDUSTRY

Insulation

- Air barrier installed continuously.
- Vapor retarder installed.
  - Seams.
  - Around windows.
  - At wall intersections.
  - Junction boxes in walls and ceilings.
- Insulation:
  - Foundation, walls, rim joist, floor, window/door jambs. (Attic at final)

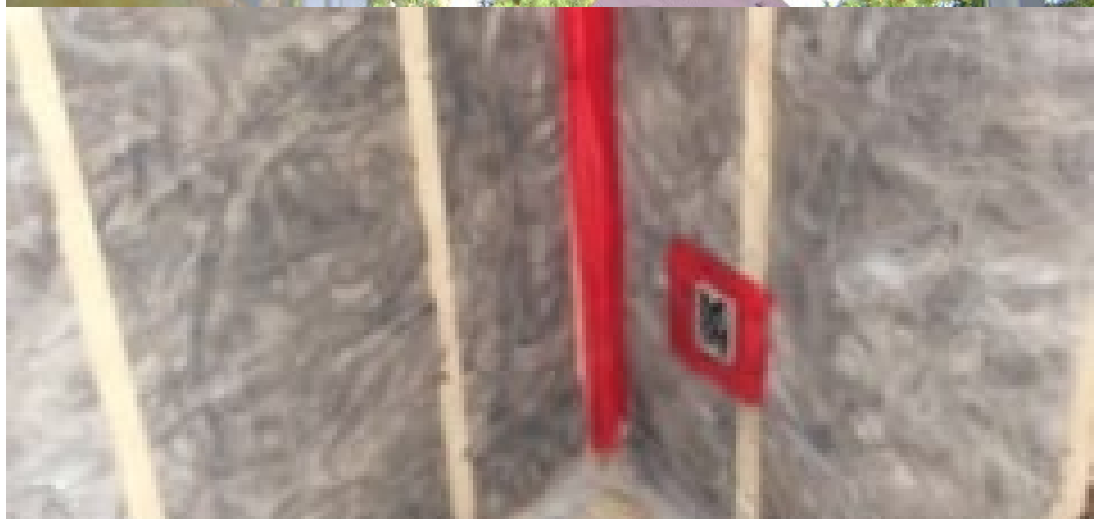


Table RE402.1.1 and RE402.1.1.7

Insulation

Spray foam types.

- Closed cell – hard to the touch. No vapor retarder required at sufficient thickness.
- Open cell – soft to the touch. Requires a vapor retarder.
- Caulk plates to subfloor. (acoustic sealant)

Framing – Foundation Insulation

DEPARTMENT OF LABOR AND INDUSTRY

RE402.1.1, 2

Foundation insulation:

- Protected down to 6” below finished grade level.

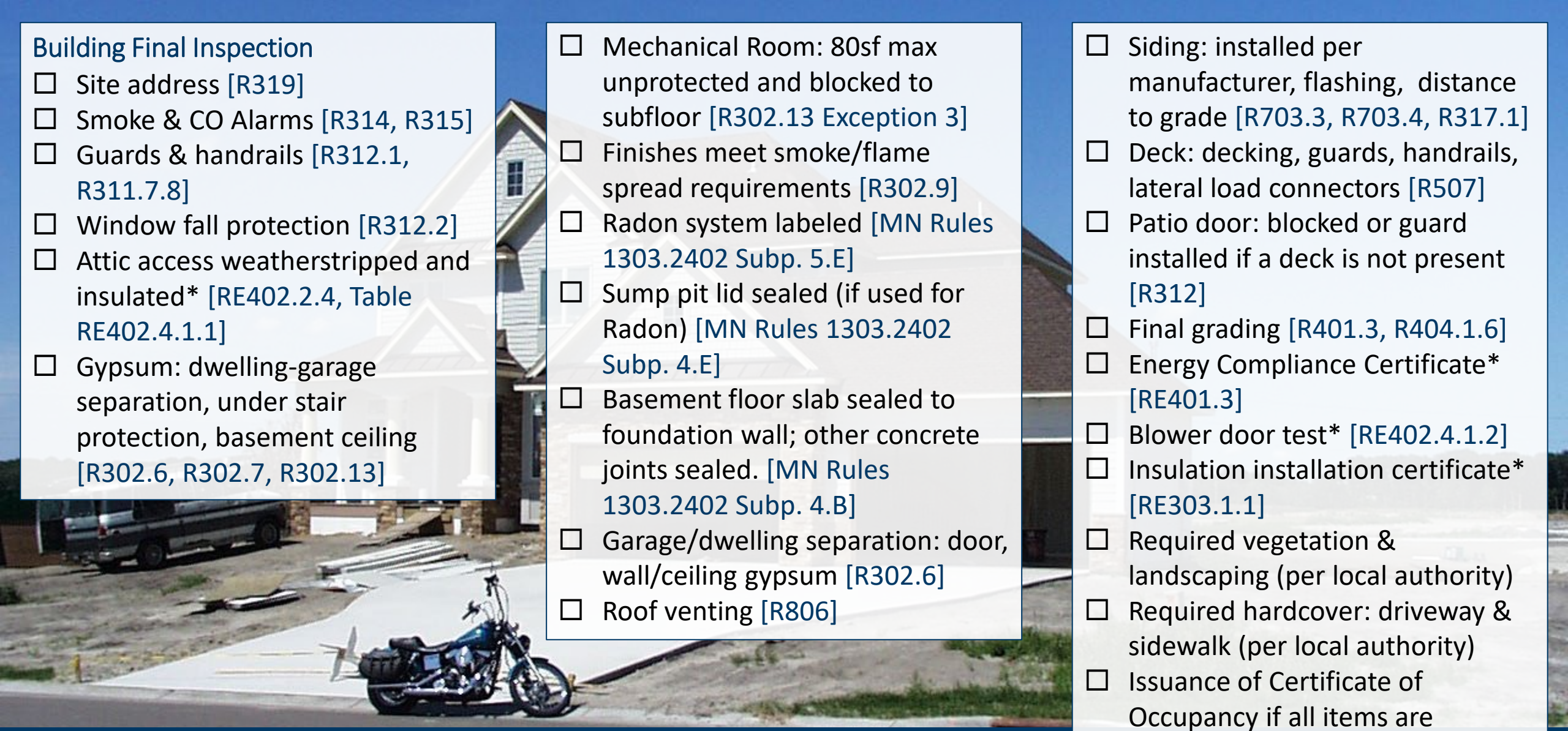
Types:

- FRP (Fiberglass reinforced paneling)
- Coil stock (Aluminum)
- Stucco coated fiberglass
- Other

Insulation

Rigid Foam:

- EPS: Expanded Polystyrene. AKA “Beadboard”
- XPS: Extruded Polystyrene.
- Poly-Iso: Polyisocyanurate.



Building Final Inspection

- ☐ Site address [R319]
- ☐ Smoke & CO Alarms [R314, R315]
- ☐ Guards & handrails [R312.1, R311.7.8]
- ☐ Window fall protection [R312.2]
- ☐ Attic access weatherstripped and insulated* [RE402.2.4, Table RE402.4.1.1]
- ☐ Gypsum: dwelling-garage separation, under stair protection, basement ceiling [R302.6, R302.7, R302.13]
- ☐ Mechanical Room: 80sf max unprotected and blocked to subfloor [R302.13 Exception 3]
- ☐ Finishes meet smoke/flame spread requirements [R302.9]
- ☐ Radon system labeled [MN Rules 1303.2402 Subp. 5.E]
- ☐ Sump pit lid sealed (if used for Radon) [MN Rules 1303.2402 Subp. 4.E]
- ☐ Basement floor slab sealed to foundation wall; other concrete joints sealed. [MN Rules 1303.2402 Subp. 4.B]
- ☐ Garage/dwelling separation: door, wall/ceiling gypsum [R302.6]
- ☐ Roof venting [R806]
- ☐ Siding: installed per manufacturer, flashing, distance to grade [R703.3, R703.4, R317.1]
- ☐ Deck: decking, guards, handrails, lateral load connectors [R507]
- ☐ Patio door: blocked or guard installed if a deck is not present [R312]
- ☐ Final grading [R401.3, R404.1.6]
- ☐ Energy Compliance Certificate* [RE401.3]
- ☐ Blower door test* [RE402.4.1.2]
- ☐ Insulation installation certificate* [RE303.1.1]
- ☐ Required vegetation & landscaping (per local authority)
- ☐ Required hardcover: driveway & sidewalk (per local authority)
- ☐ Issuance of Certificate of Occupancy if all items are complete [MN Rules 1300.022

Building Final Inspection

Footing Inspection

- Setbacks
- Soil Conditions
- Strip Footings Width/Thickness
- Pad Footings Size/Thickness
- Depth/Frost Coverage
- Rebar – Per Drawings, Grounding Rod

Foundation Wall - CIP (Pre-Pour)

- Forms – Height/Thickness
- Form placement on footing – footing projection
- Rebar – Dowels, Verticals, & Horizontals

Foundation Wall – Block or CIP (Post-Pour)

- Gaps/Cracks/Flaws? Block arrangement
- Waterproofing
- Insulation - R10 Min
  - Draining
  - Non-Draining – Poly Slipsheet Required
- Walls braced for backfill
- Drain Tile
  - Rock Base, Sock/Fabric

Plumbing Rough-In

- Underground – Visual & Air Test
- Above Ground – Visual & Air Test
- Supply Piping: Support, Hots Insulated
- Mixing Valves
- Tile shower Pan

Slab

- Rock
- Poly
- Radon Tee (or use Drain Tile)

Mechanical Rough-In

- Supply & Return Ducting
- Exhaust fans
  - Bath
  - Dryer
- Gas Lines
  - Visual
  - Air Test
- Fireplace

Electrical Rough-in

Framing

- Roof Truss & Bracing/Energy Heel
- Roof covering, Ice & Water, Roof Vents
- Attic Access
- Headers
- Columns/Blocking – Follow Load Paths
- Floor Framing (Truss, I-Joist, Lumber)
- Treated Sills/Plates & Anchor Bolts
- Narrow Wall Bracing
- Sheathing
- Stair Rise/Run
- Headroom
- Hallways
- Boring/Notching
- Fireblocking/Draftstopping
- Tempered Glazing/U-Factor of Glazing
- Window Fall Protection
- Smoke Alarms
- Outlet in Attic for Future Radon Fan
- Water Resistive Barrier/House Wrap
- Flashing: Drip Caps, Pan Flashing, Kick-out Flashing, Foundation Insulation Flashing, Other

Lath (Adhered Masonry Veneer)

- Paper
- Mesh
- Fastening
- Flashing
- Weep Screed

Insulation

- Vapor Retarder
- Wall Insulation – R20 Min
- Rim Joist – R20 Min
- Window Jambs
- Penetrations sealed (Fireblocking)
- Radon Piping & Labeling

Mechanical Final

- Furnace
- Water Heater
- A/C Unit
- ERV/HRV
- Vent Terminations Hoods/Locations
- Intake/Exhaust Labeled
- Gas Connections & Sediment Traps
- Supply/Return Air Grills

Plumbing Final

- Manometer Test
- Fixtures set
- Dishwasher Air Gap & Water Hammer
- Washer Water Hammer
- Water Softener: Bonding jumper, Air Gap
- Shower Tile Height
- Backwater Valve Accessible

Building Final

- Insulation Installation Certificate
- Blower Door Test
- Plumbing Vent Roof Caps Removed
- Guards/Hand Rails
- Smoke/CO Alarm Operation
- Patio Door Blocked (if no Deck)
- Window Fall Protection
- Garage Wall/Ceiling Gypsum
- Basement Ceiling & Under Stair Gypsum
- Mechanical Room – 80sf Max Unprotected, Blocked to Floor
- Radon Labeled
- Sump Lid Sealed (if used for Radon)
- Siding: Installation, Distance to Grade
- Final Grading
- Required Vegetation/Landscaping
- Required Hardcover: Driveway, Sidewalk

Electrical Final

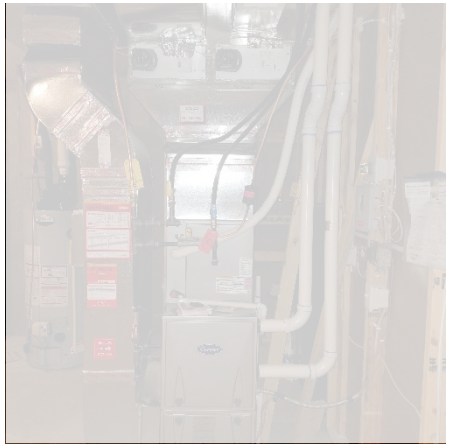
DEPARTMENT OF LABOR AND INDUSTRY

Final Inspections

MN Rules 1300.0210, Subp. 6, K

Complete all final inspections.

Electrical



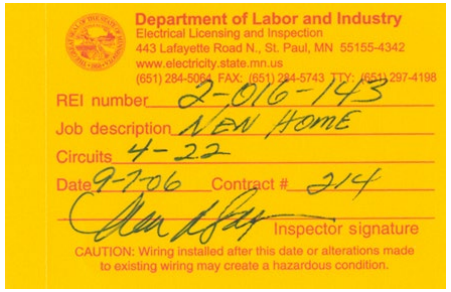
Mechanical

Plumbing

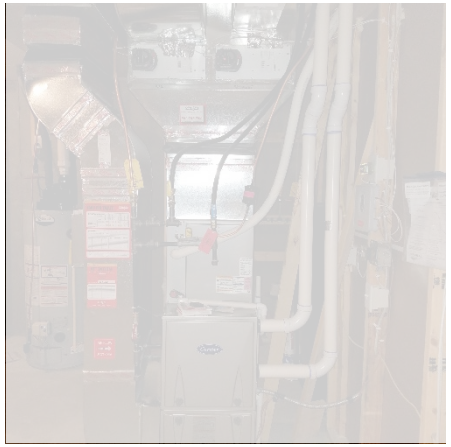
Final Inspections

MN Rules 1300.0210, Subp. 6, K

Complete all final inspections.



Electrical



Mechanical

Plumbing

Final Inspections

MN Rules 1300.0210, Subp. 6, K

Complete all final inspections.

Electrical

Mechanical

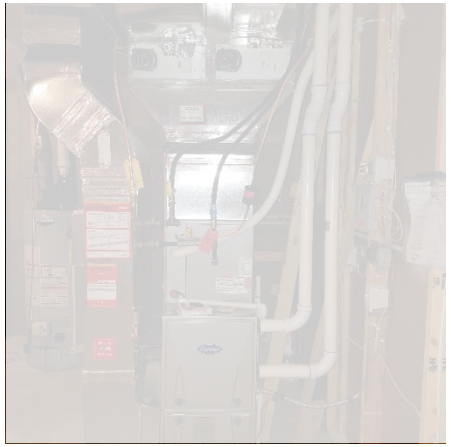
Plumbing

Final Inspections

MN Rules 1300.0210, Subp. 6, K

Complete all final inspections.

Electrical



Mechanical

Plumbing

Final – Fireplace (Gas)

DEPARTMENT OF LABOR AND INDUSTRY

IFGC 406.4, R1001, and R1004.1

- Gas line.
  - Proper connection, sediment trap.
  - Complete & operational.
  - More detail provided in Fuel Gas presentation.
- Manufacturer's installation instructions.

Final – Smoke Alarms

Smoke Alarms:

- Verify Operation.
- Where more than one smoke alarm is required to be installed within an individual dwelling unit, the alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual dwelling unit.
  - Wired or wireless connectivity.

Final – Carbon Monoxide Alarms

Carbon monoxide alarms:

- Verify operation.
- Outside of and within 10 feet of bedrooms.
- Each level containing bedrooms.

Final – House/Garage Separation

House/garage separation:

- Type X gypsum board for garage ceilings beneath habitable rooms shall be installed perpendicular to the ceiling framing and shall be fastened at a maximum 6 inches on center by minimum 1 7/8 inch 6d coated nails or equivalent drywall screws.

Final – House/Garage Separation

DEPARTMENT OF LABOR AND INDUSTRY

R302.5.1

House/garage separation:

- Openings between the garage and residence shall be equipped with:
  - Solid wood doors not less than 1 3/8 inch in thickness;
  - Solid or honeycomb core steel doors not less than 1 3/8 inch; or
  - 20 minute fire-rated doors.
- **Are self closing devices required?**

Final –House/Garage Separation

DEPARTMENT OF LABOR AND INDUSTRY

R302.11, 4

House/garage separation:

- The garage shall be separated from the residence and its attic by not less than 1/2 inch gypsum board applied to the garage side.
- Penetrations through the separation shall be protected by filing the opening around the penetrating item with approved material to resist the passage of flame and products of combustion.

Final – House/Garage Separation

DEPARTMENT OF LABOR AND INDUSTRY

Table R302.6

- House/garage separation:
  - Attic access within the garage – how to address?

Final - Guards

DEPARTMENT OF LABOR AND INDUSTRY

R312.1

Guards:

- Minimum of 36 inches in height.
  - *Exception when used as the handrail.*
- Openings which not allow passage of a sphere 4 inches.
  - *Exception – Space under the shoe rail – 6”*
  - *Exception – open sides of stairs – 4-3/8”*
- Handrail height, measured vertically from the sloped plane adjoining the tread nosing, or finish surface of ramp slope, shall be not less than 34 inches and not more than 38 inches.

Final - Stairs

DEPARTMENT OF LABOR AND INDUSTRY

R311.7.1

Stairs:

- Minimum width 36 inches.
- The maximum riser height shall be 7-3/4 inches.
- The minimum tread depth shall be 10 inches.
- Uniform within 3/8 inch.

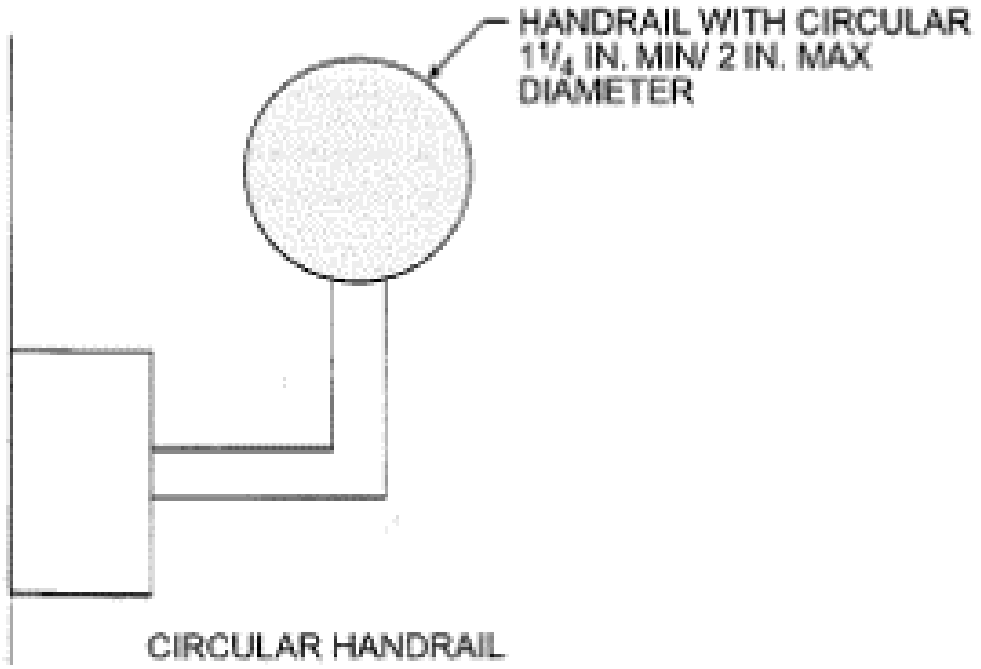
Final - Stairs

DEPARTMENT OF LABOR AND INDUSTRY

R311.7.8.3, 1

All required handrails shall be of one of the following types or provide equivalent graspability:

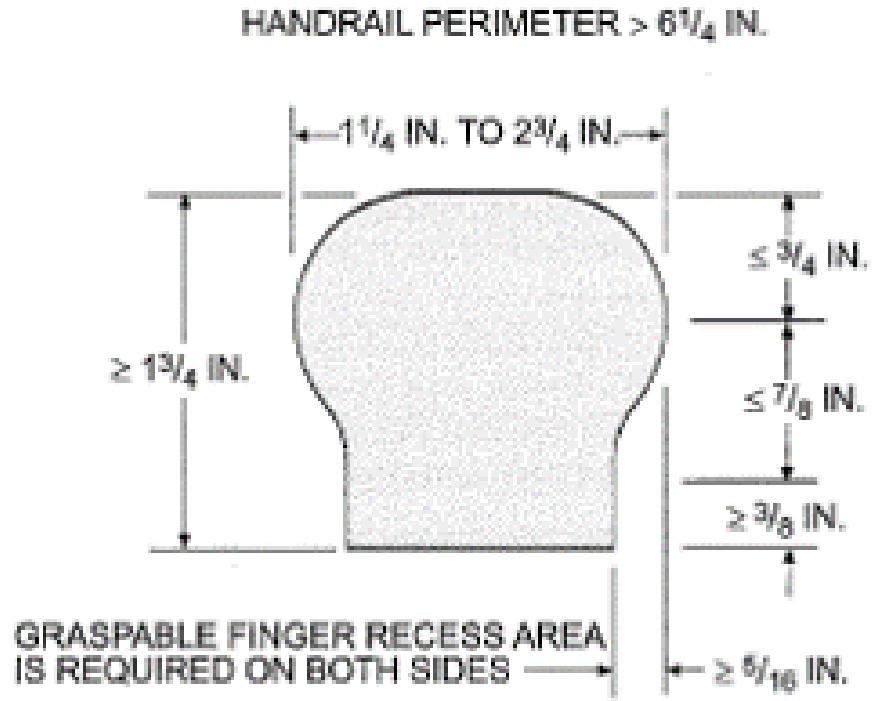
- **Type I.** Handrails with a circular cross section shall have an outside diameter of at least 1-1/4 inches and not greater than 2 inches. If the handrail is not circular, it shall have a perimeter dimension of at least 4 inches and not greater than 6-1/4 inches with a maximum cross section of dimension of 2-1/4 inches.



Final - Stairs

DEPARTMENT OF LABOR AND INDUSTRY

Type II. Handrails with a perimeter greater than 6-1/4 inches shall have a graspable finger recess area on both sides of the profile. The finger recess shall begin within a distance of 3/4 inch measured vertically from the tallest portion of the profile and achieve a depth of at least 5/16 inch within 7/8 inch below the widest portion of the profile. This required depth shall continue for at least 3/8 inch to a level that is not less than 1-3/4 inches below the tallest portion of the profile. The minimum width of the handrail above the recess shall be 1-1/4 inches to a maximum of 2-3/4 inches. Edges shall have a minimum radius of 0.01 inch.



For SI: 1 inch = 25.4 mm.

Figure R311.7.8.3(2)
TYPE II HANDRAIL

Final – Exposed Insulation

Foam plastic insulation:

- Sill plates and headers (rim joists).
- Thermal barrier.
  - *Exception: Rim joist*
- Vapor retarder.
- R value.
- Double-checking from the previous insulation inspection.

Final – Under Stair Area

Accessible under-stair enclosure:

- Walls
- Under-stair surface.
- Soffits.

Final – Fire Protection of Floors

DEPARTMENT OF LABOR AND INDUSTRY

R302.7

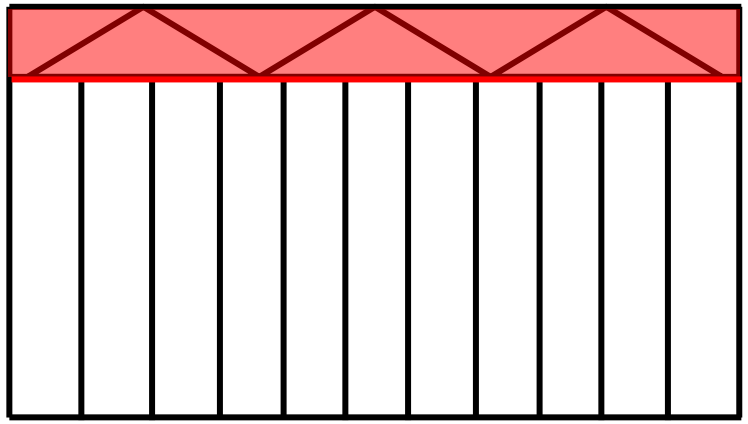
½” Gypsum or 5/8” Plywood

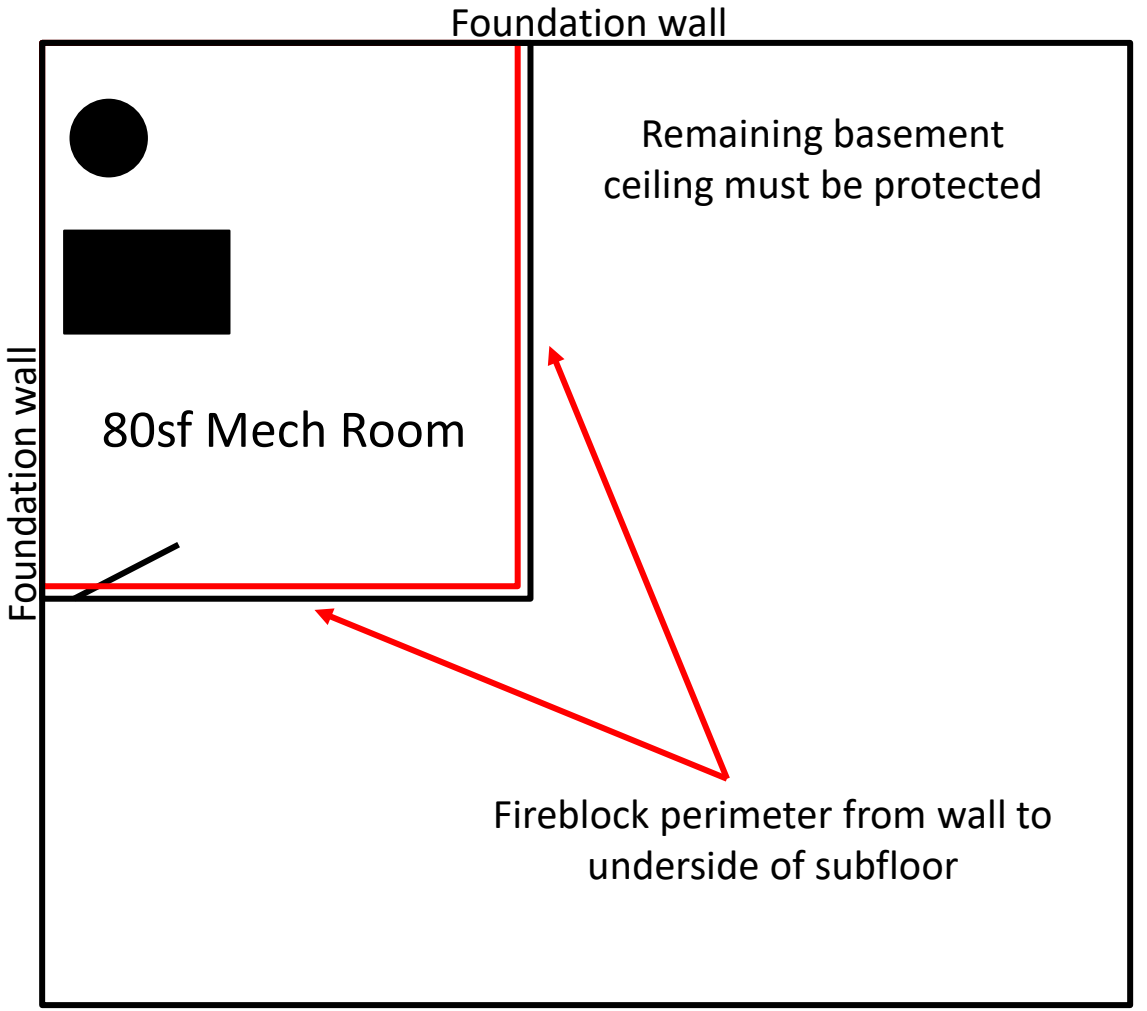
- *Exceptions:*
  - *Sprinkled.*
  - *Crawl spaces (no storage or appliances).*
  - *2x10 Lumber Joists*
  - *80sf Max unprotected (Mechanical Room)*

Final – Fire Protection of Floors

80sf Exception:

- Portions of floor assemblies can be unprotected when complying with the following:
  - 80sf aggregate per story
  - Fireblocking installed along the perimeter of unprotected area.





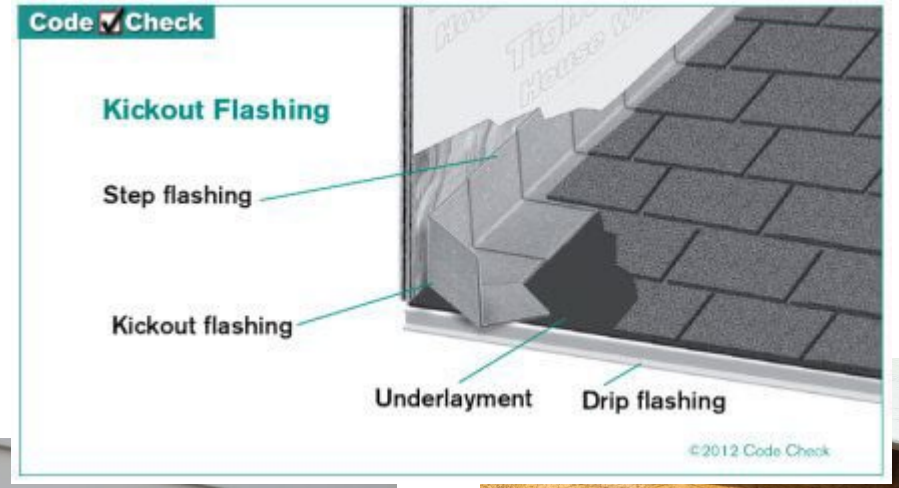
Final - Exterior

DEPARTMENT OF LABOR AND INDUSTRY

R703.1.1 and R703.8

Exterior:

- Flashing … proper installation of siding and windows.



Final - Exterior

Exterior:

- Wood siding, sheathing and wall framing on the exterior of a building shall have a clearance of not less than 6 inches from the ground.
- Otherwise, use treated wood.

Final - Exterior

DEPARTMENT OF LABOR AND INDUSTRY

R703.1, R308.4, R303.7 and R507.3

Exterior items:

- Siding/flashing/caulking.
- Safety glazing.
- Exterior lights at door and deck stair.
- Specifications of the composite decking.

Final – Garage Door

DEPARTMENT OF LABOR AND INDUSTRY

R309, Table R301.2(2), Figure 301.2(7)

Garage Door:

- MN Statutes 325F.82 & 325F.83.
- Wind load – 90mph Basic Wind Speed.
- Edge sensor.

Final - Grade

Drainage:

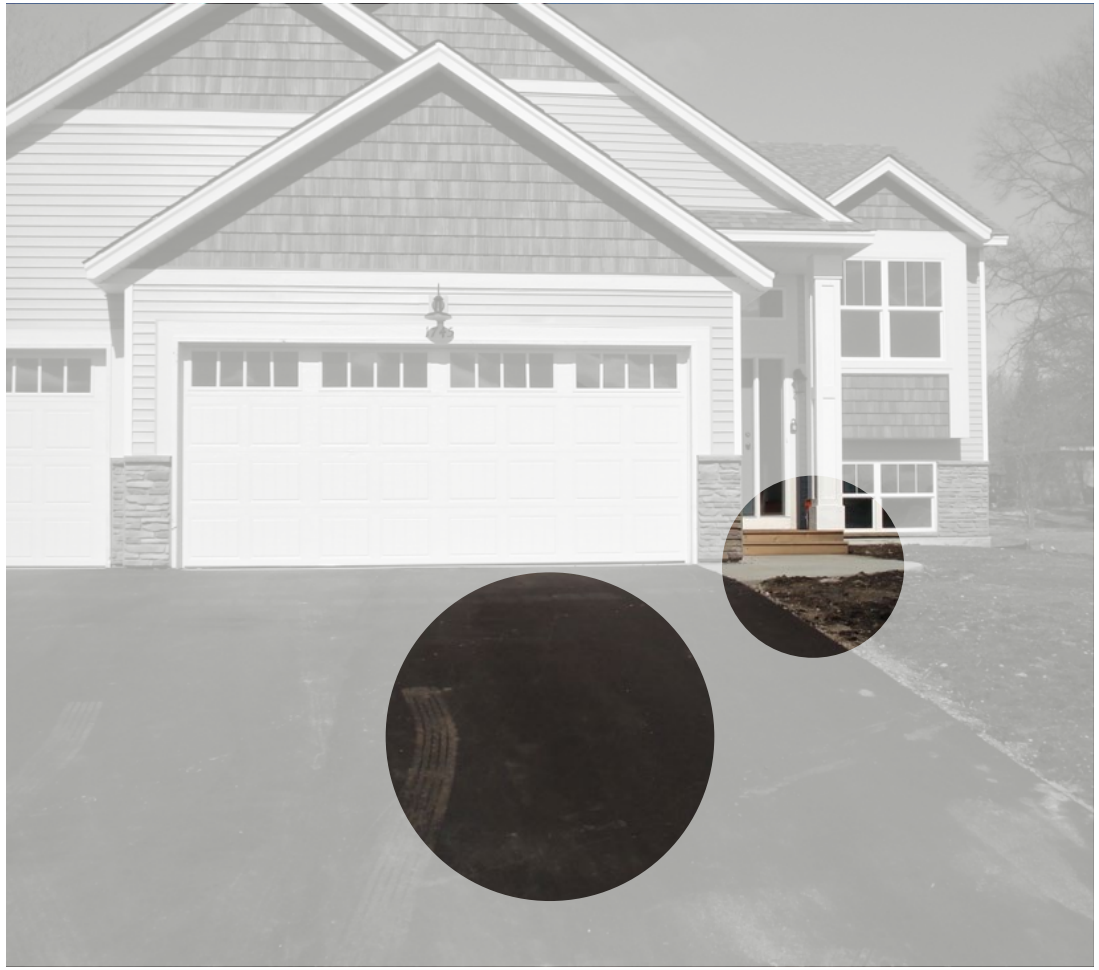
- Surface drainage shall be diverted to a storm sewer conveyance or other approved point of collection so as to not create a hazard.
- Lots shall be graded to drain surface water away from foundation walls.
- The grade shall fall a minimum of 6 inches within the first 10 feet.

Final – Other Items

DEPARTMENT OF LABOR AND INDUSTRY

MN Rules 1300.0210, Subp. 6, K

Driveway, Sidewalk, Vegetation

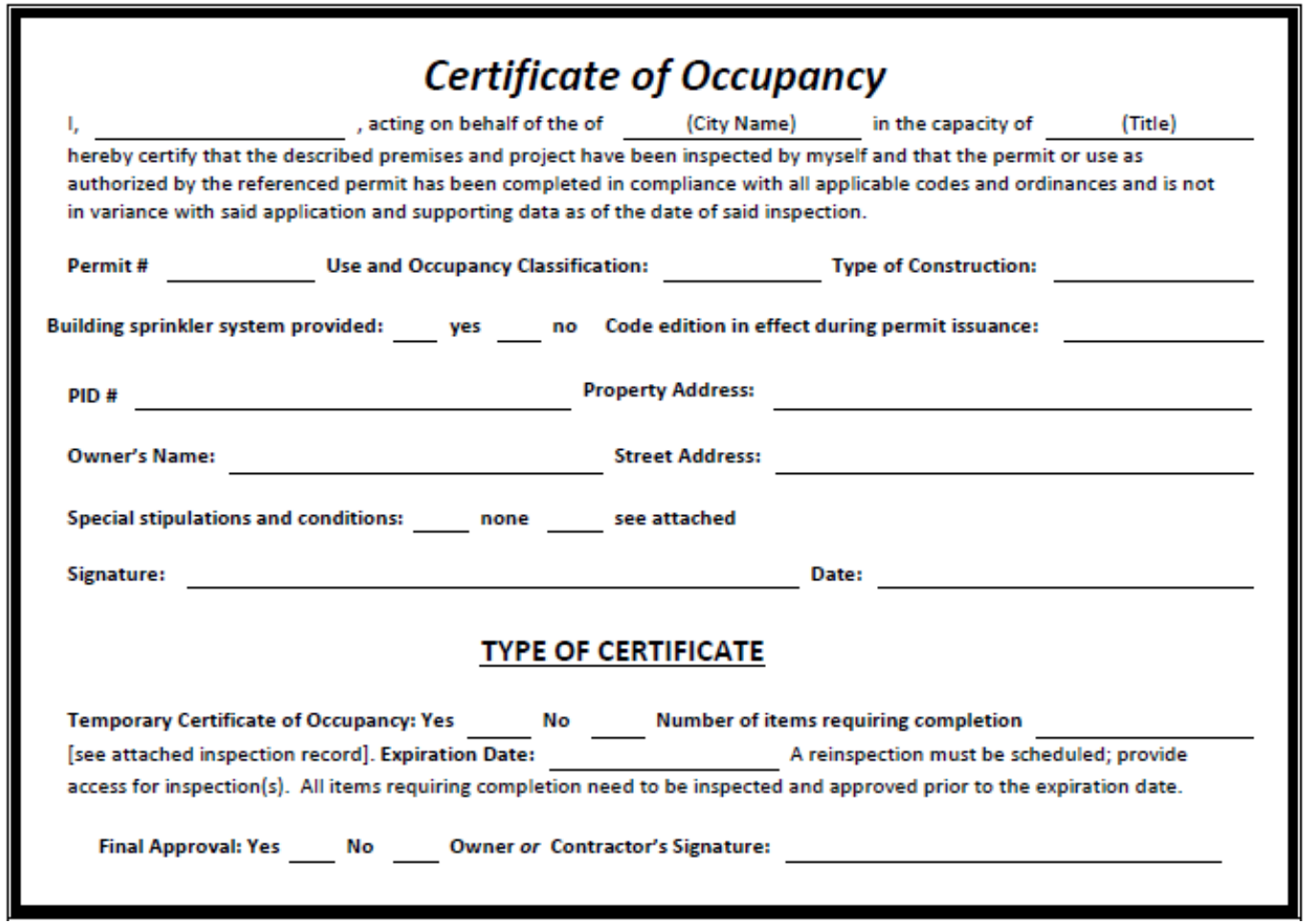


Final - Occupancy

DEPARTMENT OF LABOR AND INDUSTRY

MN Rules 1300.0220, Subp. 5 & Subp. 6

- Certificate of Occupacy.
  - Conditions?
- Temporary Certificate of Occupancy.
  - Not required to issue, option open to AHJ
  - Seasonal challenges
  - Establish Escrow?
  - It is essentially a CO
  - Fee?



Certificate of Occupancy

I, _____ , acting on behalf of the of _____(City Name)_____ in the capacity of _____(Title)_____ hereby certify that the described premises and project have been inspected by myself and that the permit or use as authorized by the referenced permit has been completed in compliance with all applicable codes and ordinances and is not in variance with said application and supporting data as of the date of said inspection.

Permit # _____ **Use and Occupancy Classification:** _____ **Type of Construction:** _____

Building sprinkler system provided: ____ **yes** ____ **no** **Code edition in effect during permit issuance:** _____

PID # _____ **Property Address:** _____

Owner's Name: _____ **Street Address:** _____

Special stipulations and conditions: ____ **none** ____ **see attached**

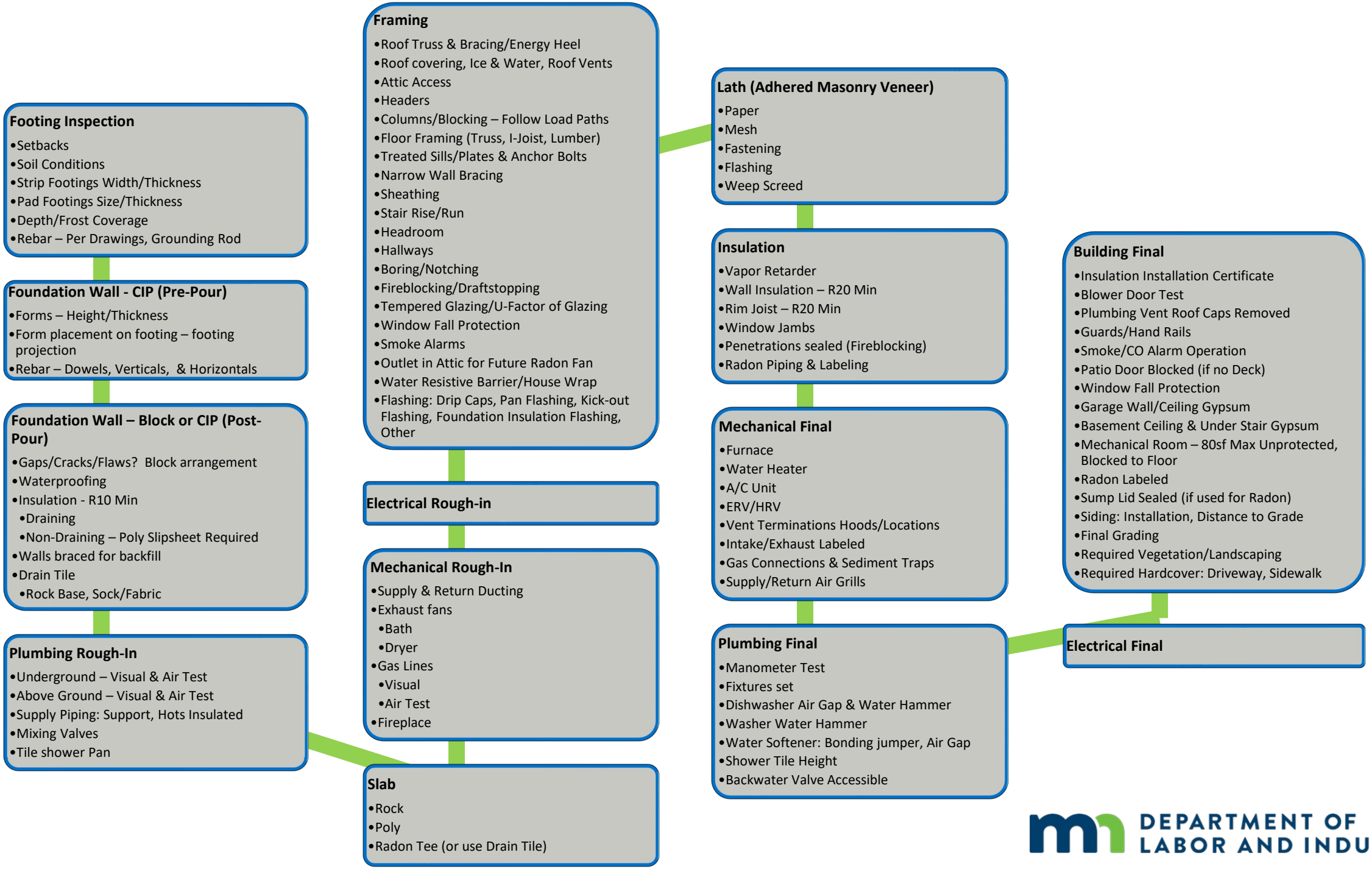
Signature: _____ **Date:** _____

TYPE OF CERTIFICATE

Temporary Certificate of Occupancy: Yes _____ **No** ____ **Number of items requiring completion** _____ [see attached inspection record]. **Expiration Date:** _____ A reinspection must be scheduled; provide access for inspection(s). All items requiring completion need to be inspected and approved prior to the expiration date.

Final Approval: Yes ____ **No** ____ **Owner *or* Contractor's Signature:** _____

Details provided in binder.



DEPARTMENT OF LABOR AND INDUSTRY

DEPARTMENT OF LABOR AND INDUSTRY

Thank you!

Department of Labor and Industry

Construction Codes and Licensing Division

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