

# 8' x 12' Microshelter Design Plans

7/23/2021

Questions/comments?

Contact Jeff Loyer @ 360-819-2520

**Microshelter goal is to provide sturdy shelter for \$1000 that is “better than a tent”, to:**

- Improve living conditions for the houseless, make their existence bearable by being superior to tents in:
  - Durability
  - Weather resistance (snow, rain, wind, etc.)
  - Rodent resistance
  - Security
- Replace unsightly, flimsy tents and tarps with tidy structures
- Be cost effective – replace \$200 tents with durable \$1000 structures
- Be moveable
  - Can be disassembled and reassembled
  - Light and small enough to be moved in a pickup
- Provide temporary, moveable structures which don't require permits. They will be built and painted off-site, and then assembled on-site.
- Build and assembly can be proliferated, require no special materials or tools (basic carpentry only)

The Microshelters consist of 6 panels, each of which is constructed independently of the others. Possible construction is: One person cuts and labels the 2x4's, a team of 2 frames each panel, another person cuts the plywood, and a team of 2 nails the plywood onto the frame. A team of 2 can then assemble all panels but the roof, which takes 2-4 people to slide into position.

Nine Microshelters have been built, painted, and delivered to Nickerson, to replace tents. Original costs were ~\$500 each with discount from Lowe's but lumber prices have soared, bringing estimated cost to about \$1,000.

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# Microshelter Build/Assembly Hints

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## Microshelter Build/Assembly hints

- Build floor first, then build other panels on it, using floor as a template to make the framing roughly square
- Use plywood factory edges to make walls square since we're assembling them together
- Plywood factory edges meet in middle of walls
- Plywood overlaps of 1 1/2" are intentional so a 2x4 can be used to check overlap
- Only drive 1<sup>st</sup> 8 plywood corner nails 1/2-way, then check all overlaps before driving any all the way
- Use chalk lines to center plywood nails – missed nails show on the inside
- Plywood nails:
  - Floor and roof: 6" apart on edges, 12" elsewhere
  - Walls: 8" apart on edges, 16" elsewhere
- Use construction adhesive on walls between plywood and 2x4's
- Lean roof against S side of building (N end up), and slide onto rafter supports
- Nail ripped plywood to N&S ends of roof to provide a little more overhang
- Notch window frame 1x2's and deadbolt mounts on table saw before building party
- Drill deadbolt mount using 1 3/4" hole saw before building party

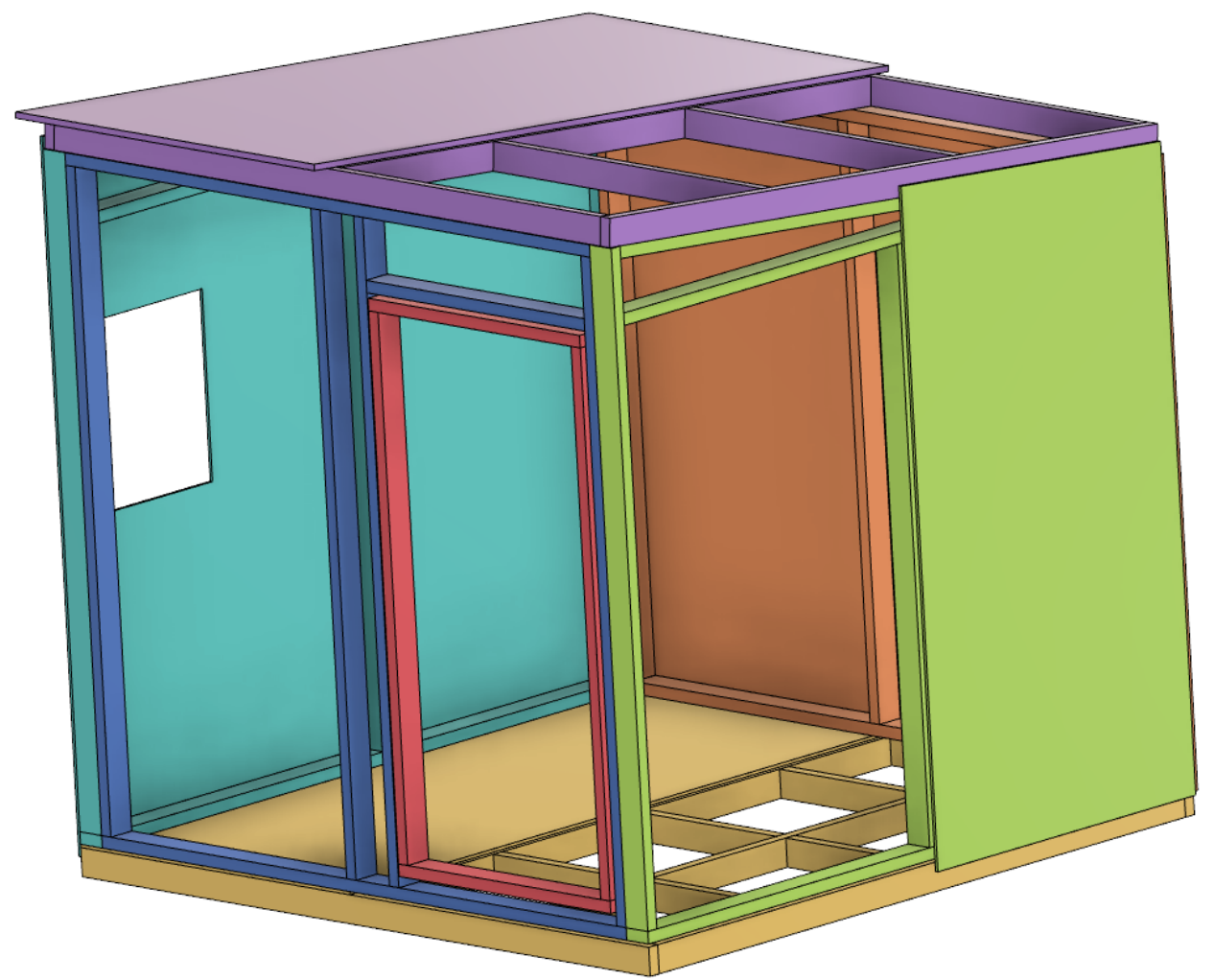
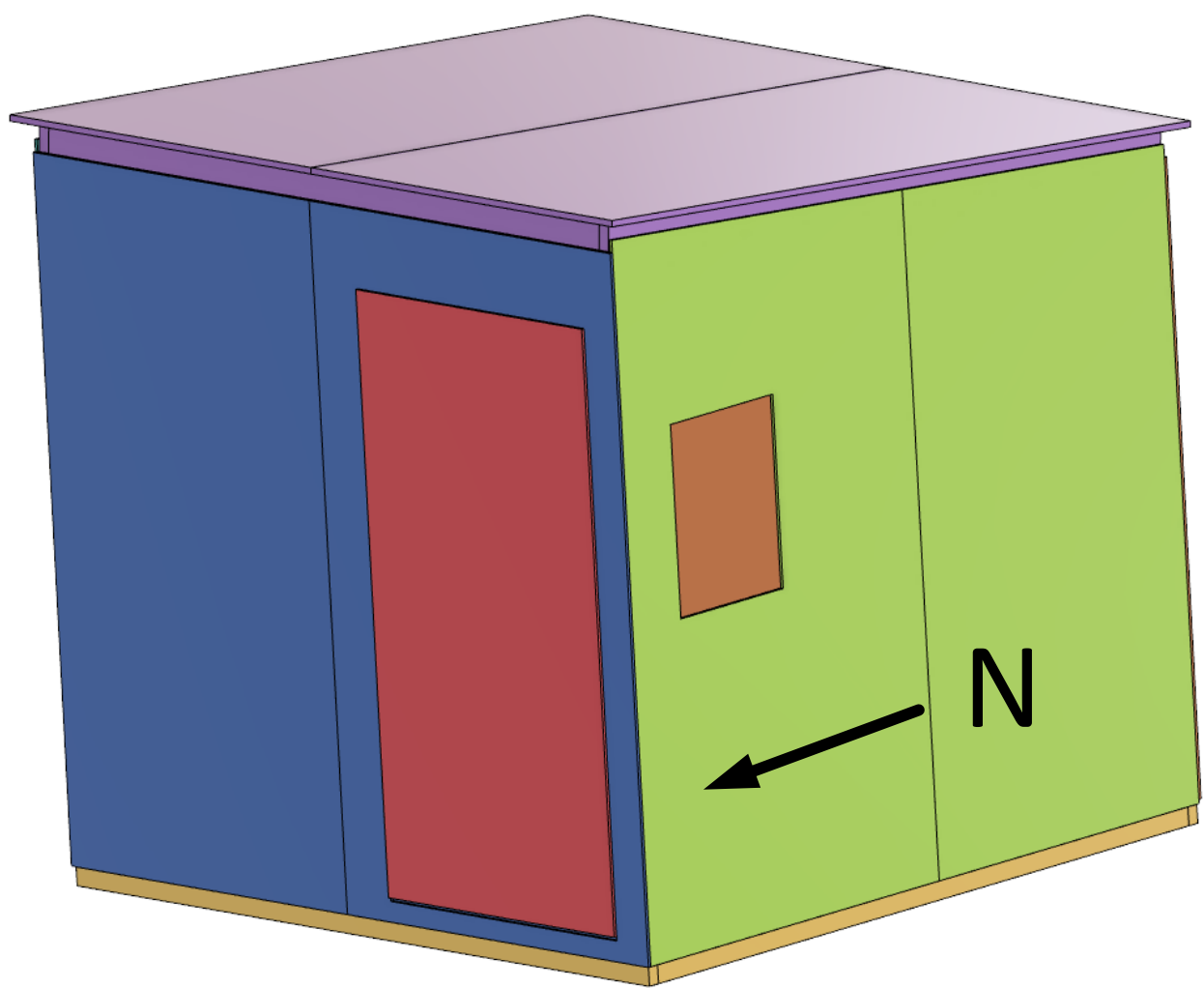
# Microshelter Build/Assembly Teams & Tools

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## Microshelter Build/Assembly Teams and Tools

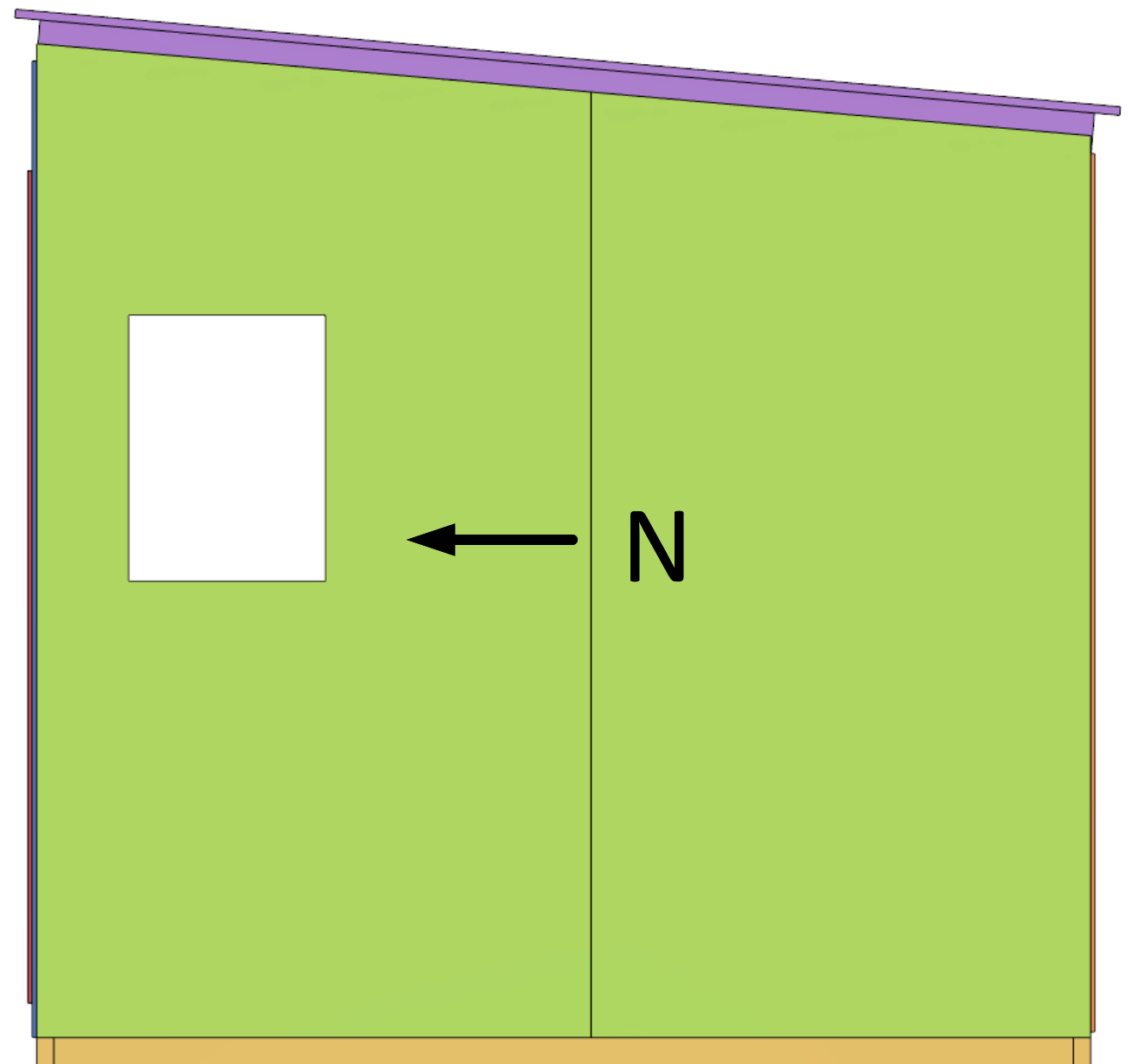
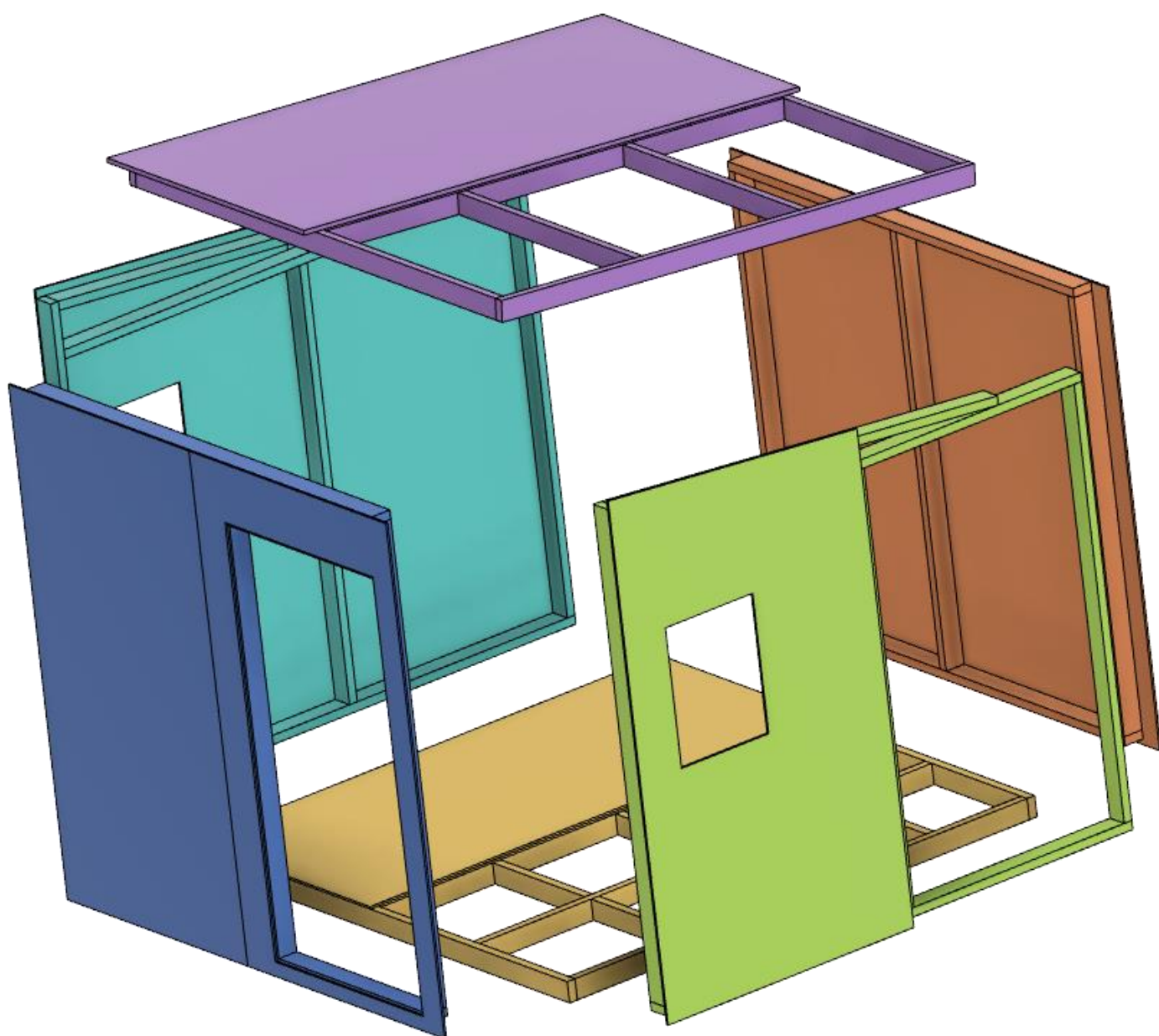
(in addition to standard hammer, tape measure, pencil, etc.)

- Miter Saw – cut and label 2x4's
  - Miter (“Chop”) saw
  - Sharpie to label 2x4's
- Panel Framing – build 2x4 structures
  - Speed square
  - Framing nail gun and nails
  - Drill and 3/4" bit for N wall
- Panel Plywood – Cut plywood
  - Circular saw
  - Long straightedge (narrow plywood, 1x2?)
  - Sharpie to label plywood, windows, and door
- Panel Assembly
  - Chalk line
  - Roofing nail gun and 1 1/4" galv. roofing nails
  - 6" & 8" measurement gauges
- Roofing
  - Long straightedge (narrow plywood, 1x2?)
  - Utility knife
  - Putty knife, rags, lacquer thinner or mineral spirits
  - Roofing nail gun and 1 1/4" galv. roofing nails
  - Tin snips
- Building Assembly
  - Step ladder
  - 8' long clamps, or 2 1/2" to 3" wood screws and driver to temporarily clamp and hold walls (removed after lag screws are in place)
  - Angle grinder to grind off any exposed nails
  - Impact driver w/ T30 bit for lag screws
  - Sledge hammer, pry bar
- Hardware (deadbolt, eye bolts, hinges, latches, etc.)
  - Table saw for notching window trim and deadbolt mount
  - Drill and bits, including 1 3/4" diameter hole saw for deadbolt
  - Phillips driver
  - Trim nailer
  - Hardware
  - Small screws for hinges
  - Angle grinder
  - Reciprocating saw w/ wood and metal blades
- Painting:
  - Rollers
  - Brushes
  - Paint tray and liners
  - Paint stirrers
  - Can opener
  - Funnels for 1 and 5 gallon cans
  - Knee pads
  - Rubber mallet
  - Large channel locks for opening 5 gallon cans
  - 1 gallon plastic bags to store used brushes and rollers overnight
  - Rags
  - grubby clothes ☺



## 3-D Drawings

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# Picture

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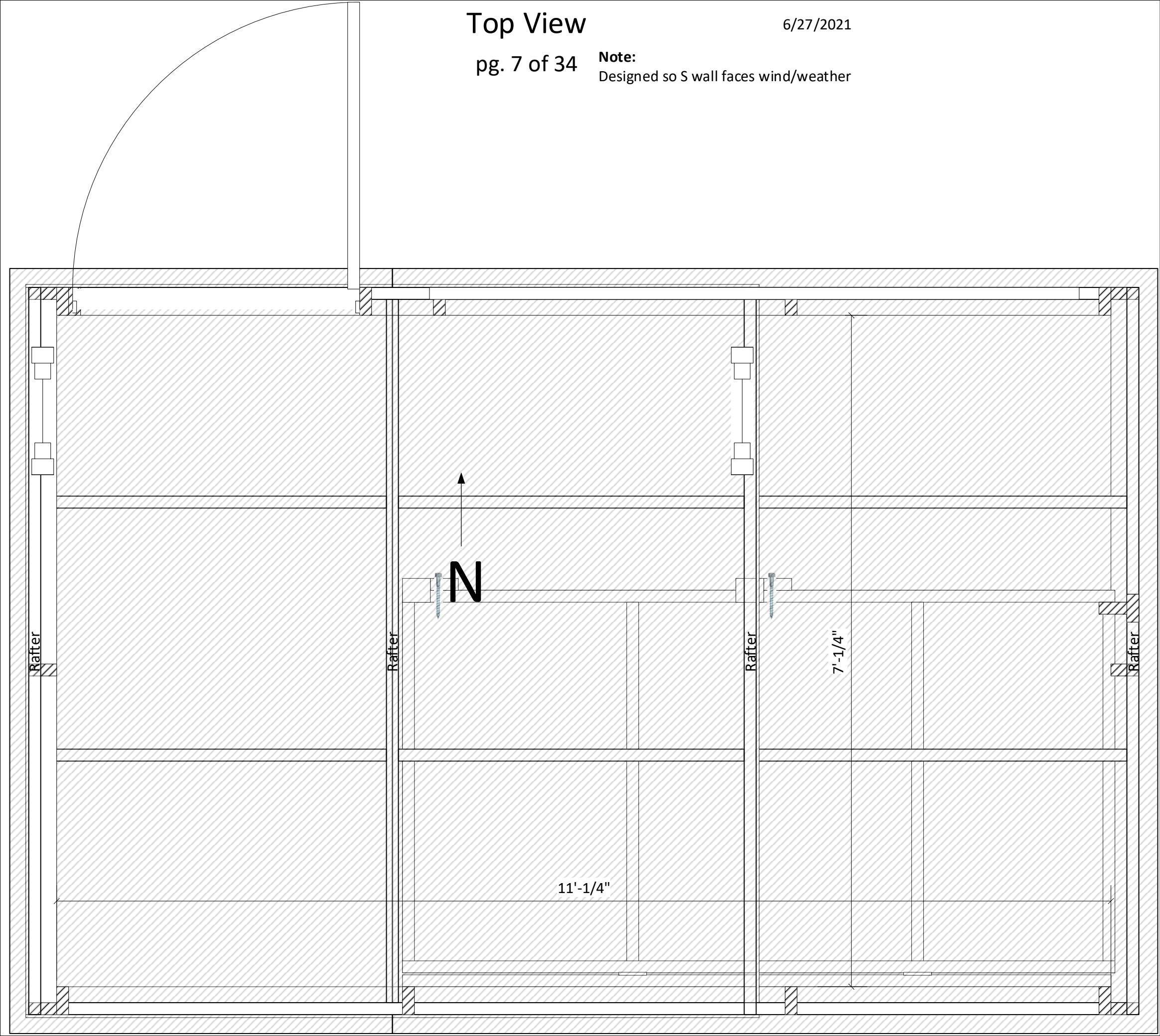


# Top View

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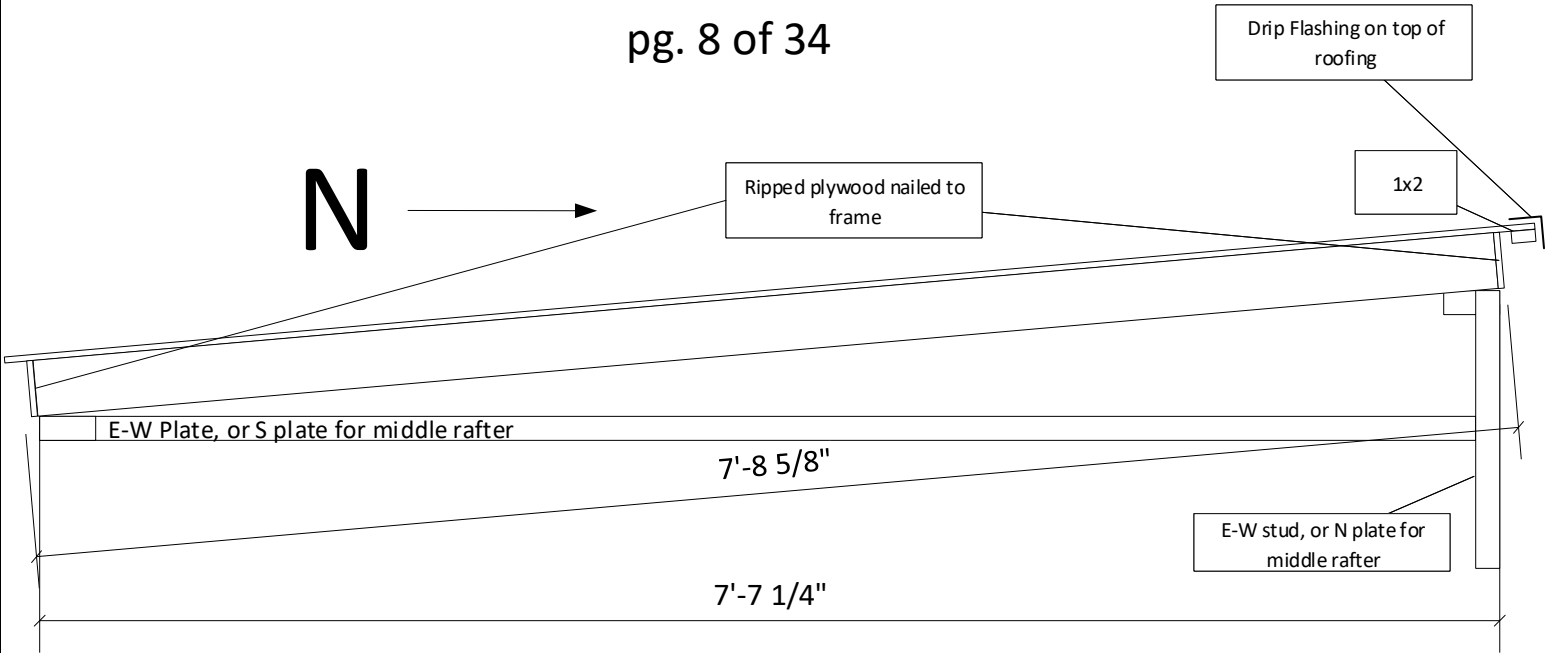
**Note:**  
Designed so S wall faces wind/weather



# Rafters @ 5° (1"/foot)

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# Roof

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## Framing

### Materials:

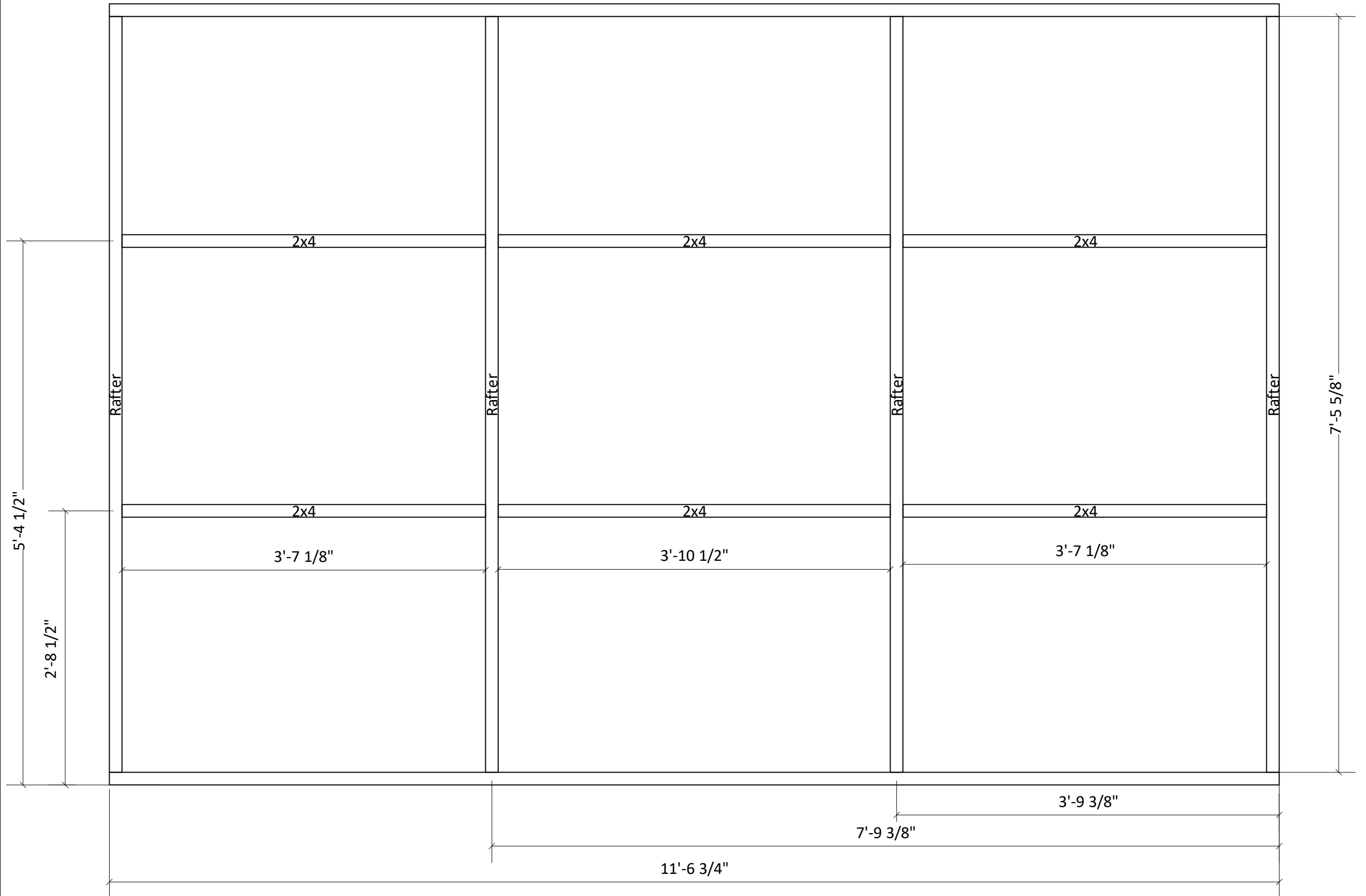
- (2) 12' 2x4's
- (7) 8' 2x4's
- (3) 4'x8'x3/8" plywood CDX plywood
- (1.5) 8' 1x2
- 100 ft<sup>2</sup> rolled roofing (1 square)
- Rolled roofing (lap) cement
- Roofing nails
- 12' Drip Flashing

### Cut List:

- (2) 11'-6 3/4" 2x4's, rafters
- (4) 7'-5 5/8" 2x4's, rafters
- (2) 3'-10 1/2" 2x4's, framing (**1/2 of 92-5/8"=3'-10 1/4"**)
- (4) 3'-7 1/8" 2x4's, framing
- (3) 4'x8'x3/8" CDX plywood, roof
- (1) 8' 1x2
- (1) 4' 1x2
- (2) 12' x 36" rolled roofing
- (1) 12' x 33" rolled roofing
- Ripped plywood on N&S ends

Trim 1/2" off end  
plywoods

N



# Roof

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## Materials:

- (2) 12' 2x4's
- (7) 8' 2x4's
- (3) 4'x8'x3/8" plywood CDX plywood
- (1.5) 8' 1x2
- 100 ft<sup>2</sup> rolled roofing (1 square)
- Rolled roofing (lap) cement
- Roofing nails
- 12' Drip Flashing

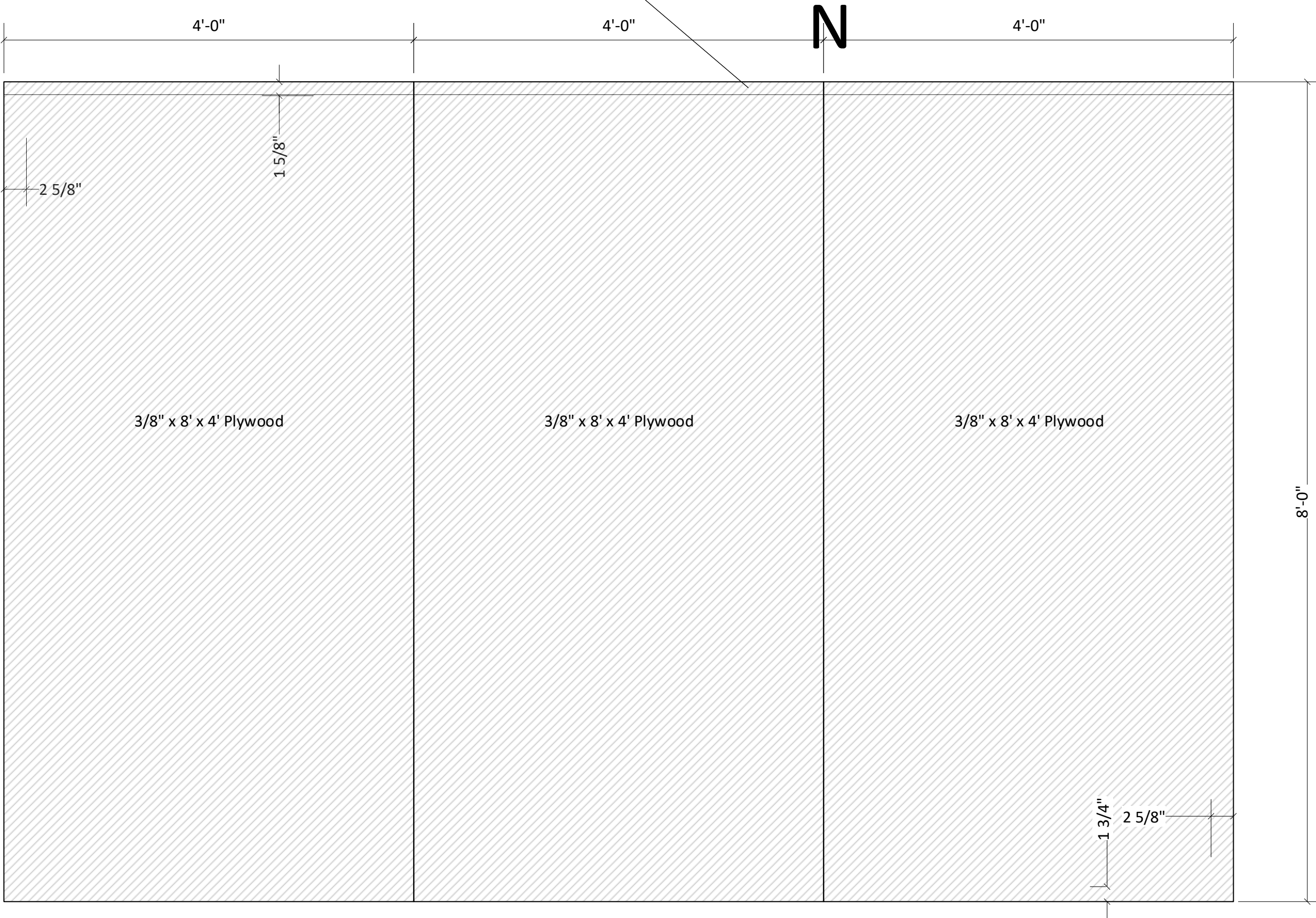
## Plywood

## Cut List:

- (2) 11'-6 3/4" 2x4's, rafters
- (4) 7'-5 5/8" 2x4's, rafters
- (2) 3'-10 1/2" 2x4's, framing (**1/2 of 92-5/8"=3'-10 1/4"**)
- (4) 3'-7 1/8" 2x4's, framing
- (3) 4'x8'x3/8" CDX plywood, roof
- (1) 8' 1x2
- (1) 4' 1x2
- (2) 12' x 36" rolled roofing
- (1) 12' x 33" rolled roofing
- Ripped plywood on N&S ends

Trim 1/2" off end  
plywoods

8' & 4' 1x2 screwed on bottom  
of plywood to absorb roofing  
nails



# Roof

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## Materials:

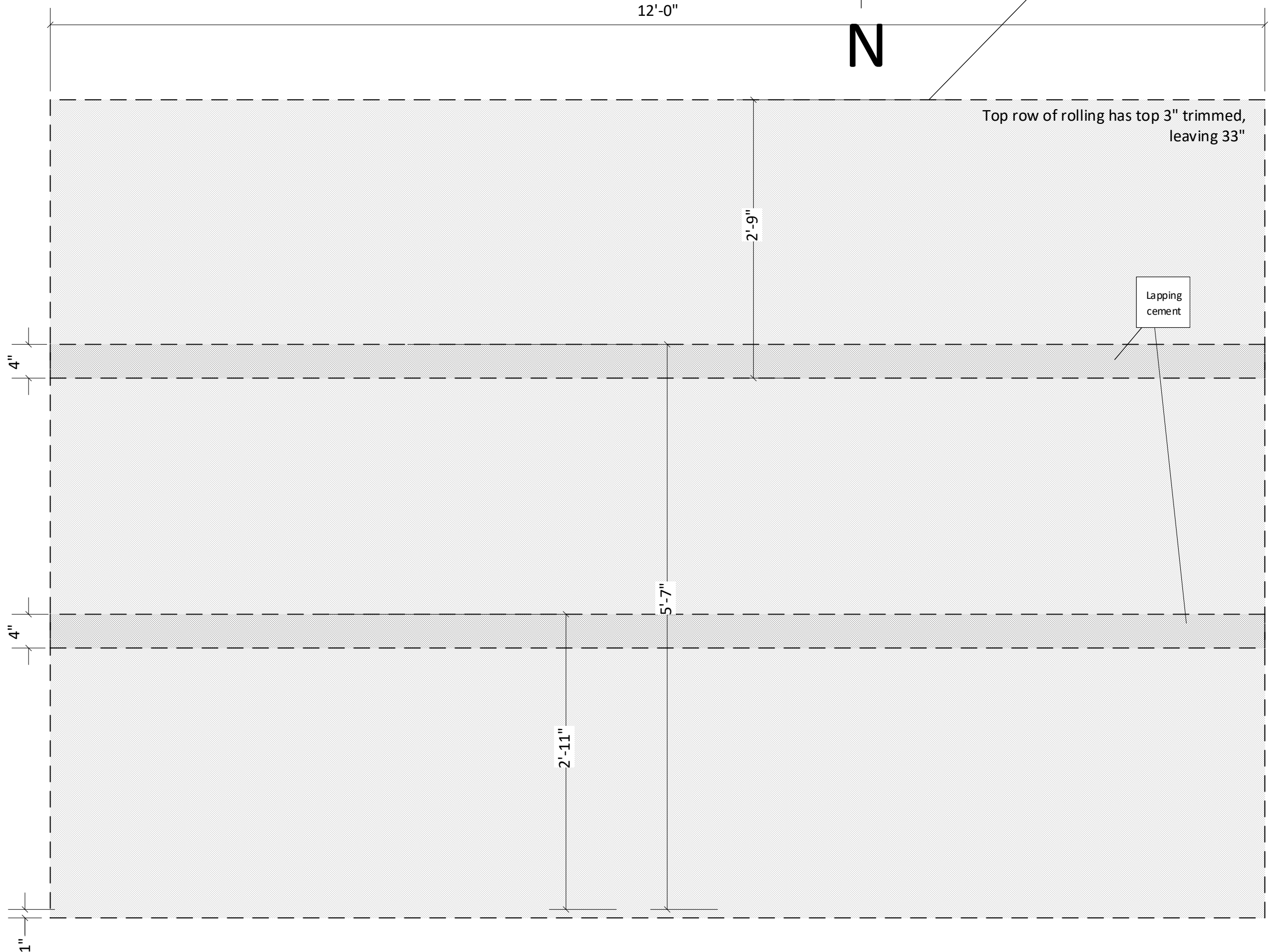
- (2) 12' 2x4's
- (7) 8' 2x4's
- (3) 4'x8'x3/8" plywood CDX plywood
- (1.5) 8' 1x2
- 100 ft<sup>2</sup> rolled roofing (1 square)
- Rolled roofing (lap) cement
- Roofing nails
- 12' Drip Flashing

## Rolled Roofing

## Cut List:

- (2) 11'-6 3/4" 2x4's, rafters
- (4) 7'-5 5/8" 2x4's, rafters
- (2) 3'-10 1/2" 2x4's, framing (**1/2 of 92-5/8"=3'-10 1/4"**)
- (4) 3'-7 1/8" 2x4's, framing
- (3) 4'x8'x3/8" CDX plywood, roof
- (1) 8' 1x2
- (1) 4' 1x2
- (2) 12' x 36" rolled roofing
- (1) 12' x 33" rolled roofing
- Ripped plywood on N&S ends

Trim 1/2" off end  
plywoods



# Roof

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### Materials:

- (2) 12' 2x4's
- (7) 8' 2x4's
- (3) 4'x8'x3/8" plywood CDX plywood
- (1.5) 8' 1x2
- 100 ft<sup>2</sup> rolled roofing (1 square)
- Rolled roofing (lap) cement
- Roofing nails
- 12' Drip Flashing

### Cut List:

- (2) 11'-6 3/4" 2x4's, rafters
- (4) 7'-5 5/8" 2x4's, rafters
- (2) 3'-10 1/2" 2x4's, framing ( $1/2$  of  $92-5/8"=3'-10\frac{1}{4}"$ )
- (4) 3'-7 1/8" 2x4's, framing
- (3) 4'x8'x3/8" CDX plywood, roof
- (1) 8' 1x2
- (1) 4' 1x2
- (2) 12' x 36" rolled roofing
- (1) 12' x 33" rolled roofing
- Ripped plywood on N&S ends

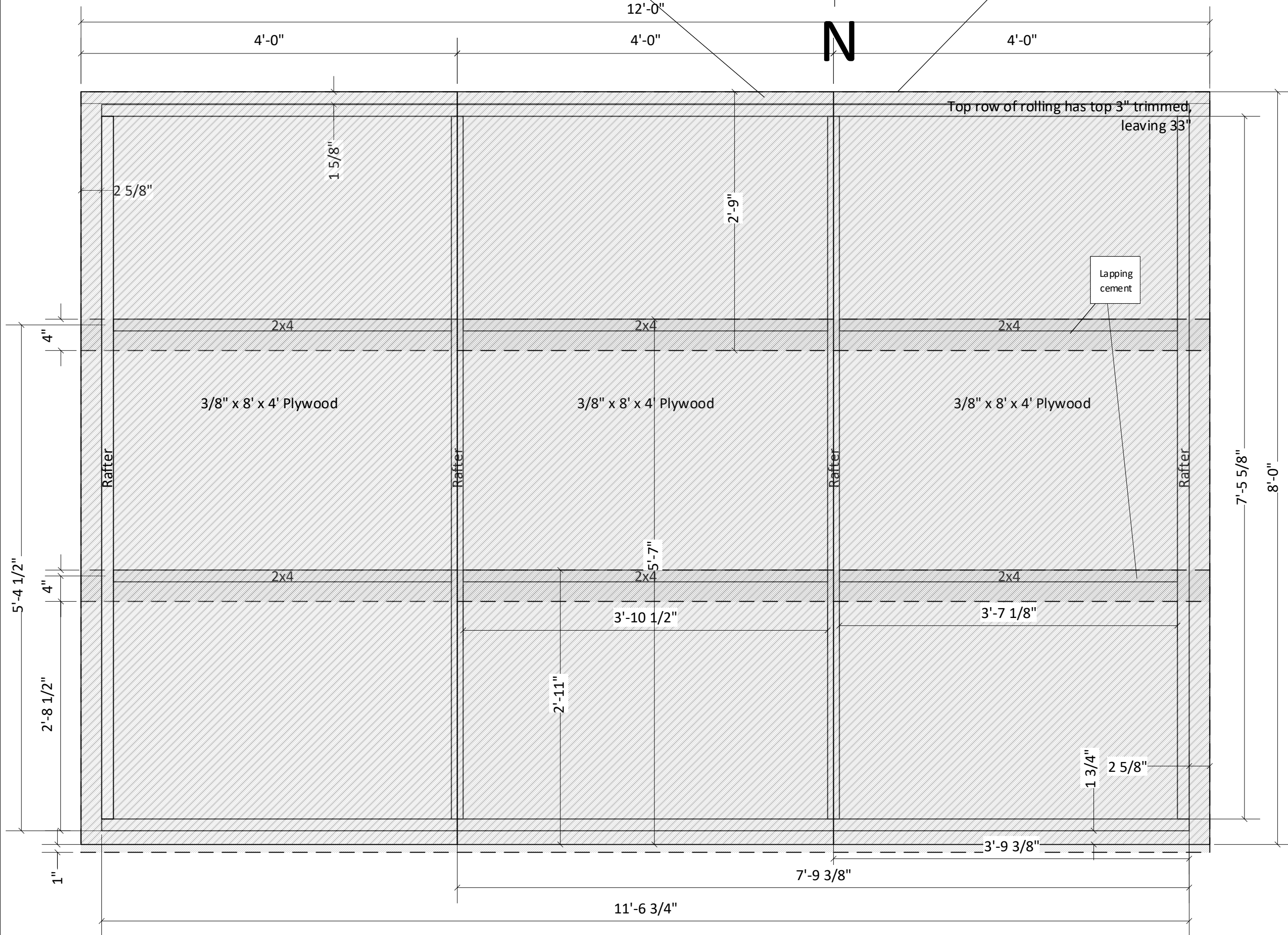
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Trim 1/2" off end plywoods

8' & 4' 1x2 screwed on bottom of plywood to absorb roofing nails

Drip Flashing on top of roofing

Lapping cement



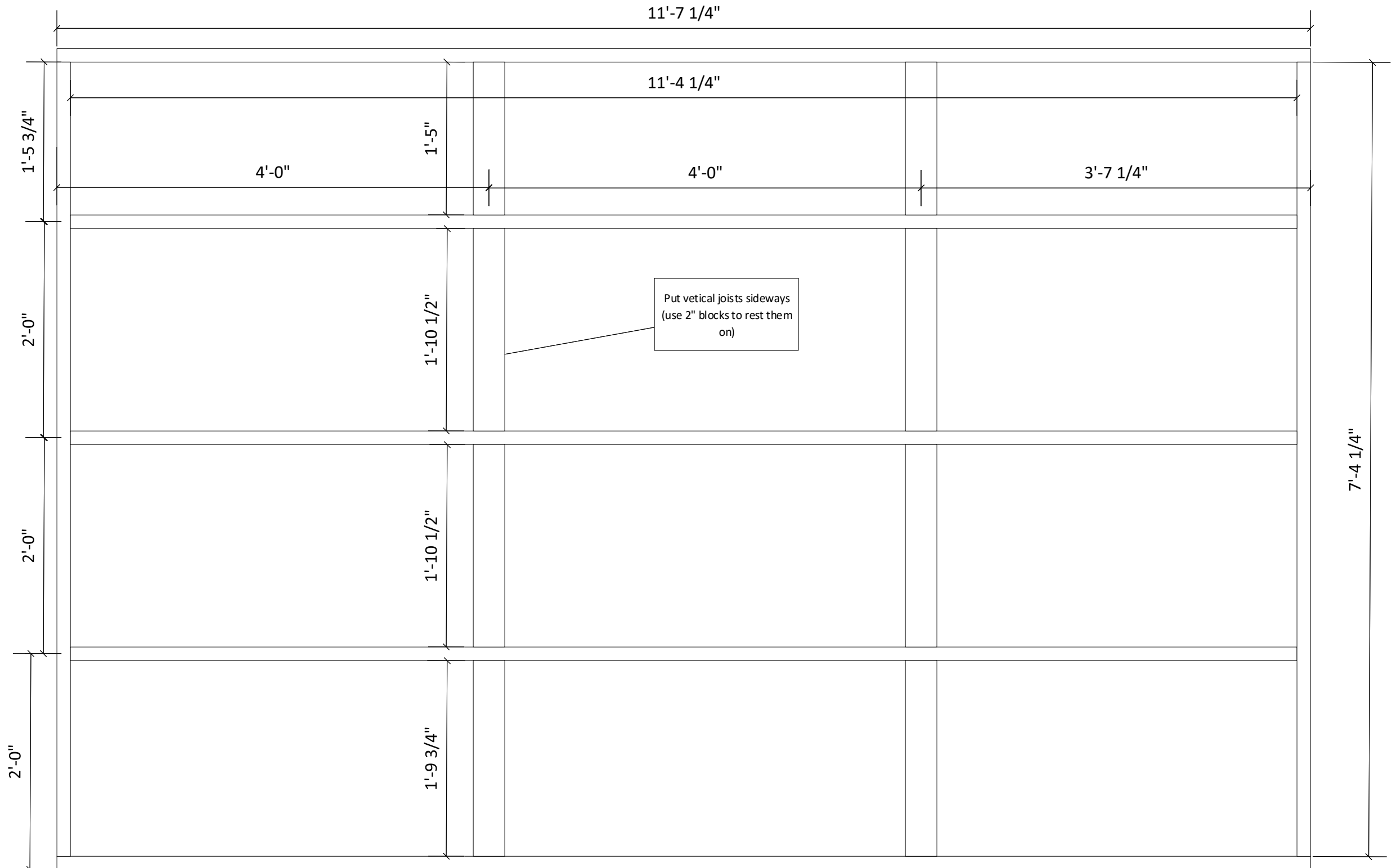
# Floor pg. 13 of 34 Framing

**Materials:**

- (1) 16' 2x4's, pressure treated
- (5) 12' 2x4's, pressure treated
- (1.5) 8' 2x4's
- (3) 4' x 8' x 1/2" CDX plywood

**Cut List:**

- (2) 11'-7 1/4" 2x4's, pressure treated
- (3) 11'-4 1/4" 2x4's, pressure treated
- (2) 7'-4 1/4" 2x4's, pressure treated
- (2) 1'-9 3/4" 2x4
- (4) 1'-10 1/2" 2x4
- (2) 1'-5" 2x4
- (2) 4' x 7'-7 1/4" 1/2" plywood
- (1) 3'-7 1/4" x 7'-7 1/4" 1/2" plywood



**Materials:**

- (1) 16' 2x4's, pressure treated
- (5) 12' 2x4's, pressure treated
- (1.5) 8' 2x4's
- (3) 4' x 8' x 1/2" CDX plywood

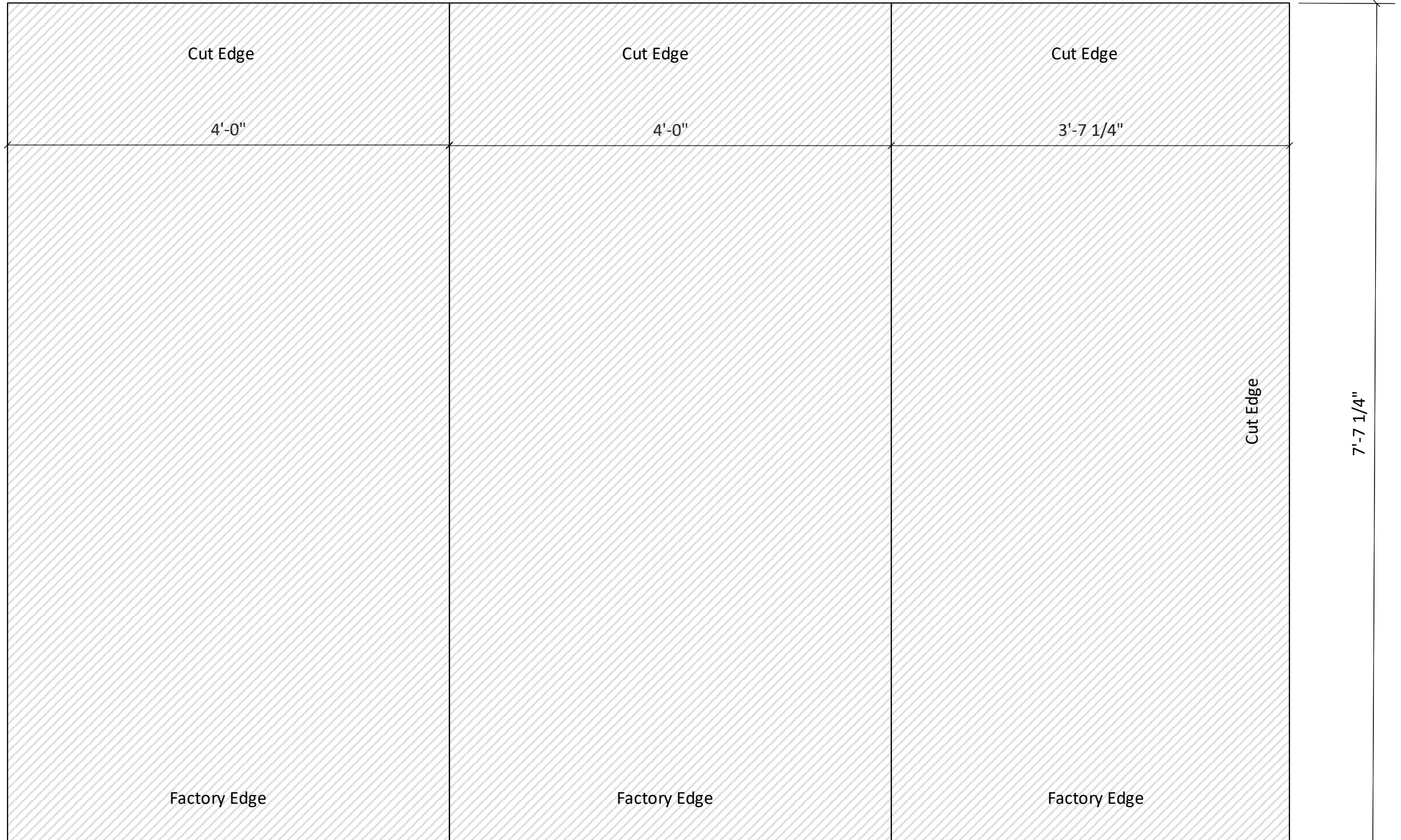
# Floor

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## Plywood

**Cut List:**

- (2) 11'-7 1/4" 2x4's, pressure treated
- (3) 11'-4 1/4" 2x4's, pressure treated
- (2) 7'-4 1/4" 2x4's, pressure treated
- (2) 1'-9 3/4" 2x4
- (4) 1'-10 1/2" 2x4
- (2) 1'-5" 2x4
- (2) 4' x 7'-7 1/4" 1/2" plywood
- (1) 3'-7 1/4" x 7'-7 1/4" 1/2" plywood



# Floor

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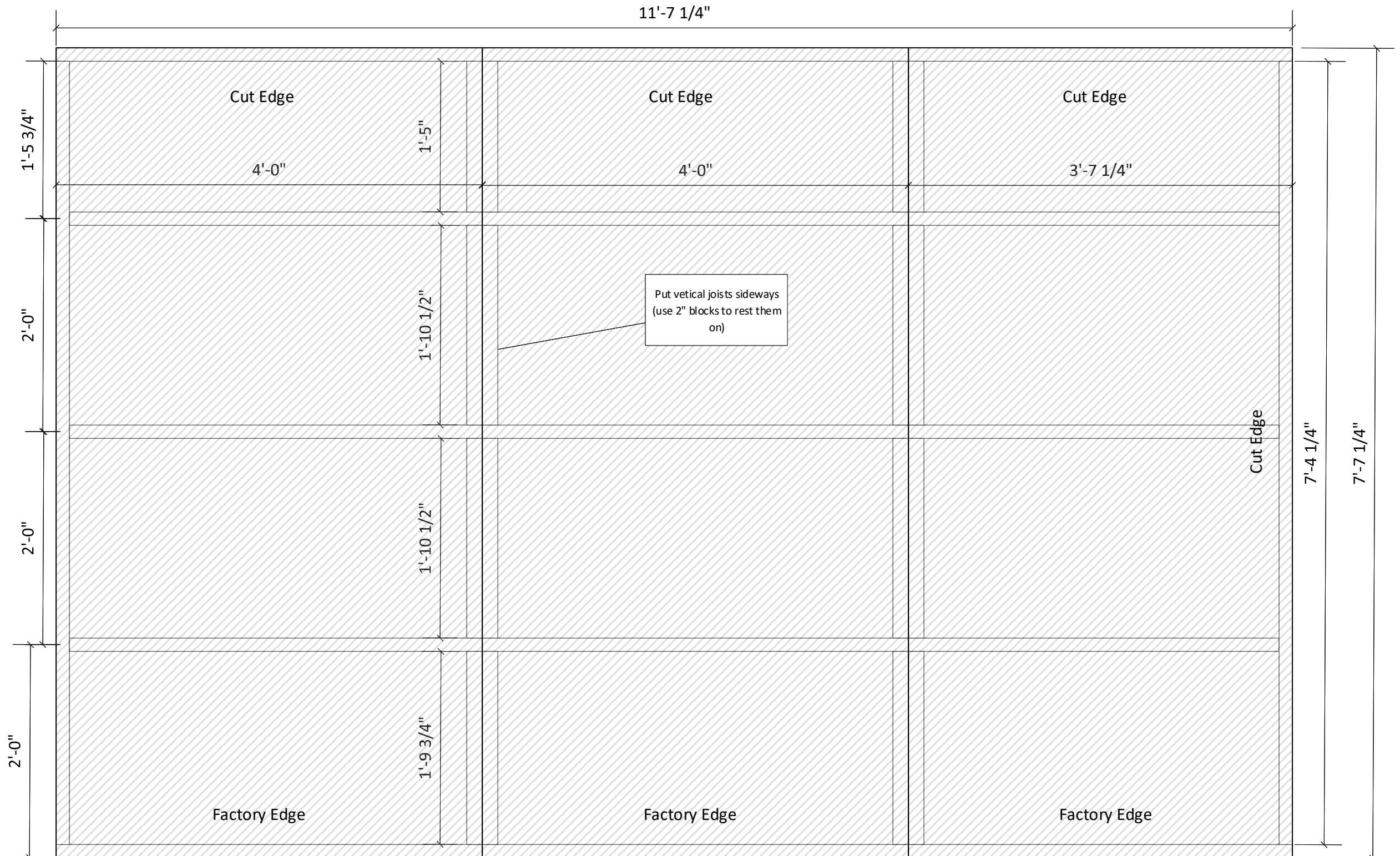
(all)

**Materials:**

- (1) 16' 2x4's, pressure treated
- (5) 12' 2x4's, pressure treated
- (1.5) 8' 2x4's
- (3) 4' x 8' x 1/2" CDX plywood

**Cut List:**

- (2) 11'-7 1/4" 2x4's, pressure treated
- (3) 11'-4 1/4" 2x4's, pressure treated
- (2) 7'-4 1/4" 2x4's, pressure treated
- (2) 1'-9 3/4" 2x4
- (4) 1'-10 1/2" 2x4
- (2) 1'-5" 2x4
- (2) 4' x 7'-7 1/4" 1/2" plywood
- (1) 3'-7 1/4" x 7'-7 1/4" 1/2" plywood



**Materials:**

- (2) 12' 2x4's (1 ea.)
- (8) 8' 2x4's (4 ea.)
- (4) 4'x8'x3/8" CDX plywood (2 ea.)
- (2) 18" x 24" plexiglass window (1 ea.)
- (4) hinges for window (2 ea.)
- (2) eyebolt and hook for window (1ea.)

# E-W Walls

## (2)

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### Framing

**Cut List:**

- (4) 6' 2x4's (2 ea.), vertical studs
- (2) 6'-9 1/2" 2x4 (1 ea.) vertical studs
- (2) 7'-5 3/4" 2x4 (1 ea.), top plate
- (2) 7'-7 1/4" 2x4 (1 ea.), sill
- (2) 6'-2" 2x4 (1 ea.), **w/ 5° cut**, rafter support
- (2) 4' x 6'-9 13/16" x 7'-2" x 3/8" plywood (1 ea.), wall
- >> Cut and label window <<
- (2) 3'-7 1/4" x 6'-6" x 6'-9 13/16" x 3/8" plywood (1 ea.), wall

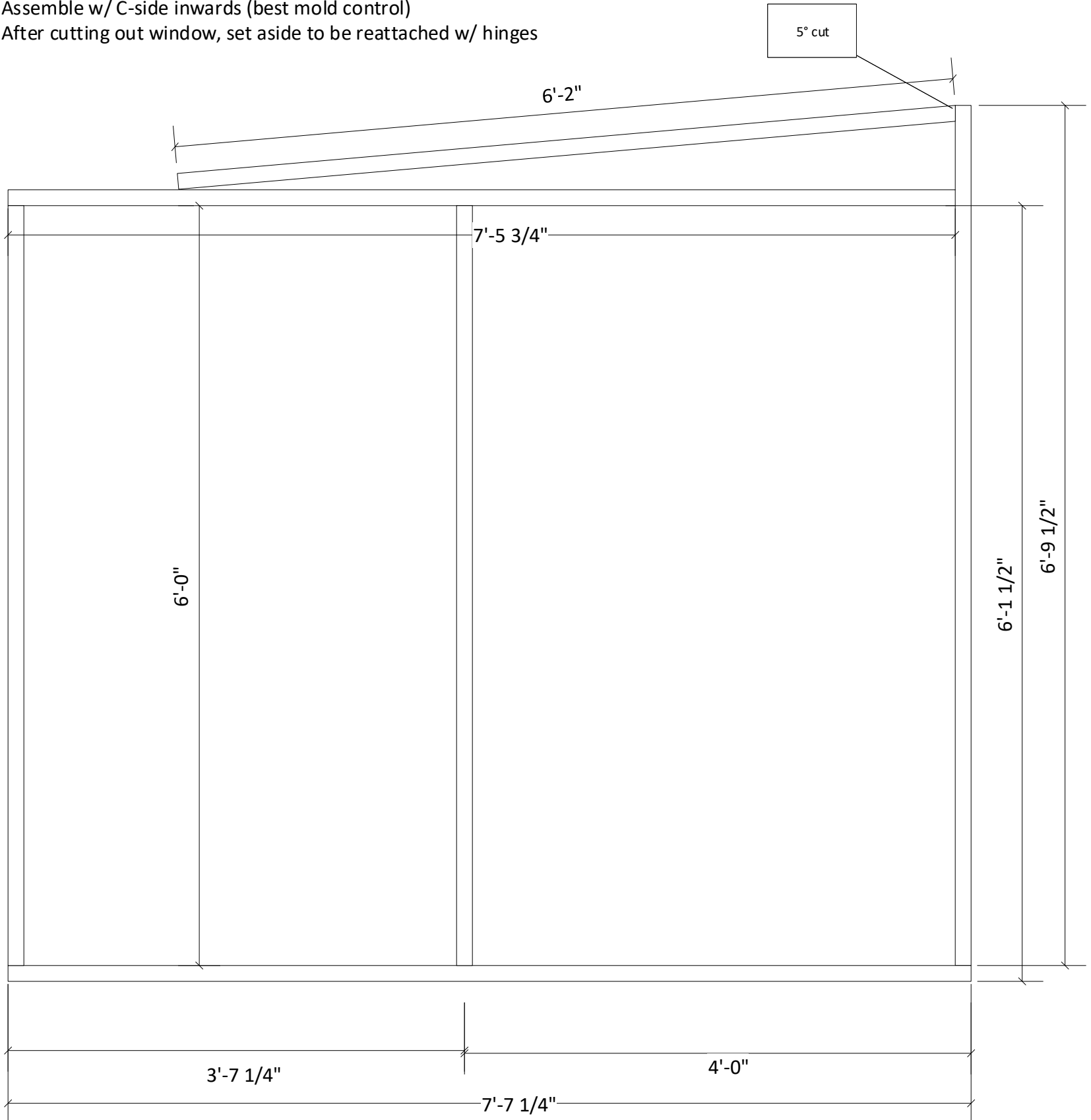
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**Assembly:**

Only difference between E & W is which side the plywood is attached to, remember to reverse direction of plywood (C-side inwards), including when cutting

Assemble w/ C-side inwards (best mold control)

After cutting out window, set aside to be reattached w/ hinges





**Materials:**

- (2) 12' 2x4's (1 ea.)
- (8) 8' 2x4's (4 ea.)
- (4) 4'x8'x3/8" CDX plywood (2 ea.)
- (2) 18" x 24" plexiglass window (1 ea.)
- (4) hinges for window (2 ea.)
- (2) eyebolt and hook for window (1ea.)

# E-W Walls

## (2)

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### Plywood

**Cut List:**

- (4) 6' 2x4's (2 ea.), vertical studs
- (2) 6'-9 1/2" 2x4 (1 ea.) vertical studs
- (2) 7'-5 3/4" 2x4 (1 ea.), top plate
- (2) 7'-7 1/4" 2x4 (1 ea.), sill
- (2) 6'-2" 2x4 (1 ea.), **w/ 5° cut**, rafter support
- (2) 4' x 6'-9 13/16" x 7'-2" x 3/8" plywood (1 ea.), wall
- >> Cut and label window <<
- (2) 3'-7 1/4" x 6'-6" x 6'-9 13/16" x 3/8" plywood (1 ea.), wall

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**Assembly:**

Only difference between E & W is which side the plywood is attached to, remember to reverse direction of plywood (C-side inwards), including when cutting

Assemble w/ C-side inwards (best mold control)

After cutting out window, set aside to be reattached w/ hinges



# E-W Walls

## (2)

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(all)

### Cut List:

- (4) 6' 2x4's (2 ea.), vertical studs
- (2) 6'-9 1/2" 2x4 (1 ea.) vertical studs
- (2) 7'-5 3/4" 2x4 (1 ea.), top plate
- (2) 7'-7 1/4" 2x4 (1 ea.), sill
- (2) 6'-2" 2x4 (1 ea.), w/ 5° cut, rafter support
- (2) 4' x 6'-9 13/16" x 7'-2" x 3/8" plywood (1 ea.), wall
- >> Cut and label window <<
- (2) 3'-7 1/4" x 6'-6" x 6'-9 13/16" x 3/8" plywood (1 ea.), wall

### Materials:

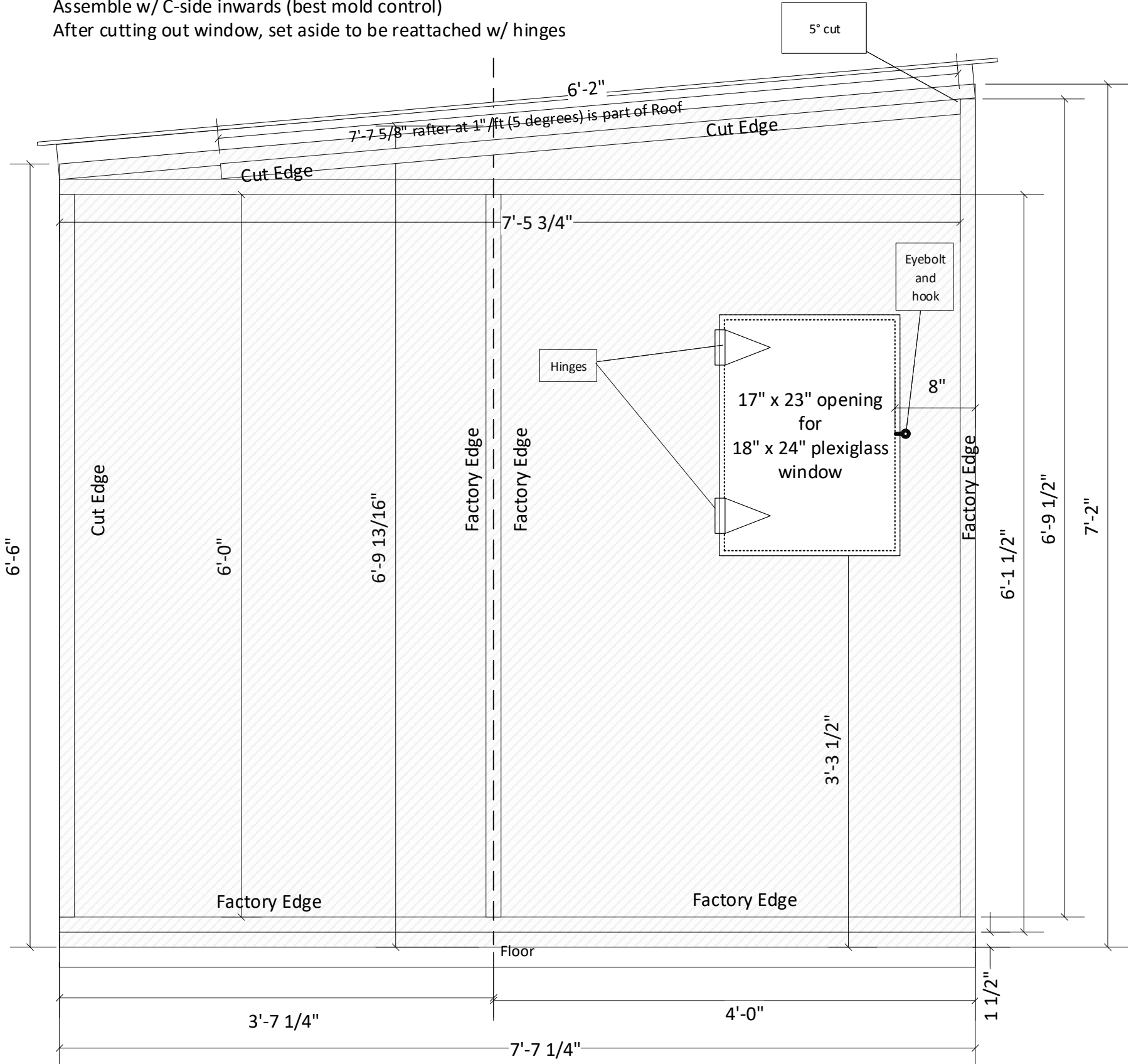
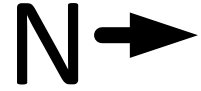
- (2) 12' 2x4's (1 ea.)
- (8) 8' 2x4's (4 ea.)
- (4) 4'x8'x3/8" CDX plywood (2 ea.)
- (2) 18" x 24" plexiglass window (1 ea.)
- (2) hinges for window (2 ea.)
- (2) eyebolt and hook for window (1ea.)

### Assembly:

Only difference between E & W is which side the plywood is attached to, remember to reverse direction of plywood (C-side inwards), including when cutting

Assemble w/ C-side inwards (best mold control)

After cutting out window, set aside to be reattached w/ hinges



**Materials:**

- (4) 12' 2x4's
- (3) 4'x8'x3/8" CDX plywood

# S Wall

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**Cut List:**

- (4) 6' 2x4's
- (2) 11'- 1/4" 2x4's, plate & sill
- (2) 4' x 6'-4 1/4" x 3/8" plywood, wall
- (1) 3'-8" x 6'-4 1/4" x 3/8" plywood, wall

6/27/2021

## Framing



**Materials:**  
(4) 12' 2x4's  
(3) 4'x8'x3/8" CDX plywood

# S Wall

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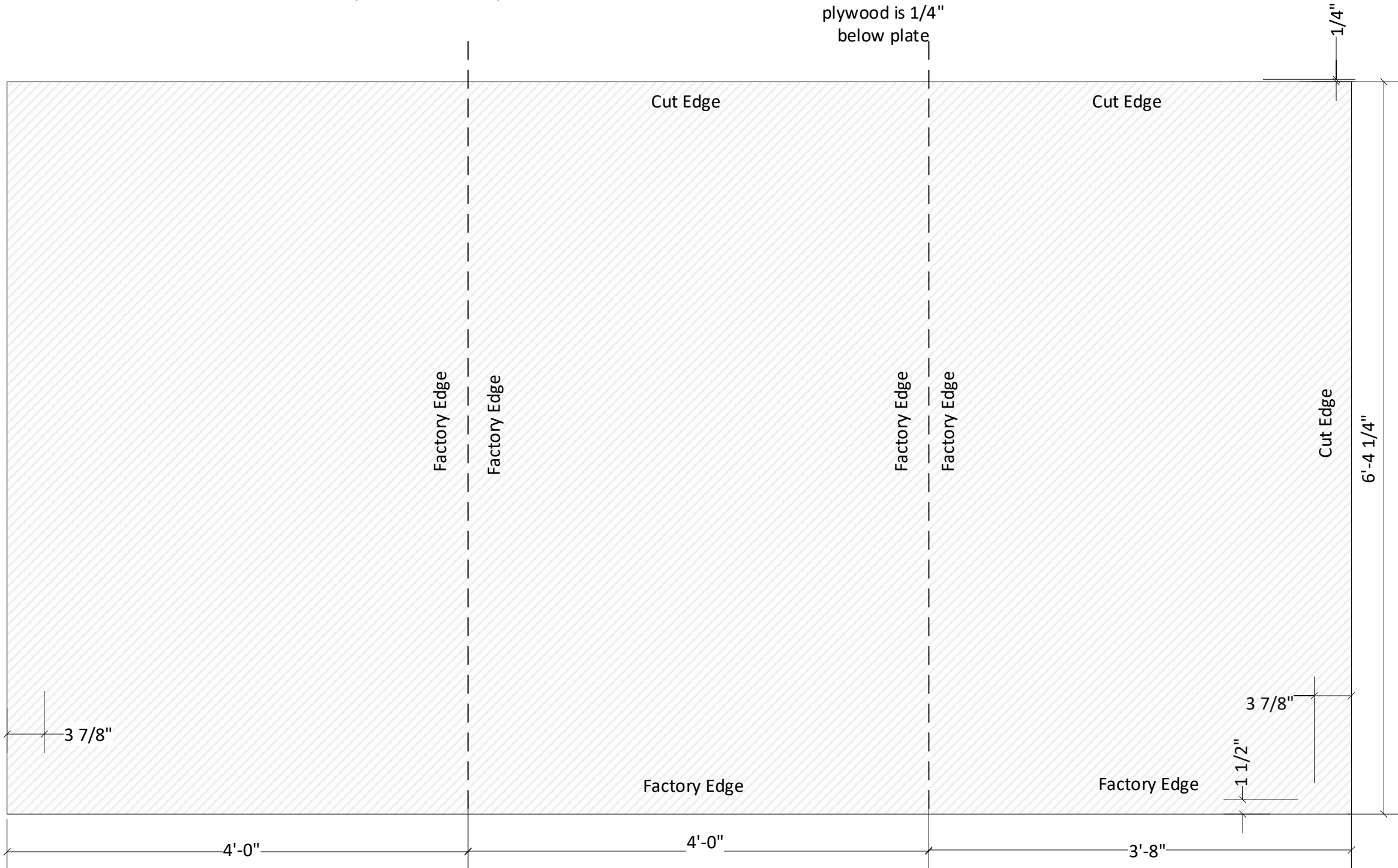
**Cut List:**  
(4) 6' 2x4's  
(2) 11'- 1/4" 2x4's, plate & sill  
(2) 4' x 6'-4 1/4" x 3/8" plywood, wall  
(1) 3'-8" x 6'-4 1/4" x 3/8" plywood, wall

6/27/2021

## Plywood

**Assembly:**  
Assemble w/ C-side inwards (best mold control)

Note that  
plywood is 1/4"  
below plate



**Materials:**  
(4) 12' 2x4's  
(3) 4'x8'x3/8" CDX plywood

# S Wall

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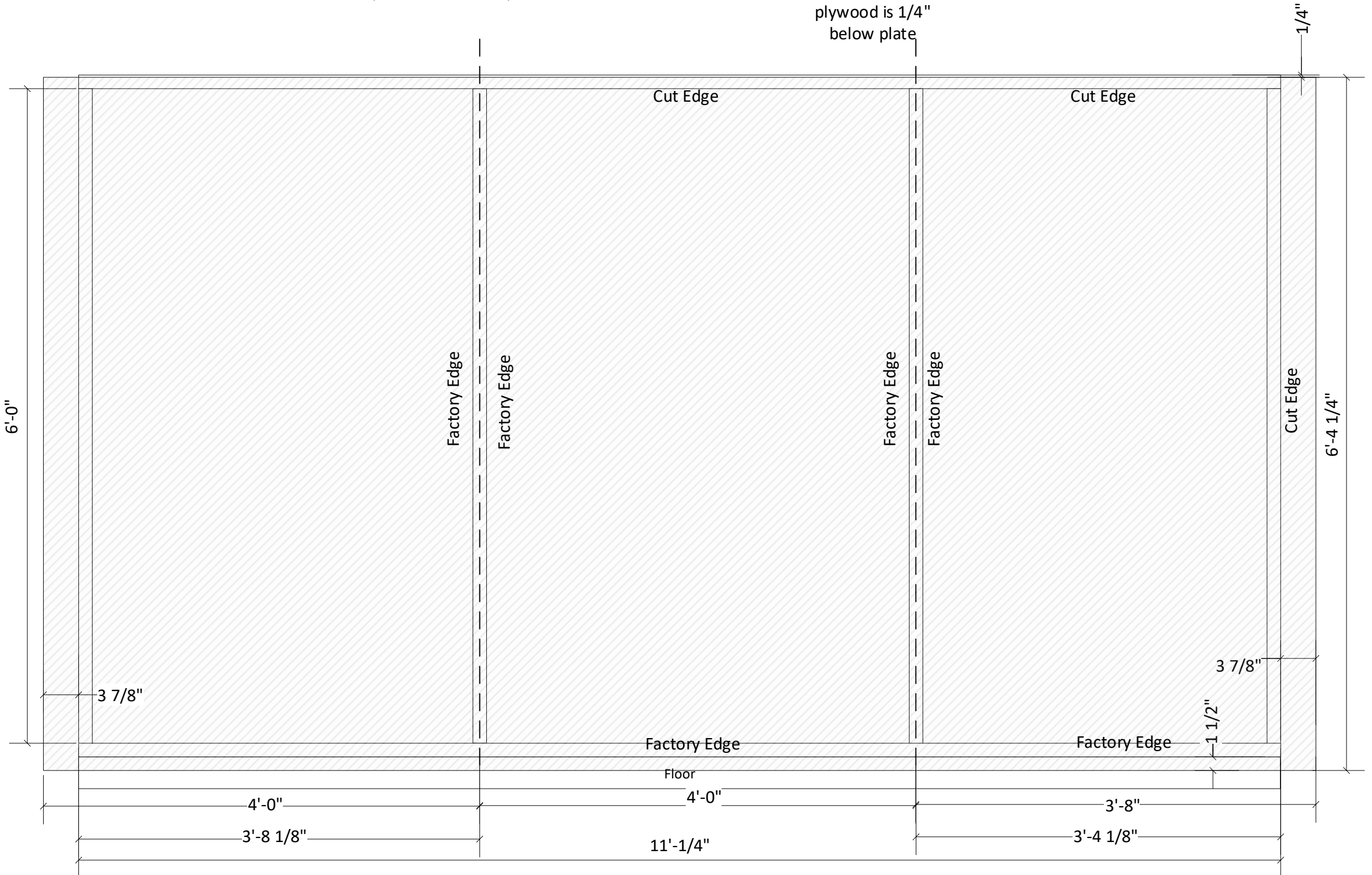
**Cut List:**  
(4) 6' 2x4's  
(2) 11'- 1/4" 2x4's, plate & sill  
(2) 4' x 6'-4 1/4" x 3/8" plywood, wall  
(1) 3'-8" x 6'-4 1/4" x 3/8" plywood, wall

6/27/2021

(all)

**Assembly:**  
Assemble w/ C-side inwards (best mold control)

Note that  
plywood is 1/4"  
below plate



**Materials:**

- (6) 8' 2x4's
- (4) 12' 2x4
- (3) 4'x8'x3/8" CDX plywood

**N Wall**

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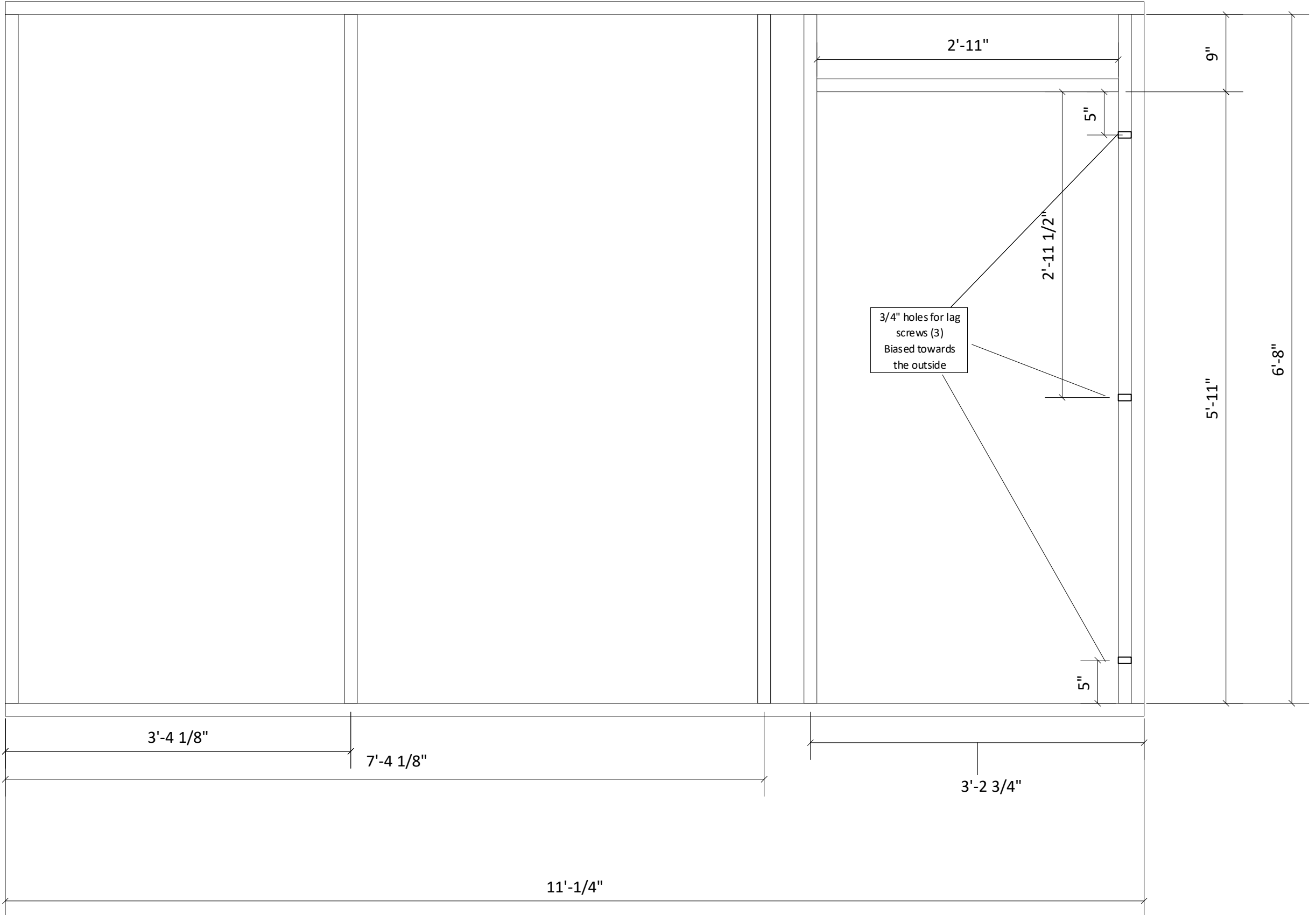
**Framing**

**Cut List:**

- (6) 6'-8" 2x4's, vertical studs, 1 drilled 6/27/2021
- (2) 11'- 1/4" 2x4's, plate and sill
- (1) 2'-11" 2x4, plate above door
- (2) 5'-6" 2x4's, door, 1 w/ 3 3/4" x 1 5/8" notch
- (2) 2'-10" 2x4's, door
- (2) 4' x 7' 1/4" x 3/8" plywood, wall
- (1) 3'-8" x 7' 1/4" x 3/8" plywood, wall

**Assembly:**

Cut door w/ 2 blades before nailing plywood so nails don't interfere  
 After cutting out door, label and set aside to be reattached w/ hinges  
 Assemble w/ C-side inwards (best mold control)



**Materials:**

- (6) 8' 2x4's
- (4) 12' 2x4
- (3) 4'x8'x3/8" CDX plywood

# N Wall

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## Plywood

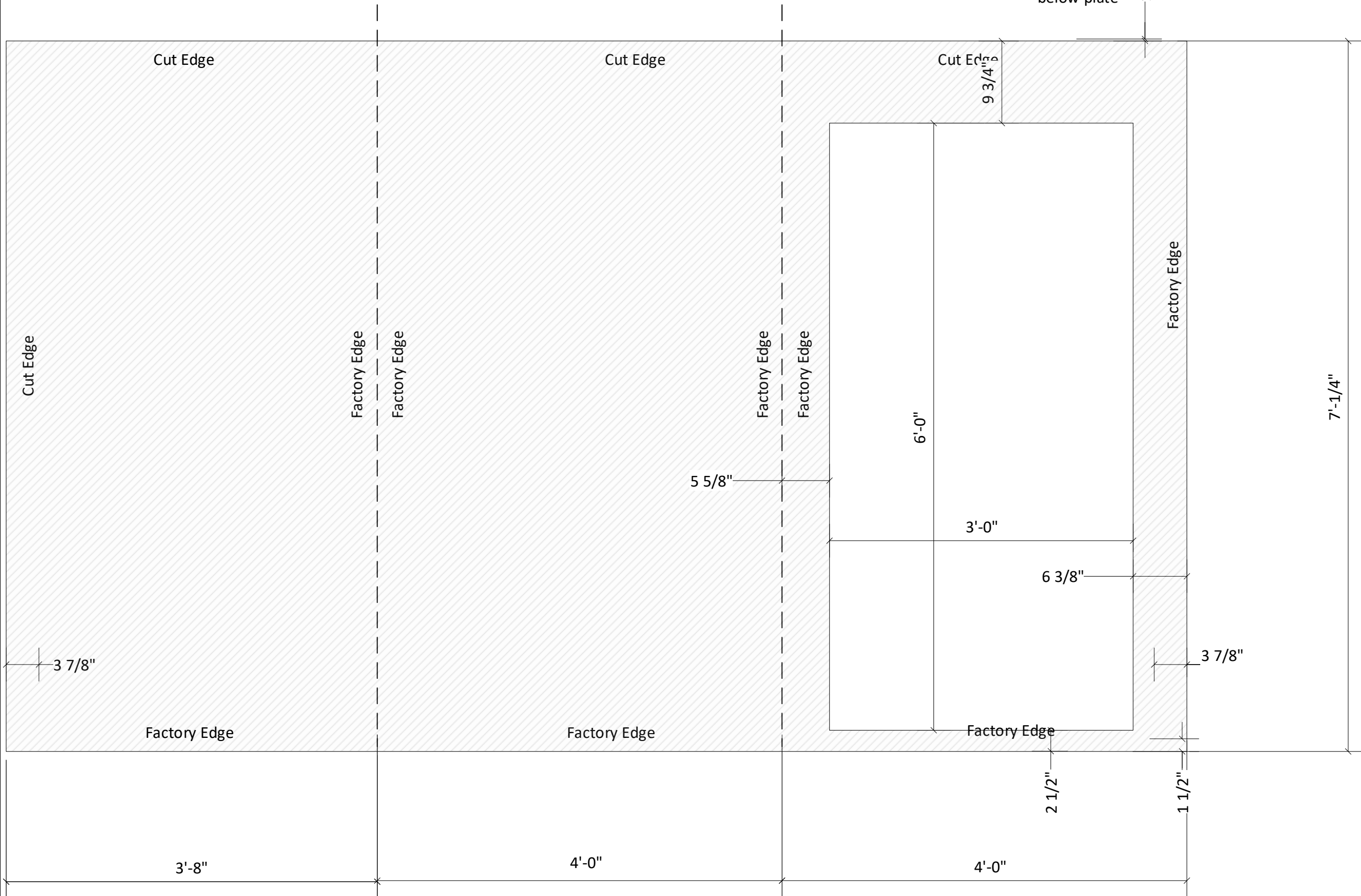
**Cut List:**

- (6) 6'-8" 2x4's, vertical studs, 1 drilled 6/27/2021
- (2) 11'- 1/4" 2x4's, plate and sill
- (1) 2'-11" 2x4, plate above door
- (2) 5'-6" 2x4's, door, 1 w/ 3 3/4" x 1 5/8" notch
- (2) 2'-10" 2x4's, door
- (2) 4' x 7' 1/4" x 3/8" plywood, wall
- (1) 3'-8" x 7' 1/4" x 3/8" plywood, wall

**Assembly:**

Cut door w/ 2 blades before nailing plywood so nails don't interfere  
 After cutting out door, label and set aside to be reattached w/ hinges  
 Assemble w/ C-side inwards (best mold control)

Note that  
 plywood is 1/4"  
 below plate 1/4"



**Materials:**

- (6) 8' 2x4's
- (4) 12' 2x4
- (3) 4'x8'x3/8" CDX plywood

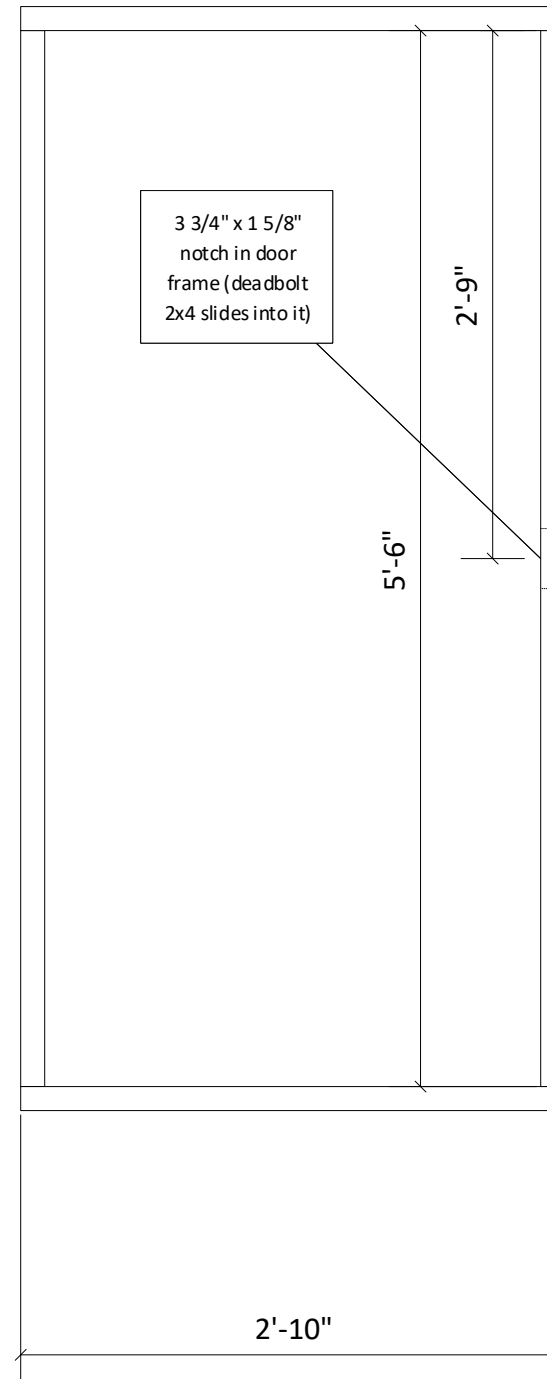
# N Wall

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## Door Frame

**Cut List:**

- (6) 6'-8" 2x4's, vertical studs, 1 drilled 6/27/2021
- (2) 11'- 1/4" 2x4's, plate and sill
- (1) 2'-11" 2x4, plate above door
- (2) 5'-6" 2x4's, door, 1 w/ 3 3/4" x 1 5/8" notch
- (2) 2'-10" 2x4's, door
- (2) 4' x 7' 1/4" x 3/8" plywood, wall
- (1) 3'-8" x 7' 1/4" x 3/8" plywood, wall





**Materials:**

- (6) 8' 2x4's
- (4) 12' 2x4
- (3) 4'x8'x3/8" CDX plywood

# N Wall

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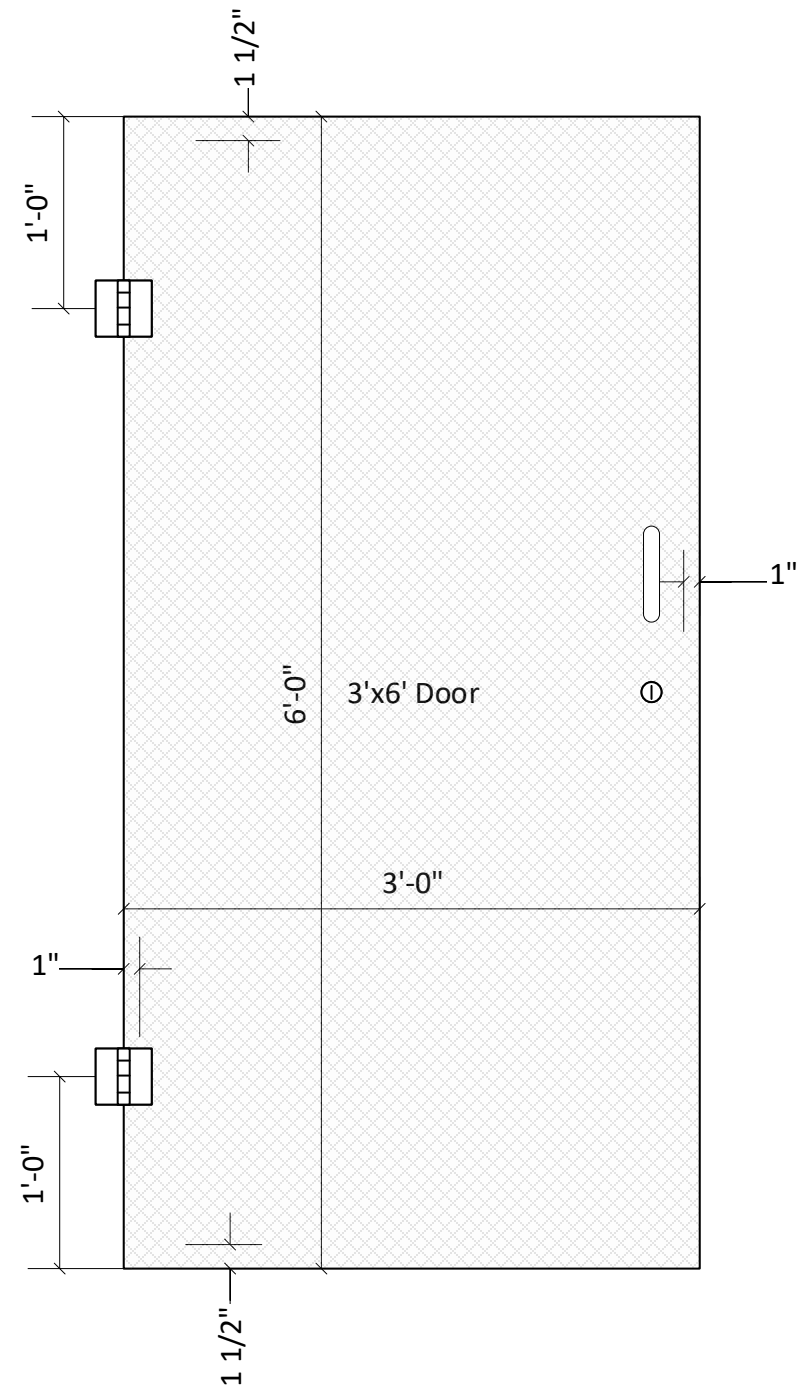
## Door

**Cut List:**

- (6) 6'-8" 2x4's, vertical studs, 1 drilled 6/27/2021
- (2) 11'- 1/4" 2x4's, plate and sill
- (1) 2'-11" 2x4, plate above door
- (2) 5'-6" 2x4's, door, 1 w/ 3 3/4" x 1 5/8" notch
- (2) 2'-10" 2x4's, door
- (2) 4' x 7' 1/4" x 3/8" plywood, wall
- (1) 3'-8" x 7' 1/4" x 3/8" plywood, wall

**Assembly:**

Cut door w/ 2 blades before nailing plywood so nails don't interfere  
After cutting out door, label and set aside to be reattached w/ hinges  
Assemble w/ C-side inwards (best mold control)



- Materials:**  
 (6) 8' 2x4's  
 (4) 12' 2x4  
 (3) 4'x8'x3/8" CDX plywood

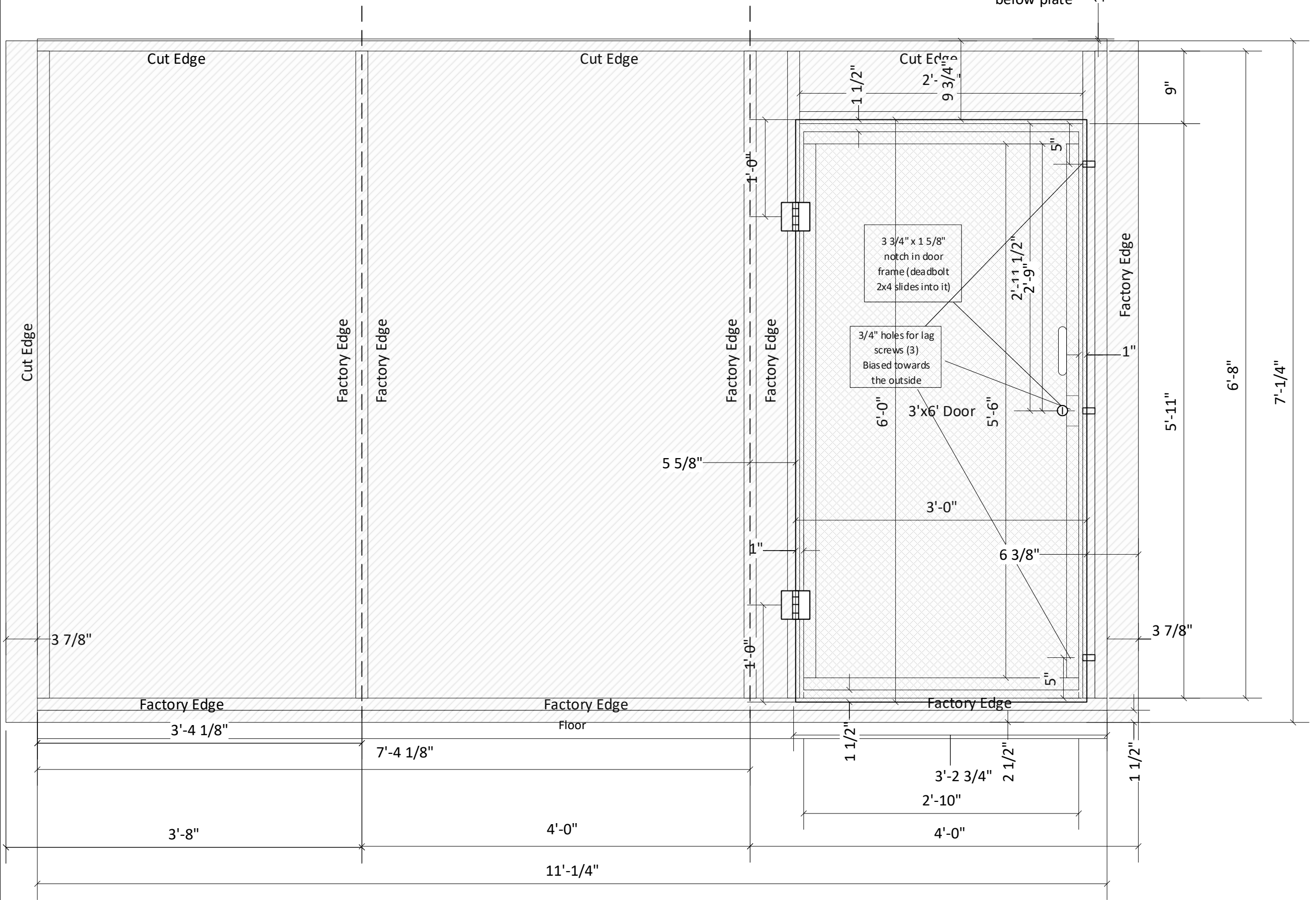
**N Wall**

(all)

- Cut List:**  
 (6) 6'-8" 2x4's, vertical studs, 1 drilled 6/27/2021  
 (2) 11'- 1/4" 2x4's, plate and sill  
 (1) 2'-11" 2x4, plate above door  
 (2) 5'-6" 2x4's, door, 1 w/ 3 3/4" x 1 5/8" notch  
 (2) 2'-10" 2x4's, door  
 (2) 4' x 7' 1/4" x 3/8" plywood, wall  
 (1) 3'-8" x 7' 1/4" x 3/8" plywood, wall

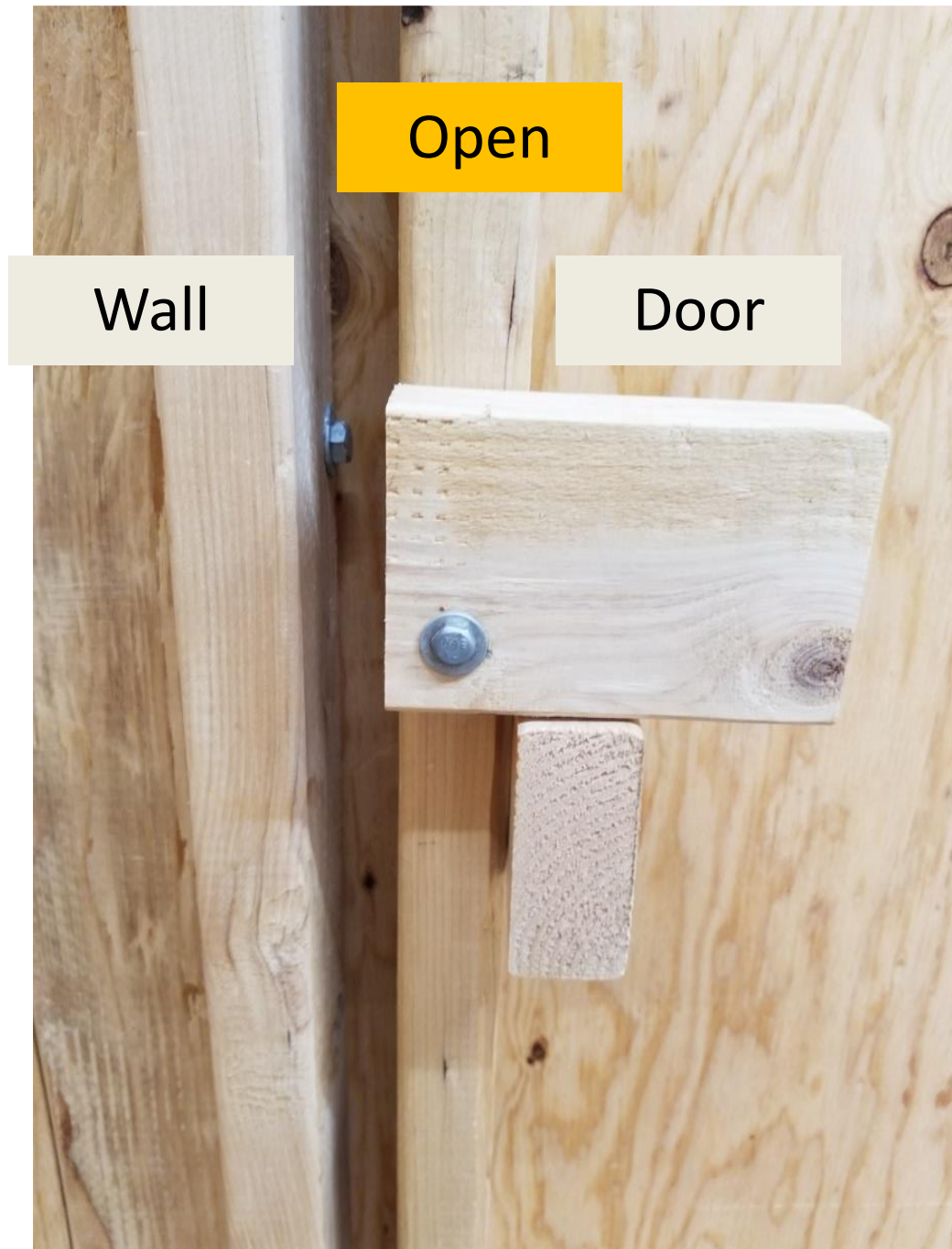
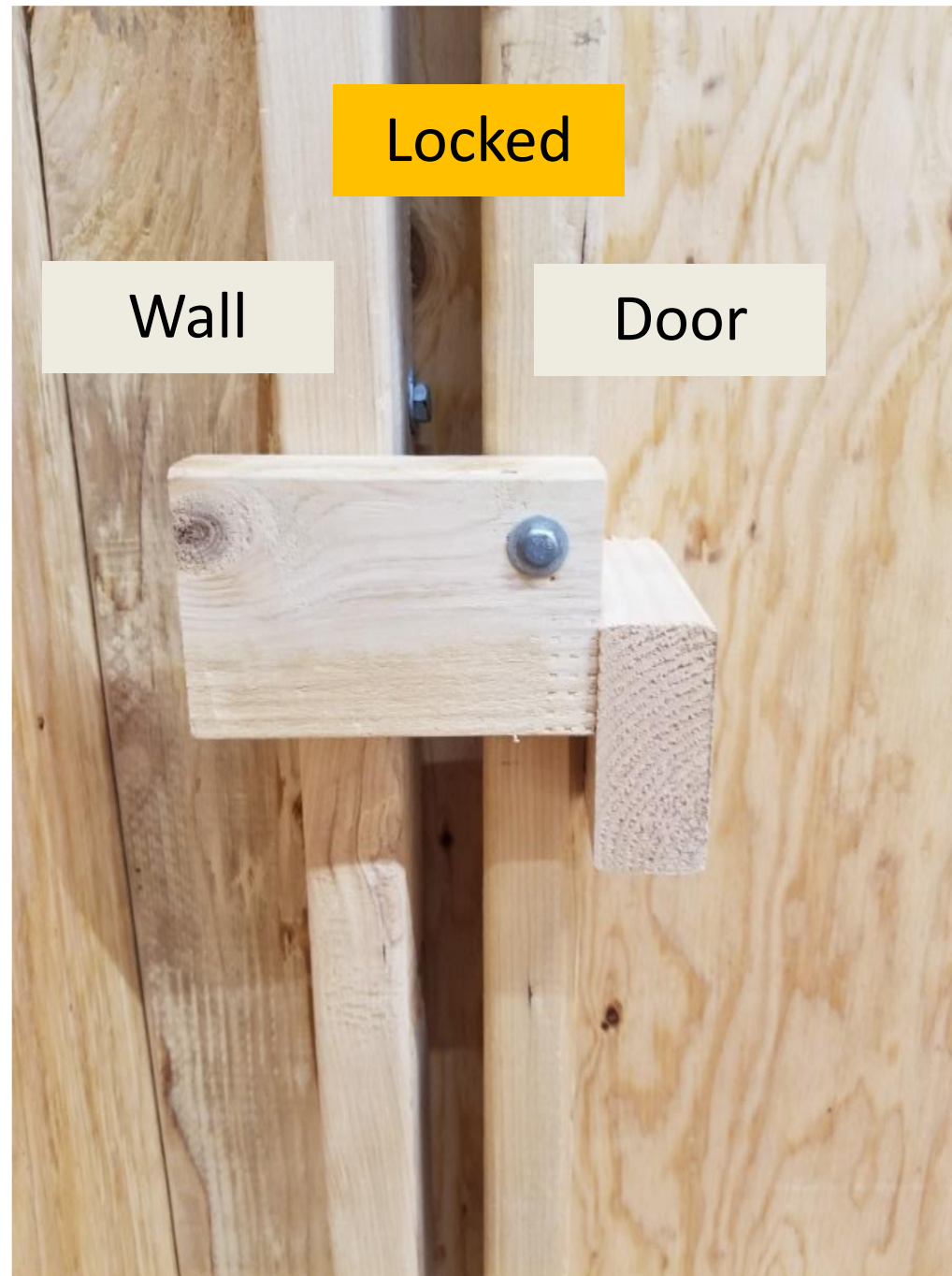
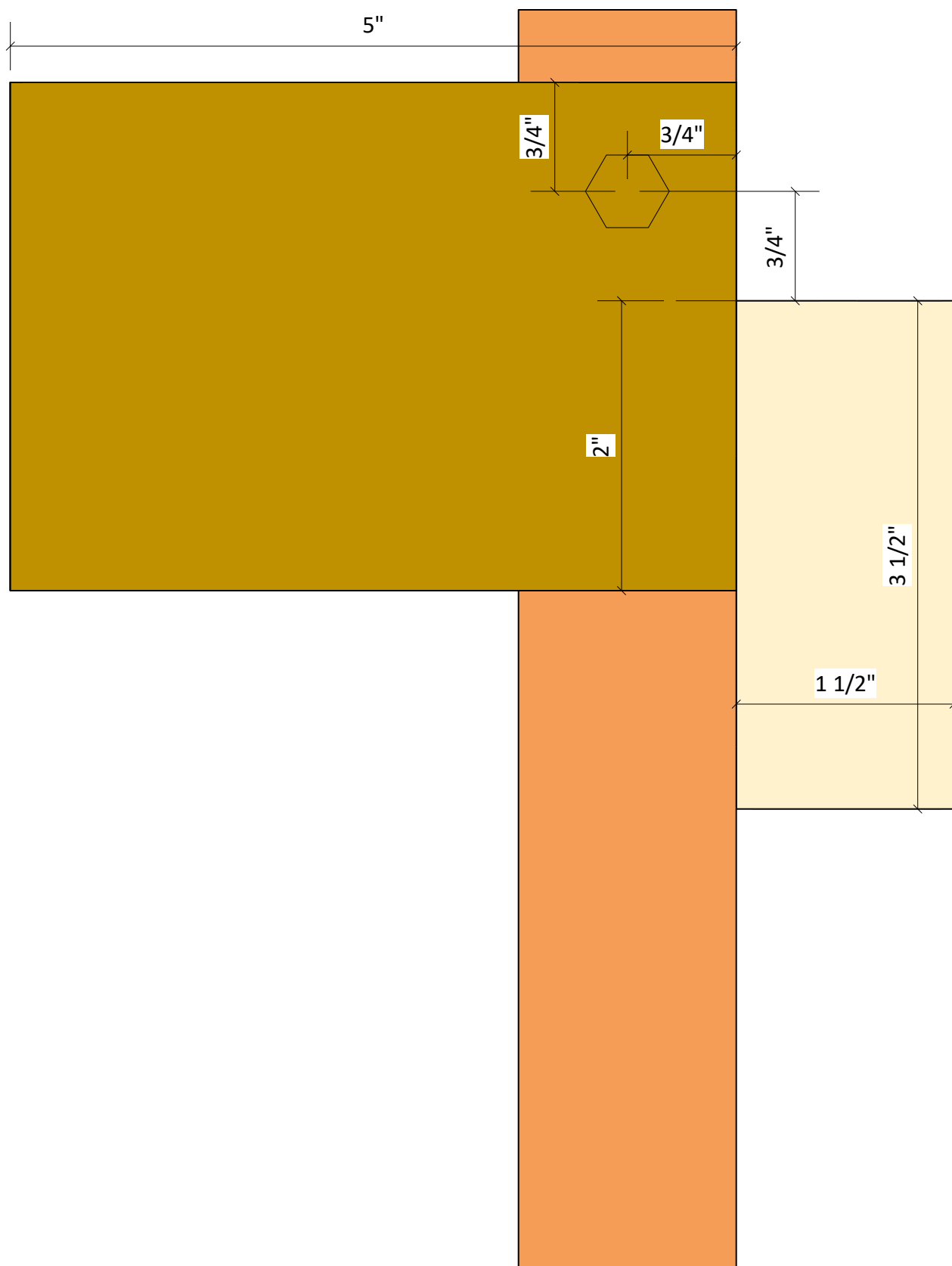
**Assembly:**  
 Cut door w/ 2 blades before nailing plywood so nails don't interfere  
 After cutting out door, label and set aside to be reattached w/ hinges  
 Assemble w/ C-side inwards (best mold control)

Note that  
 plywood is 1/4"  
 below plate



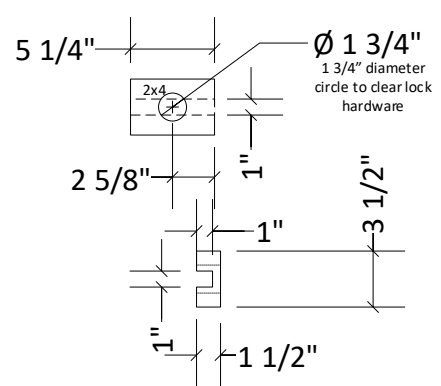
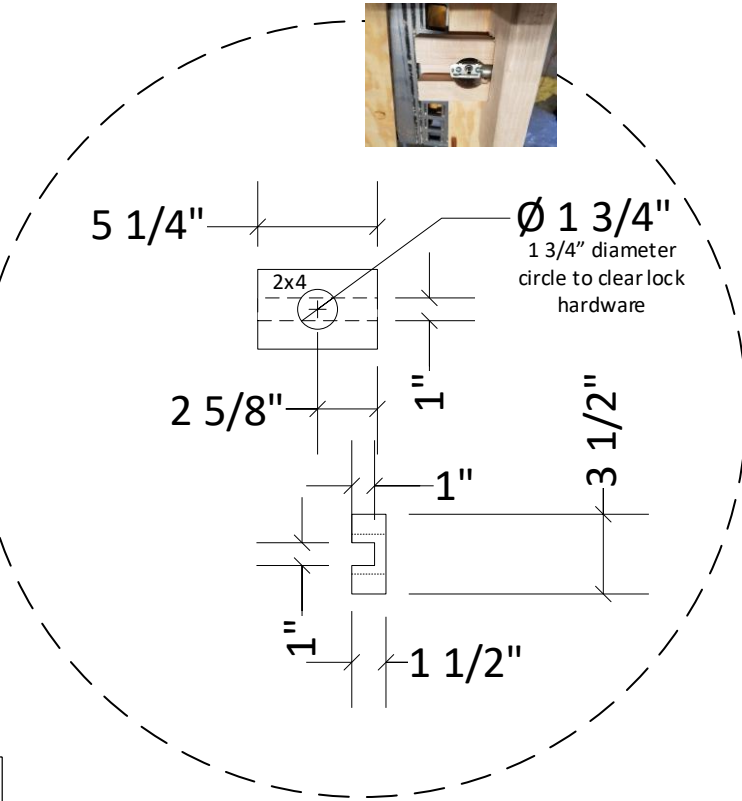
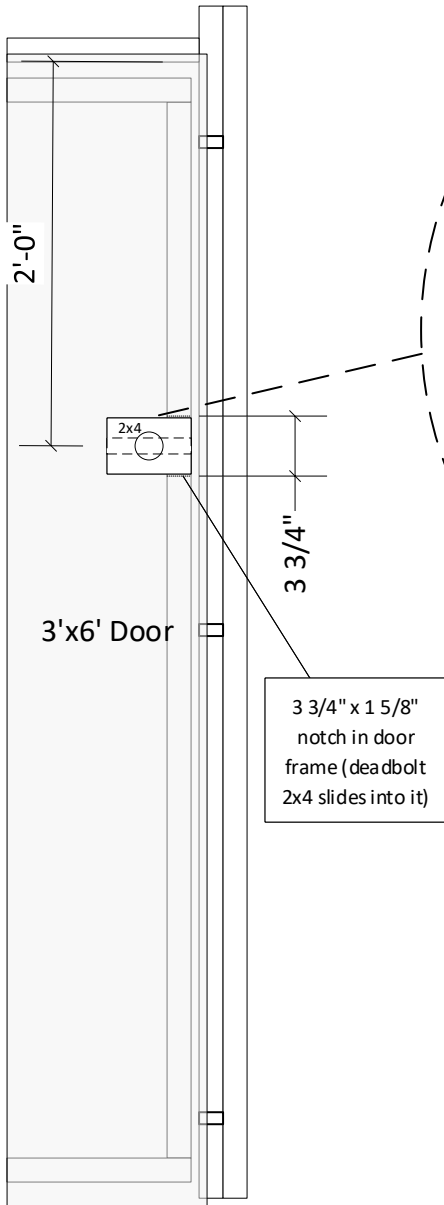
# Door latch from (2) 5" 2x4's and lag screw/washer

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# Deadbolt Mount

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# Window Frame

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## Materials:

(1.5) Trim Board Primed Finger-Joint (Common: 1 in. x 2 in. x 8 ft.; Actual: 3/4" x 1 1/2")

## Trim manufacture:

Remove 1/2 of trim material to make room for plexiglass

(see figure a)

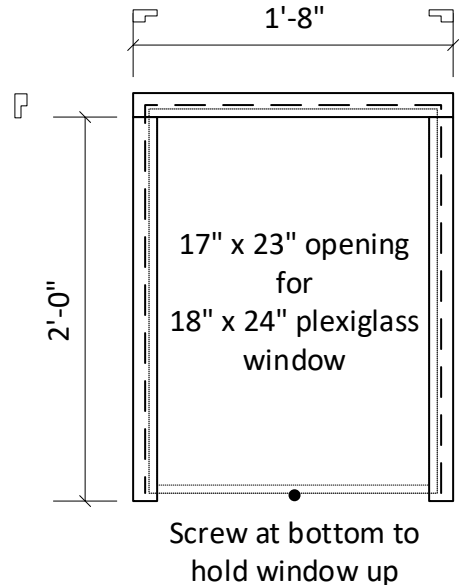
Nail or screw trim around window, flush w/ opening

Slide window up from bottom

Hold window in place w/ screw at bottom



Fig. a: Side view of  
trim w/ 1/2 removed



# 7'-7 3/8" x 4' Folding (Murphy) Bed Frame

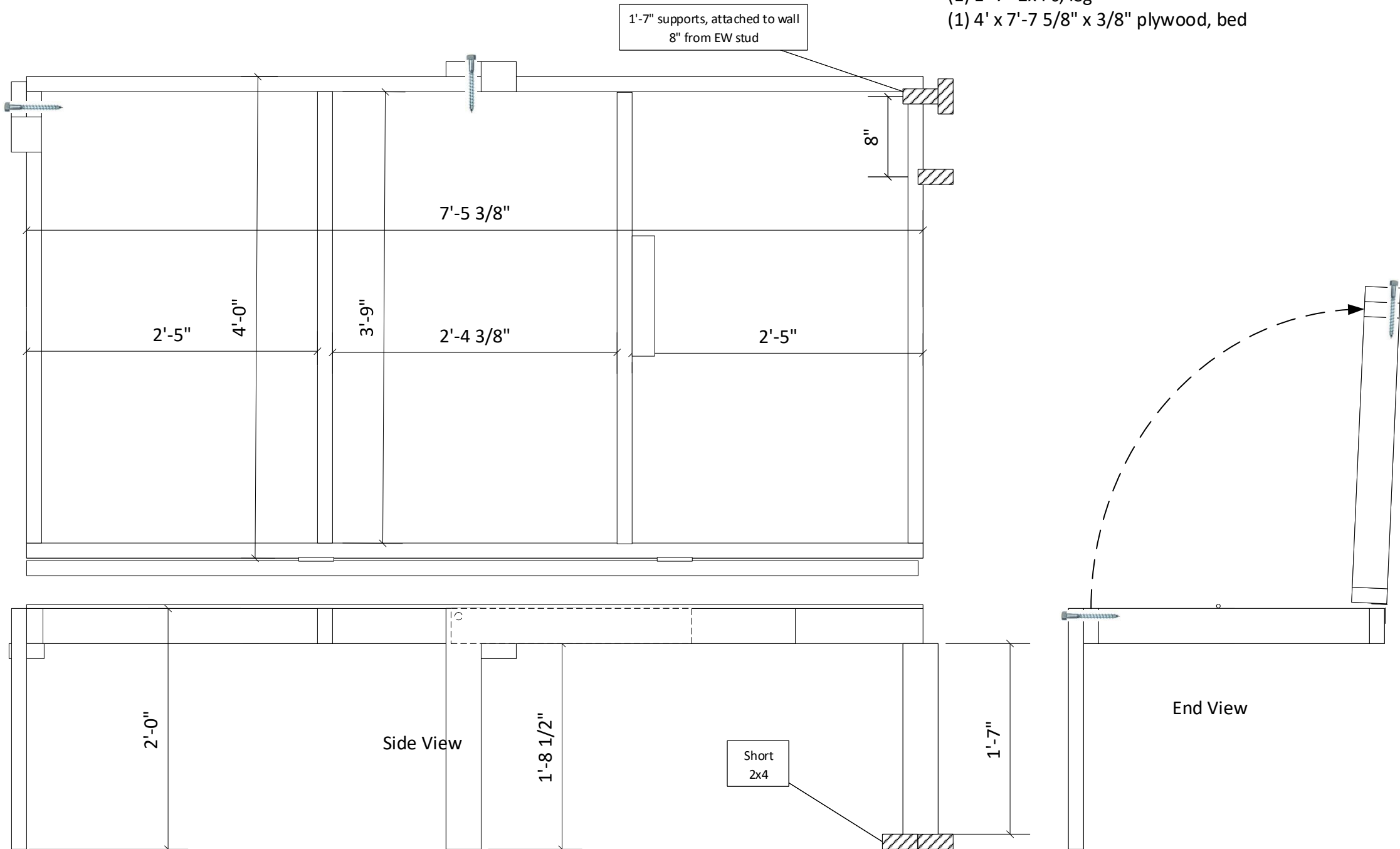
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## Materials:

- (4) 8' 2x4's
- (1) 12' 2x4
- (2) 4'x8'x3/8" CDX plywood

## Cut List:

- (3) 7'-7 5/8" 2x4's, mount & horizontal frames
- (4) 3'-9" 2x4's, vertical frames
- (2) 2' 2x4's, swivel legs
- (1) 1'-7" 2x4's, leg
- (1) 4' x 7'-7 5/8" x 3/8" plywood, bed



# Costs

6/27/2021

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## Materials List for 5 8'x12' Microshelters w/ bed (Lowe's, retail)

#	Parts Descriptions	Each	Extra	Total	Lowe's item #	Actual Description	Price ea.	Total Price	Comments
1	16' 2x4's, pressure treated	1		5	476213	Severe Weather 2-in x 4-in x 16-ft Premium Pressure Treated Lumber	\$ 22.37	\$ 111.85	
2	12' 2x4's, pressure treated	5		25	476165	2-in x 4-in x 12-ft #2 Square Pressure Treated Lumber	\$ 21.98	\$ 549.50	
3	8' 2x4	29.3		147	7033	2-in x 4-in x 8-ft Douglas Fir Pre-Cut Stud (Common); 1.5-in x 3.5-in x 92-5/8-in (Actual)	\$ 7.96	\$ 1,170.12	
4	12' 2x4's	11.8		59	130744	2-in x 4-in x 12-ft Douglas Fir Lumber (Common); 1.5-in x 3.5-in x 12-ft (Actual)	\$ 15.12	\$ 892.08	
5	4'x8'x3/8" CDX plywood	14		70	12181	3/8 Cat Ps1-09 Square Structural Douglas Fir Sheathing, Application as 4 x 8	\$ 50.03	\$ 3,502.10	
6	4'x8'x5/8" (or 1/2") CDX plywood	3		15	12178	19/32 Cat Ps1-09 Square Structural Douglas Fir Sheathing, Application as 4 x 8	\$ 71.27	\$ 1,069.05	
7	1x2x8' Trim	3		15	1408	1-in x 2-in x 8-ft Whitewood Board	\$ 3.39	\$ 50.85	
8	Construction adhesive	0.3		2	44906	LIQUID NAILS LN-901 HEAVY DUTY 11-oz	\$ 2.98	\$ 5.96	
9	100 ft^2 rolled roofing	1		5	10285	Owens Corning 3-ft W x 36-ft L 100-sq ft Shasta White Roll Roofing	\$ 42.98	\$ 214.90	100ft (1 square)
10	Rolled roofing adhesive	3		15	12011	BLACK JACK 3.6-Quart Fibered Waterproofer Cement Roof Sealant	\$ 13.68	\$ 205.20	Enough for 5 shelters
11	8' Drip Edge Flashing	1.3		7	3429684	Gibraltar Building Products 2-in x 10-ft White Galvanized Steel Drip Edge	\$ 4.78	\$ 33.46	
12	5 gallon semi gloss exterior paint (2 coats)	0.75		4	936263	Valspar SeasonFlex Ultra White/Base1 Semi-Gloss Exterior Tintable Paint (5-Gallon), "Cream in my Coffee" Tint	\$ 143.00	\$ 572.00	400 ft/gallon, need 320*2=640, enough for 2 shelters
13	1 gallon Patio & Floor paint (2 coats)	0.75		4	123265	Valspar Tintable Satin Exterior Porch and Floor Paint (1-Gallon)	\$ 29.98	\$ 119.92	400 ft/gallon, need 64*2 = 128, enough for 2 shelters
14	Paint roller covers	0.3		2	1021449	Purdy Contractor 1st 3-Pack 9-in x 3/8-in Knit Polyester Paint Roller Cover	\$ 7.98	\$ 15.96	Enough for several shelters
15	Paint brushes	0.3		2	1035775	Project Source 3-Pack Utility Polyester Flat and Angle 3-in Paint Brush Set	\$ 9.48	\$ 18.96	Enough for several shelters
16	Paint roller pan covers	0.3		2	1060890	Valspar 3-Pack 15.5-in x 9.25-in Paint Tray Liner	\$ 2.58	\$ 5.16	Enough for several shelters
17	(2) 18" x 24" plexiglass window	2		10	78778	OPTIX 0.08-in T x 18-in W x 24-in L Clear Acrylic Sheet	\$ 14.48	\$ 144.80	
18	21°, 3" x .120" Framing nails, exterior, galv., 1,000 pcs	0.3		2	126174	Metabo HPT (was Hitachi Power Tools) 3-in 21-Degree Pneumatic Framing Nails (1000-Count)	\$ 32.48	\$ 64.96	Enough for several shelters
19	1-1/4" Roofing nails, 7200	0.2		1	688873	Metabo HPT (was Hitachi Power Tools) 1-1/4-in 15-Gauge Electro-Galvanized Steel Pneumatic Roofing Nails (7200-Count)	\$ 35.98	\$ 35.98	Enough for 5 shelters
20	#10 x 3-1/8" lag screws	0.13		1	2886388	GRK #10 x 3-1/8-in Climatek-coated Polymer Round Washer Exterior Multi-Material Screws (236-Count)	\$ 45.21	\$ 45.21	236, enough for 8 shelters (30 screws each)
21	Hinges for door and bed, 12-pack	0.33		2	352846	Gatehouse Satin Nickel 5/8-in Radius Mortise Door Hinge (12-Pack)	\$ 25.48	\$ 50.96	Enough for 4 shelters w/ beds, 6 w/o
22	(4) Hinges for windows	2		10	308971	Gatehouse 2-1/2-in Zinc Mortise Door Hinge (2-Pack)	\$ 2.78	\$ 27.80	
23	(2) eyebolts and hook for windows (pkg of 2)	1		5	330641	Blue Hawk Steel Gate Hook and Eye (2-Pack)	\$ 1.28	\$ 6.40	
23	Eyebolt and hook for bed	1		5	58432	Blue Hawk Steel Gate Hook and Eye	\$ 1.28	\$ 6.40	Spring loaded catch to prevent accidental opening
24	Deadbolt	1		5	806902	Kwikset Security 600 Deadbolt Series Satin Chrome with SmartKey Single Cylinder Deadbolt	\$ 17.28	\$ 86.40	Deadbolt + handle replaces hasp
25	Handle for door	1		5	308985	Gatehouse Home Hardware Zinc-Plated Screen/Storm Door Pull Handle	\$ 3.48	\$ 17.40	Handle can be made from 2x4 (see plan)
26	Smoke and Carbon Monoxide Detector	1		5	986241	First Alert Smoke and Carbon Monoxide Detector	\$ 37.48	\$ 187.40	
								\$ 9,210.78	Pre-tax Total

#shelters Bed?

5 Yes

Total price per shelter: \$ 1,842.16

Price for materials for only one shelter: \$ 1,752.49

Price for materials for several shelters: \$ 442.39





# Microshelter “Aftermarket Improvements”

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- Folding beds. Design included in plans, about \$60 each in materials
- Insulation for the roof (1st insulation priority)
  - a. One panel with 1.5” insulation and 20 pins would cost ~\$66 w/ tax
- Insulation for the walls
  - a. One Microshelter (5 panels, 1.5” insulation, 100 pins) would cost ~\$240
- “Porch”: a sheet of plywood over the door to provide a covered outside area
- Shelves, possibly including a mini attic
- Wall covering (sheetrock or equivalent)
- Passive (desiccant) dehumidifiers
- Bedding materials
- Caulking
- Coat racks
- Better flooring (linoleum, carpeting, etc.)
- Battery (or solar?) powered ceiling light
- Curtains
- Outside lockable storage box

# Revision History

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6/5/21:

- 1) Added 8'x12' option
- 2) Adjusted formulas for weights and costs spreadsheets
- 3) Some cleanup, including moving deadbolt to center of door

6/10/21, 6/11/21:

- 1) Minor cleanups on both (8'x8', 8'x12') versions
- 2) Increased bed size to 4' wide for 8'x12' version

6/15/21: Fixed dimensions on 1p5 roof

6/25/21:

- 1) Removed 8' x 8' justification & door handle
- 2) Modified beds to sit on supports screwed to walls
- 3) Added construction adhesive to walls
- 4) Added plywood to roof ends for a little more overhang
- 5) Small fixes during prototype build