



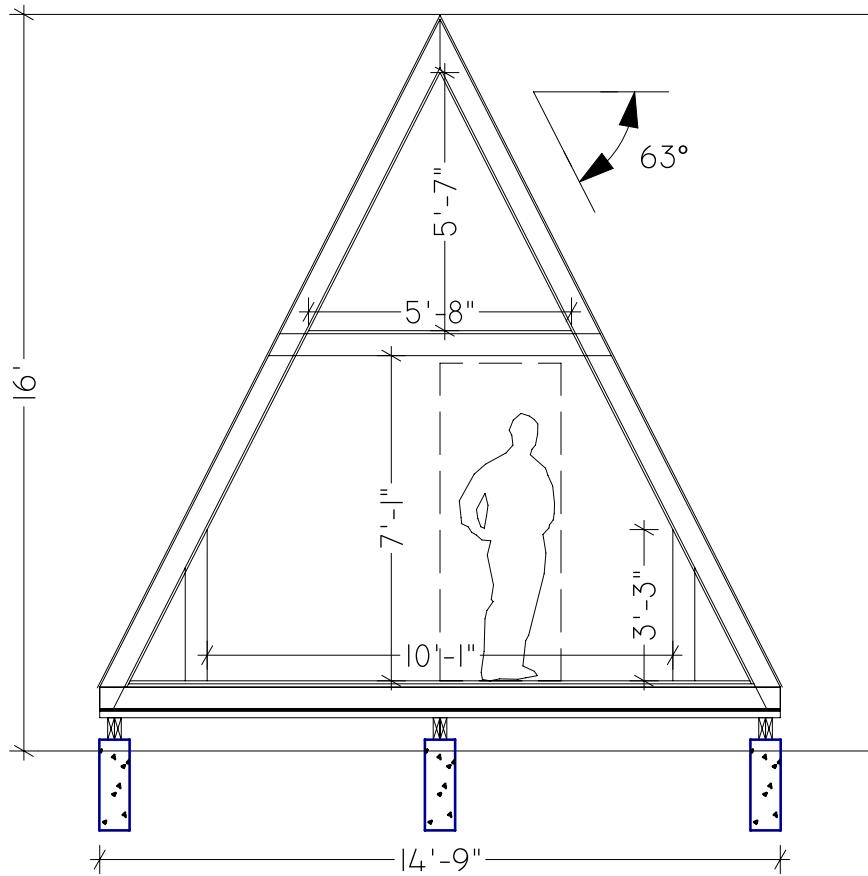
SOLO+100

DIY TINY HOUSE CONSTRUCTION GUIDE
& PLAN SET

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Imperial

12-Dec-21
V1.1



SOLO+ 100

SPECIFICATION

| | |
|--------------------------|---------------------|
| FLOORS: | 1 floor + loft |
| BUILDING AREA: | 491 ft ² |
| FLOOR AREA: | 413 ft ² |
| HEIGHT: | 16' |
| WIDTH: | 14'-9" |
| LENGTH WITH ROOF-LINE | 35'-3" |
| LENGTH WITHOUT ROOF-LINE | 33'-4" |
| WEIGHT | ~26 455 pounds |

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Hi!

Thank you for purchasing an **Avrame SOLO+** DIY Construction Plan Set.

I have been building house kits for over 20 years, and I knew that finding a tiny house with a great design is super tricky. That's why we partnered with MIT Professor Sheila Kennedy and her team of design innovators. Together, we developed three concepts that provide maximum flexibility for living and working at home. We brought together the iconic form of the A-Frame, the radical affordability of DIY, and the idea of getting the flexible design to a tiny house that can be adapted to fit your needs - affordable, flexible configuration, durable, and easy to build.

DIY ("Do It Yourself") is a method of building something by yourself. With the **Avrame SOLO+** plan set, you can make the house by yourself or with the help of a local contractor. Before starting, you should gain perfect clarity on what you want to build. Start by defining what you'll be using it for.

Although this is a DIY project, **Avrame SOLO+** is a top-performance house. Therefore it is not exactly cheap. Make sure you are building an object of a size you can afford.

The exact cost of your construction must be estimated with a thorough budget. To compile the budget correctly, you'll need to get a clear understanding of all the materials that play a part in the construction. You'll have to figure out the cost for those materials and to source them from local shops.

Using this guide, you can do most of the work yourself. Still, you might need professional help for the following activities, which are not covered in this guide:

- Building a foundation;
- Installing Windows & doors;
- Installing the insulation;
- Installing the roof;
- Installing water and plumbing;
- Installing electricity;
- Installing heating/cooling solution;
- Installing the interior & exterior paneling;

If you start building by yourself, I expect that you have some knowledge & experience. Otherwise, I strongly recommend you to consult with professionals and certified experts. And don't forget to get all required permissions from local authorities.

Let's make simpler life A reality,



INDREK KULDKEPP
CEO at Avrame



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Congratulations You Made It!





Errors & Omissions

Every attempt has been made to provide you with a set of error-free plans. There will always exist the possibility of errors. It is essential that the builder carefully review and check all details, including dimensions and material quantities, before construction. Responsibility for the interpretation of these plans lies with the builder. If errors are found, please report them, and we will correct them promptly.

Printing & Scaling

No drawings are to be scaled if there is no scale ratio on the sheet. If you will print out this manual, use A4 paper format and 'Actual size' print mode. Do not use 'Fit' or 'Shrink oversized pages' mode.

Loads & Specifications

Structural analysis, codes, and loads have not been included in this guide as each country has different snow, wind, etc., requirements to consider. If specific construction conditions must be met, please consult with your local building authorities before initiating this project to comply with the building codes in your area. We also recommend consulting local specialists for proper HVAC solutions.

Adaptations

This plan has been prepared to conform to generally accepted construction practices. However, because of variations in building codes, we cannot guarantee that our plans conform to the requirements in your area. Therefore, changes or alterations (for example, adding extra trusses or additional fixing details) may be necessary to comply with the codes and regulations of your jurisdiction. Changes to these plans to meet local building codes are the builder's responsibility. There may be other reasons for using different materials as described in our shopping list and material specifications. There may be slightly different materials available in your area, maybe you are used to additional fixings (screws instead of nails, etc.), or you want to upgrade/use something different. When substituting/upgrading any materials, please think about how it will affect the structural integrity of the building. If needed, consult with a local engineer.

Qualifications

The enclosed construction plans are intended for use by an individual familiar with general construction methods and techniques. The builder should also be competent with the safe operation of tools and machinery required to construct such a building.

Lumber Dimensions & Properties

You can permanently alter the lumber to larger dimensions, but we recommend using more minor dimensioned details. When using larger lumbers, please keep in mind that it may affect your building and pay attention to the changes you are creating to openings. Please also remember that wood is natural and is prone to swelling and shrinkage, which should not pose a concern, but some measurements may vary.

Foundation

This guide does not include instructions on how to build a foundation. Check your local requirements for tiny houses; some areas may have unique restrictions for foundations. Building foundations function to distribute the weight of your home, stopping the plot's subsoil from spreading and the structure facing an unequal settlement – both of which could lead to structural problems for your home down the line. The type of foundations system you choose (stripe, post, and beam or screw foundation) depends on the type of soil and depth of local frost penetration you're laying your building foundations onto. Regardless of the foundation type you will use, make sure to have proper ventilation below the structure. Getting the building foundations right is key to preventing future structural issues for your house.





Screws vs. Nails

When deciding between nails and screws, keep in mind that nails are less brittle, so they provide greater shear strength. They may bend under pressure, but they seldom snap. Common nails are suggested for structural joining and framing; when you prefer screws, ensure that you use special structural screws. When you are ready to nail or screw parts together, be careful not to do so too close to the edges or ends of the lumber, it may cause the lumber to split or crack.

Door and Window Options

Before purchasing doors and windows, ensure that your opening sizes and directions are correct for proper fits and consider the thickness of preferred flooring materials and interior fittings. Always ask for the manufacturer's installation manual.

Framing the openings

Before you begin assembling the frames for the walls, you need to make the parts of the structure that will accommodate door and window(s). The entrance door and any eventual window you decide to install in your building need to have proper framing in place. The structure has to be dimensioned based on the actual dimensions of the door or windows you will install. Since the new frame for the door or window has to be installed in the wall, some modifications to the basic framing of the fence are necessary.

Roof

The roof plan shows the surface area that is needed to be covered. Consult with a local specialist to have ventilation battens if you use another roofing cover other than bitumen shingles.

Exposed timbers

All exposed timber parts and foundation sill beams should be treated with a minimum of 2 coats of your preferred wood protective paint or stain to extend the life of the siding/cladding. According to paint supplier instructions, repaint the cabin when required (usually every 5-7 years, depending on the climate, this may vary). You are free to substitute cladding with other exterior finishes as well.

Break from construction

If you take a break from construction, use some plastic film or tarpaulin to cover the roof and unused material so that rain won't wet all the wood.





2.1. Roadmap

Our instruction is designed to be completed in stages, preparation, foundation, underfloor beams, A-frames, dormer, and detail installation.

To build SOLO+, follow the following steps:

- Define the essential aspect of your build and learn what you are getting yourself into.
- Compile a comprehensive budget, plus verify you can afford it.
- Learn what resources you are going to need.
- Learn the assembly and building process.
- Buy all the materials for the build.
- Double-check you have all the tools for the work.
- Prepare the foundation.
- Build water, sewage, and electricity inputs.
- Assemble the structural elements.
- Put the elements together.
- Install door & window(s).
- Complete the structure, make it weather-tight and finish the exterior (roofing, siding, etc.)
- Install insulation and vapour barrier.
- Install services (wiring and plumbing) and interior finishing materials.

2.2. Cutting the lumber

The list of lumber details to cut is provided in the Cut List section. Cutting everything at once saves time and guarantees fewer mistakes. We recommend you mark all parts with a detail number right after cutting. When parts are marked, you can grab them from the pile of materials and start working with them without the need for re-taking measures.

2.3. Assembly preparation

The SOLO+ is designed to be assembled in the next stages:

1. Cut all details, mark and sort them
2. Assemble all the details of the structural elements
3. Install all the elements together.

NOTE!

One person can assemble the elements but positioning the elements together requires a minimum of 2 persons. Before starting the assembly work, double-check that you have all the necessary materials, tools, hardware, and safety equipment.





2.4. Tools you need

The below list identifies all the essential tools you'll need for the successful assembly. It may be possible to work without some of these tools. However, it may prove to be more complex and time-consuming. You don't need to buy these tools; there are specialized rental companies for equipment and tools almost everywhere.

Essential Tools



Drill/Driver

Corded or cordless.
Cordless being more convenient



Hammer

A plain hammer is over the top



Tape Measure

Keep it handy all the time - you need it mostly.



Hand Saw

To cut all your parts and ensure proper fits.



Snap Off Knife

You'll need this to cut certain packaging and materials.



Level

To ensure your unit is installed level and not on a slant or slope.



Rafter Square

If any part of your structure is not cut correct, it may cause other parts to fit improperly.



Ladder

You'll need one to reach the higher areas of your structure during assembly



Stapler

To install the vapour-barrier and wind-membranes onto the frame



Pencil

to mark and make notes



Drivers / Torx

Make sure you have plenty of torx bits for screws, so you can replace them as soon as they wear off.





Optional Tools



Circular Saw

Faster and works better on certain materials such as plywood and OSB



Miter Saw

Will make short work of anything that needs to be cut.



Table Saw

Trim and various other pieces may have to be "ripped" down. a table saw provides accurate cuts to make the job easier



Reciprocating Saw

While working you might need to adjust the size of some wood part or boards. Having cutters available will make your life easier.

Safety



Safety Glasses

is must on any DIY project



Gloves

At least 3-4 pairs available at all times.



First Aid Kit

Bands-aids, antiseptic and other stuff



2.5. Material shopping list

With this shopping list, you can go to any hardware store and pack the materials required to build. Don't forget to take price offers from different stores; prices may vary significantly.

Please check Excel file for budgeting.

| TYPE | MATERIAL | AMOUNT * | UNIT |
|-----------------|--|----------|-----------------|
| Timber | Batten 2" x 2" x min length 10' | 214 | ft |
| | Siding | 1680 | ft ² |
| | OSB-3 1/2" | 1821 | ft ² |
| | OSB-3 1" | 453 | ft ² |
| | Timber (C24) 2" x 6" x 18' | 84 | pcs |
| | Timber (C24) 2" x 6" x 12' | 76 | pcs |
| Fastening | Angle connector 1 1/2" x 1 1/2" x 1 1/2" | 3 | pcs |
| | Angle connector 4" x 4" x 3" | 37 | pcs |
| | Angle connector 2" x 2" x 4" | 78 | pcs |
| | Angle connector screw #6 x 1 1/2" | 1428 | pcs |
| | Bolt (C3) 3/8" x 5" | 42 | pcs |
| | Concrete screw 3/8" x 5" | 42 | pcs |
| | Construction screw 10" x 4" | 724 | pcs |
| | Nail (C3) #11 x 2-1/2" | 3460 | pcs |
| | Nail (C3) #9 x 3" | 1968 | pcs |
| | Nail plate 7" x 4 1/8" | 44 | pcs |
| | Nail plate 5" x 13/16" | 24 | pcs |
| | Nut (C3) 3/8" | 42 | pcs |
| | Washer (C3) 3/8" | 42 | pcs |
| Hydro Isolation | Bitumen hydro isolation tape W8" | 14 | ft |
| Insulation | Insulation Material in batts 4" | 1777 | ft ² |
| | Insulation Material in batts 2" | 1777 | ft ² |
| | Tape for vapour barrier | 427 | ft |
| | Vapour barrier | 1777 | ft ² |
| Other | Rodent Wire Mesh | 549 | ft ² |
| Roof | Preferred roof covering | 1195 | ft ² |

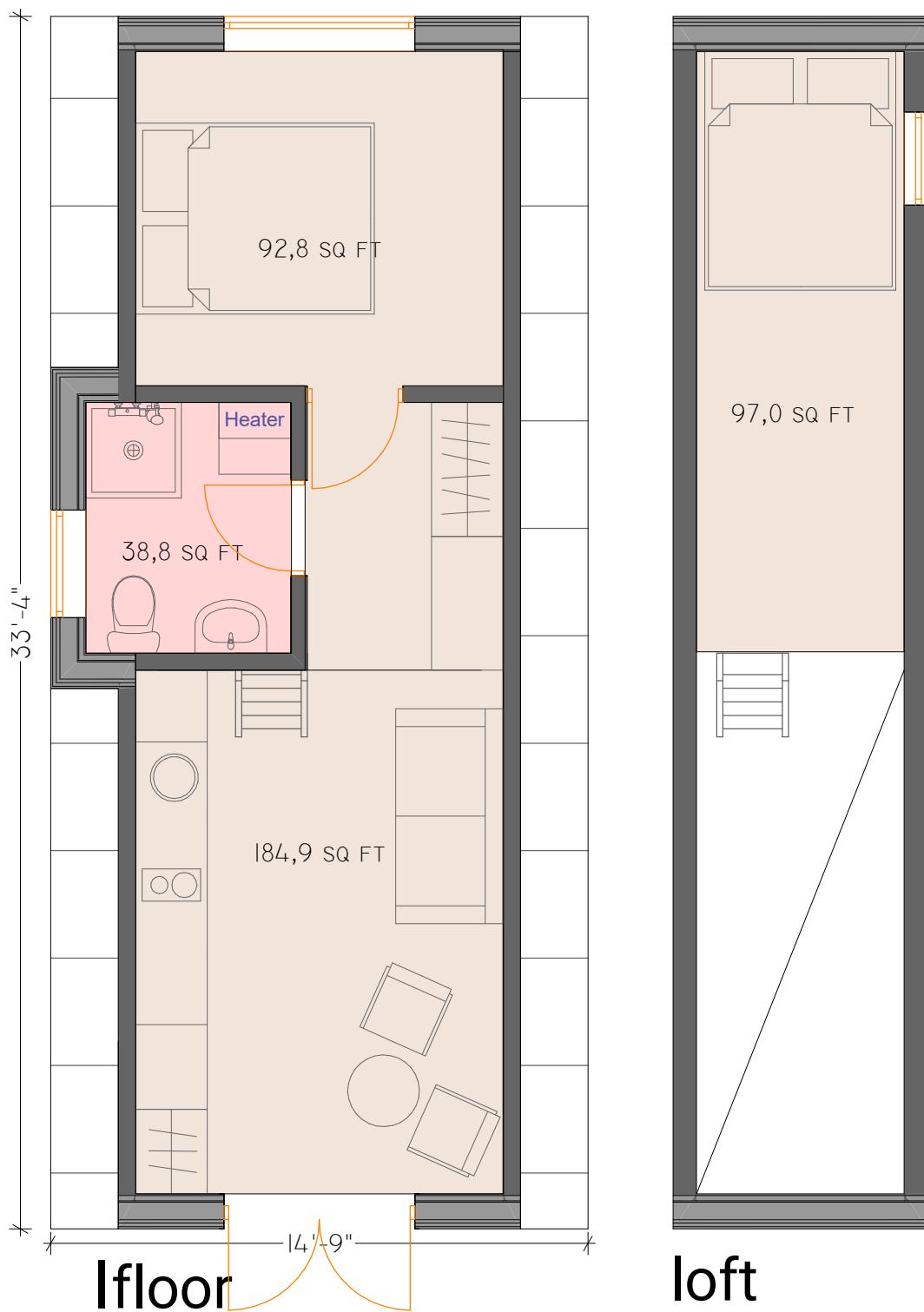
* Amount of material on this table below is calculated precisely, we recommend to buy always little (~10%) extra, screws and nails you can buy a whole package, depending on box size it's available (50/100/200 box)



3. Architectural Drawings

3.1. Floor Plan

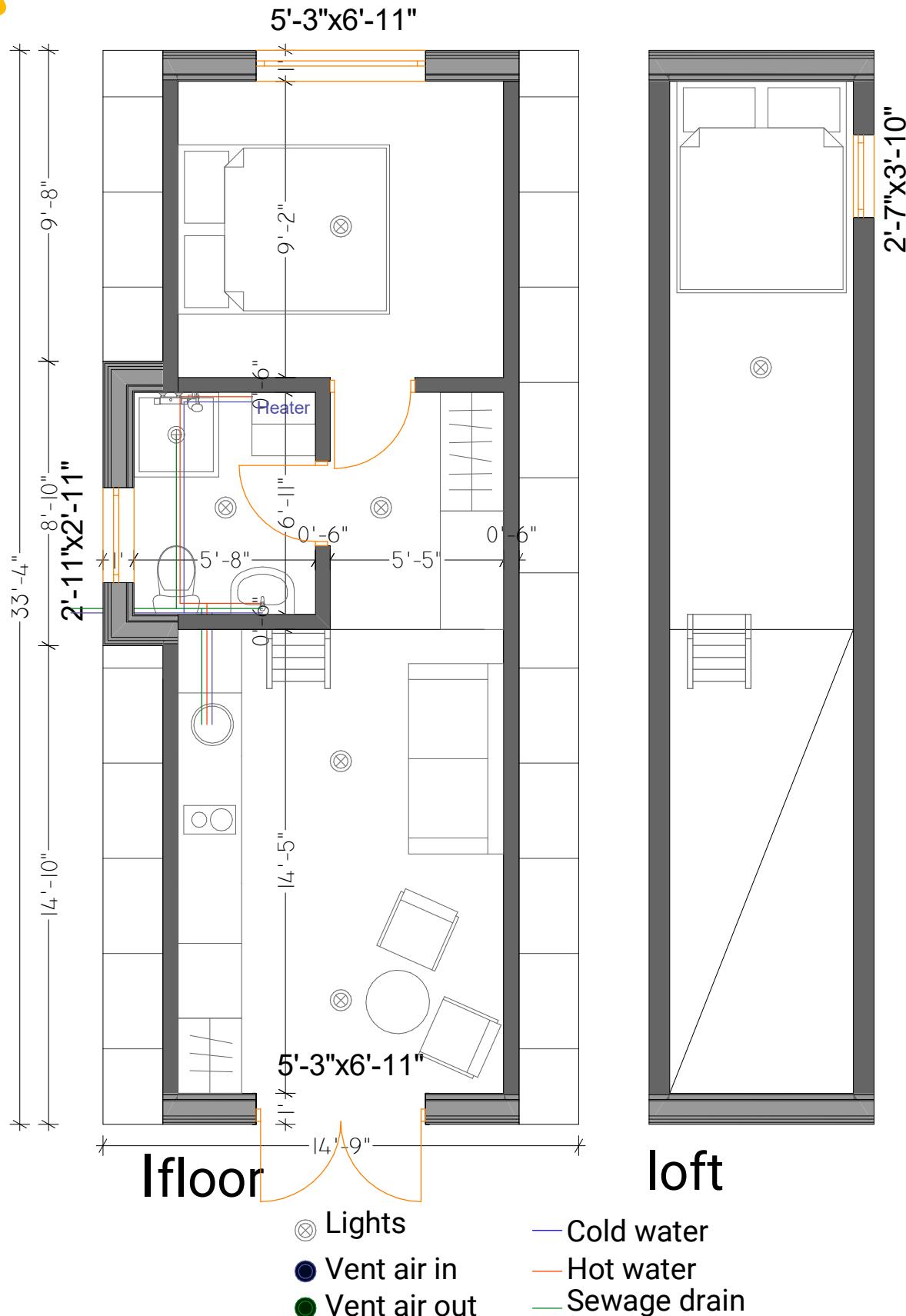
Floor area 413 ft²
Building area 491 ft²
Heating volume 3000 ft³
Heating (fireplace) 5kW



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3. Architectural Drawings

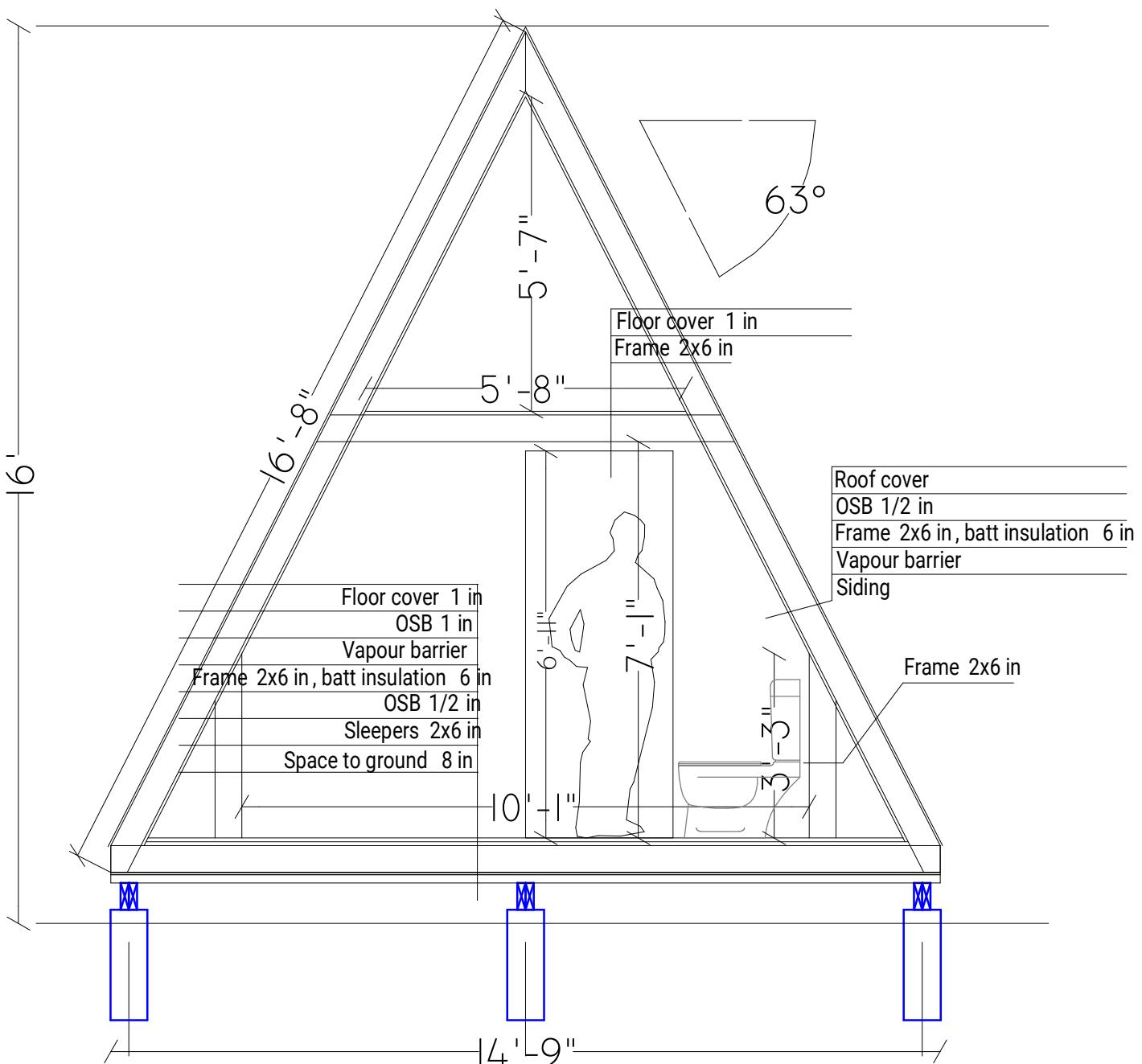
3.2. Floor Plan with Measurements



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3. Architectural Drawings

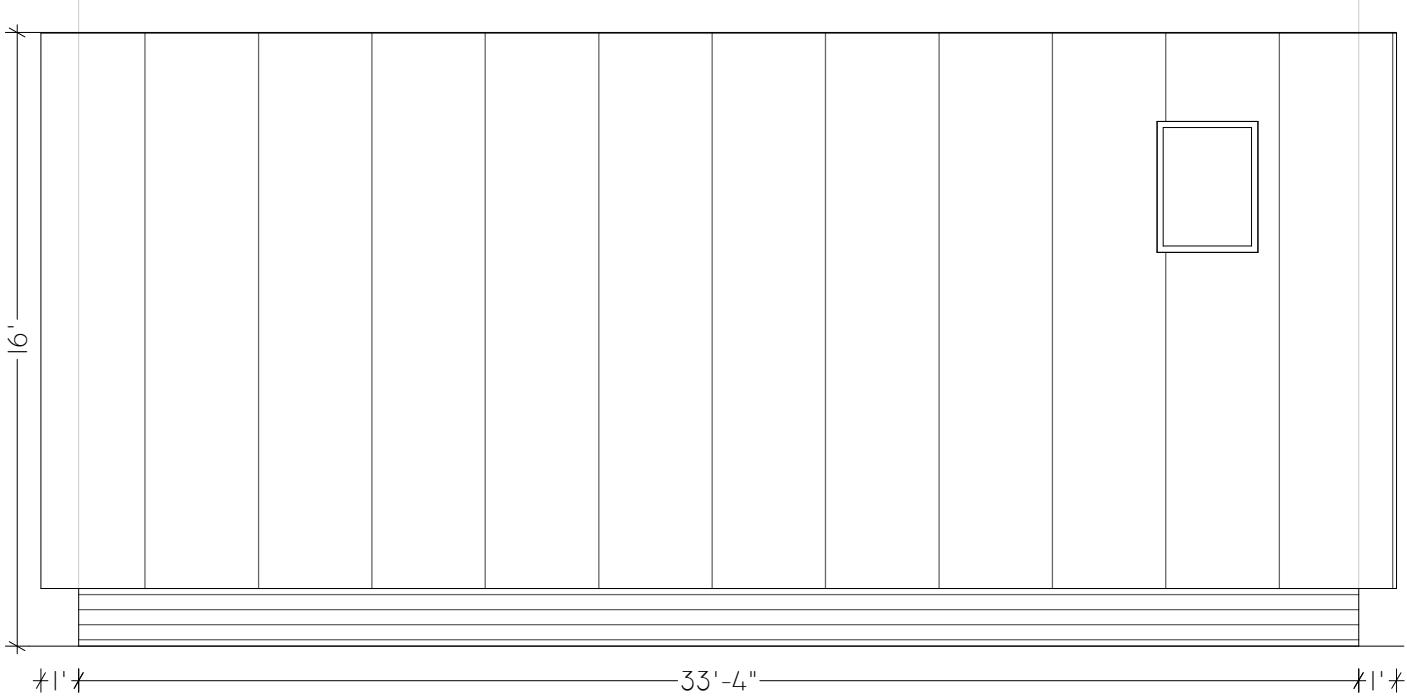
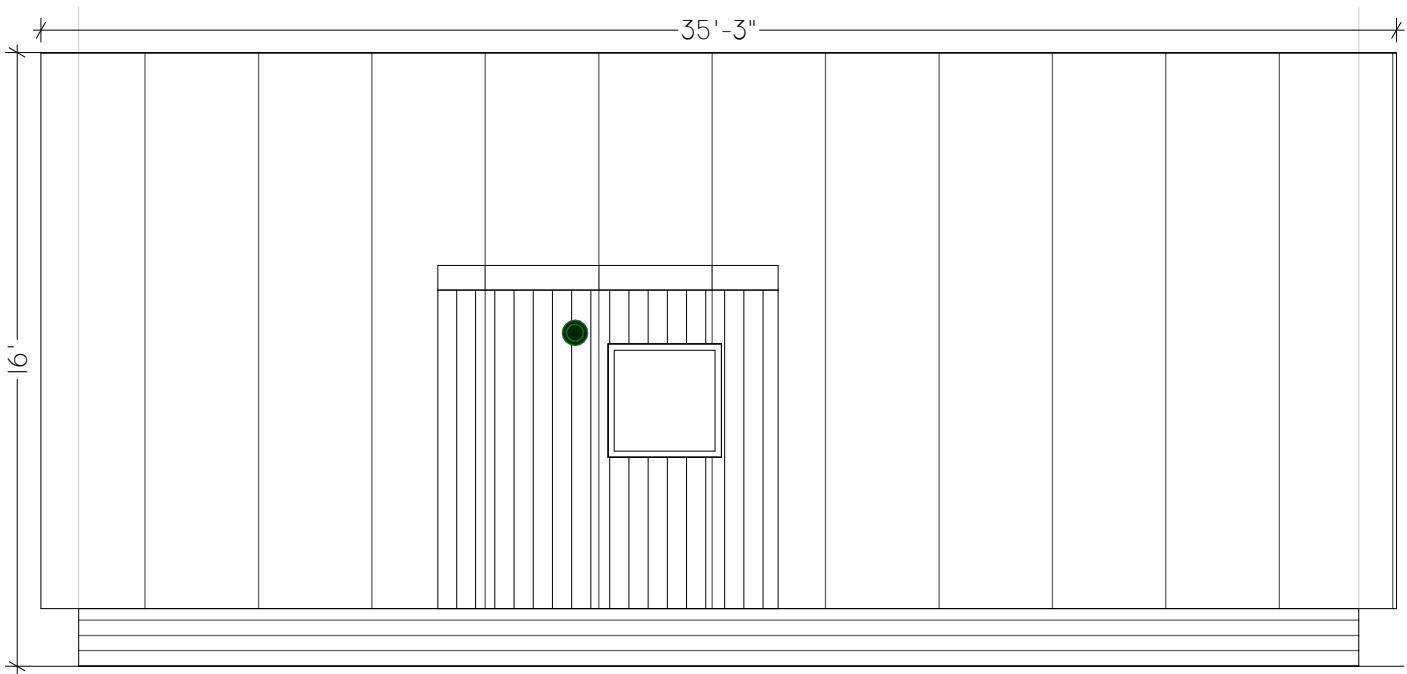
3.3. Cross Section with Measurements



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3. Architectural Drawings

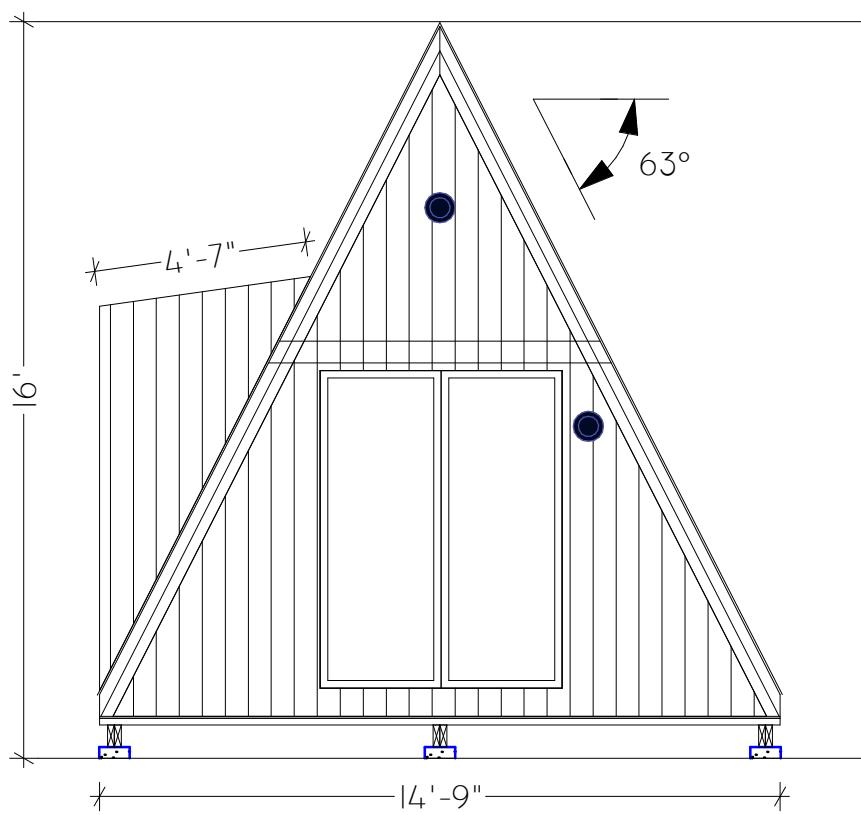
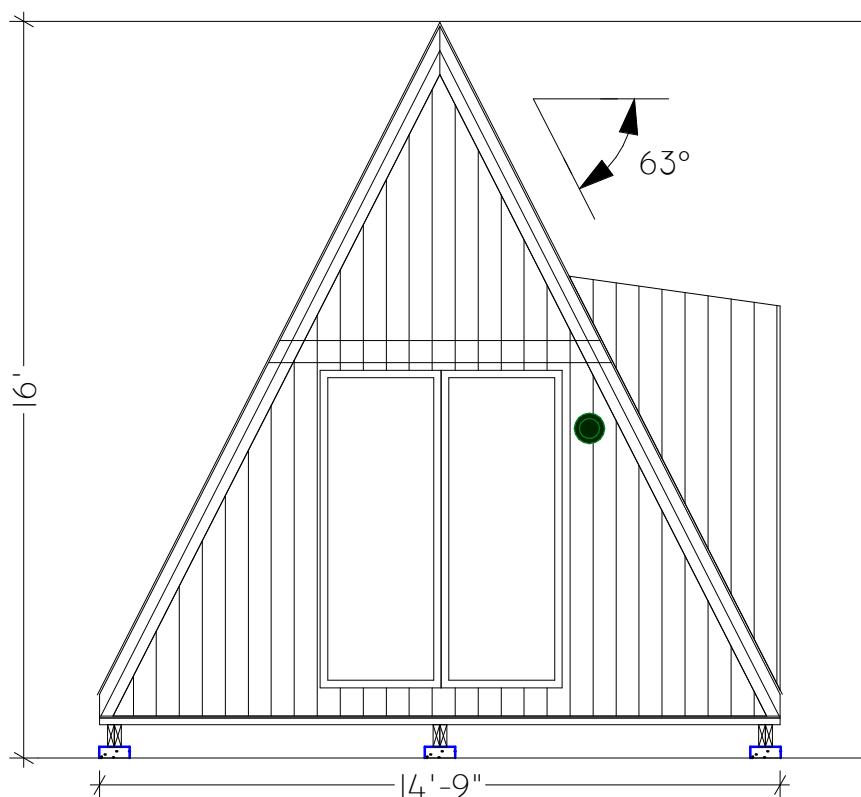
3.4. Exterior Side Views with Measurements



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3. Architectural Drawings

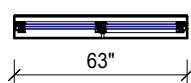
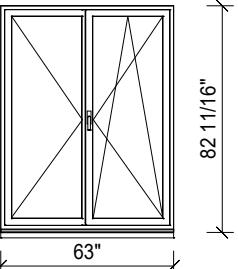
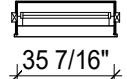
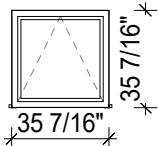
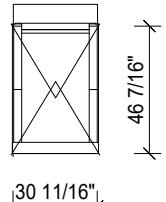
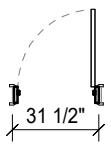
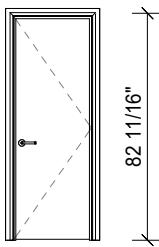
3.5. Exterior End Views with Measurements



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3. Architectural Drawings

3.6. Window and Door Specification

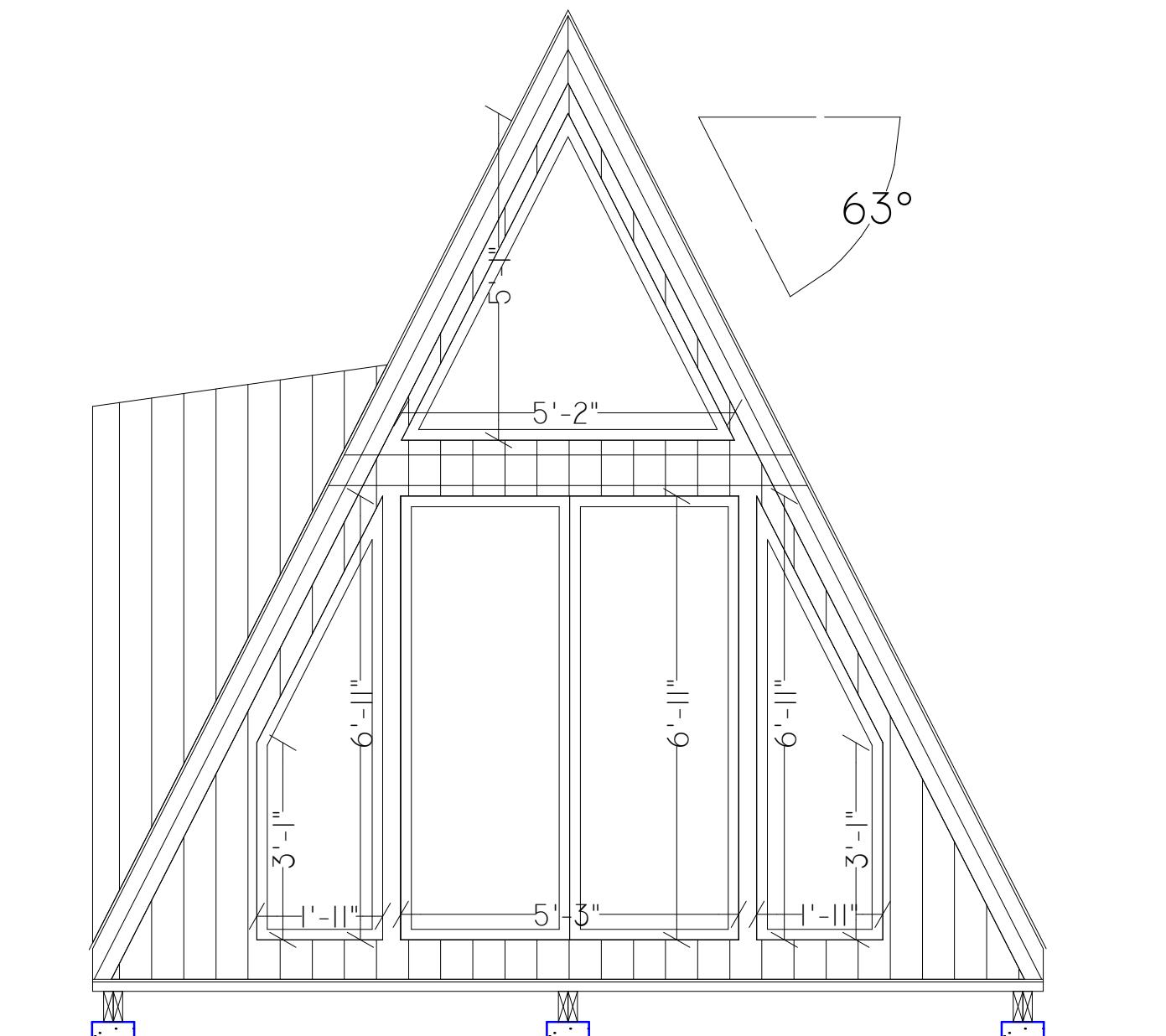
| Window/door specification | | | | | |
|---------------------------|--|---|--------------------------|------------------------|--------|
| Mark | Plan view | Inside elevation | Hole dimensions | Note | Amount |
| W-1 Double door/window | Outside  Inside |  | W= 63 1/8" H= 82 5/8" | Livingroom, Bedroom | 2 |
| W-2 Window |  |  | W= 36 5/8" H= 36 5/8" | Bathroom | 1 |
| W-2 Roof window |  | Roof window | W= 30 5/8" H= 46 5/8" | Loft | 1 |
| D-1 Interior door |  |  | W= 31 5/8" H= 82 5/8" | I floor | 2 |

This window/door specification is used only for window/door dimensions and amounts. Window/door opening directions, colors, materials and other necessary things must be coordinate with owner.



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3.7. Possible Window Upgrade



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4.1. Cut List for Subfloor

SD-1

5 1/2"

196 7/8"

QTY

12

QTY

22

SD-2

5 1/2"

177 3/16"

Impregnate and mark this details.

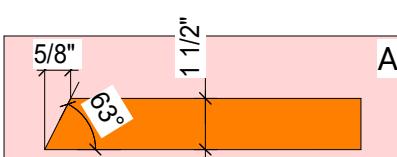
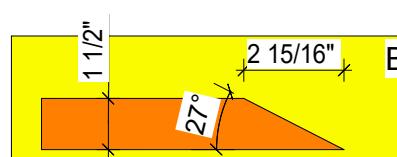


| VERSION | DATE | PROJECT | PAGE NO |
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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 14 |

4.2. Cut for A-Frame trusses

| | | QTY |
|--------|------------------------------------|-----|
| SD-3 | 5 1/2" | 4 |
| | 177 3/16" | |
| SD-4 | 5 1/2" | 2 |
| | 132 11/16" | |
| SD-5 | 5 1/2" | 12 |
| | 177 3/16" | |
| SD-5.1 | 5 1/2" | 3 |
| | 171 11/16" | |
| | 177 3/16" | |
| SD-6 | 4 7/8" | 27 |
| | 184" | |
| | 200 1/8" | |
| | For these dimensions, see page 21. | |
| SD-6.1 | 2 13/16" | 3 |
| | 78 7/16" | |
| | 92 1/16" | |
| SD-7 | 43 3/4" | 23 |
| | 10 13/16" | |
| | 54 9/16" | |

4. Cut List

| | | | QTY |
|---|---|--|-----|
| SD-8 | 2 13/16" 63° 5 1/2" 83 1/2" 2 13/16" 63° 89 1/8" | | 13 |
| SD-8.1 | 81 13/16" 5 1/2" 2 13/16" 63° 84 5/8" | | 3 |
| SD-9 | 5/8" A 63° 5 1/2" 191 5/8" 195 3/16" 2 15/16" B 27° | QTY | 4 |
| SD-10 | 5 1/2" 84 13/16" | QTY | 4 |
| SD-11 | 5/8" A 63° 5 1/2" 86 3/16" 87 7/16" 63° A 5/8" | QTY | 2 |
| SD-12 | 24 5/16" 2 15/16" B 5 1/2" 27 1/4" | QTY | 8 |
| SD-13 | 58 1/8" 5 1/2" 61 1/16" 2 15/16" B 27° | QTY | 4 |
| A | | B | |
|  | |  | |

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4. Cut List

| | | | | |
|-------|--|-----------|-----|-----------|
| SD-14 | | 2 15/16" | 27° | QTY 4 |
| SD-15 | | 22 1/8" | | QTY 14 |
| SD-16 | | 15 13/16" | | QTY 4 |
| SD-17 | | 16 9/16" | | QTY 4 |



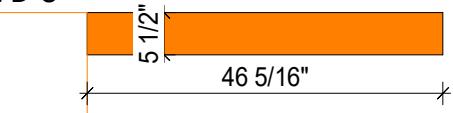
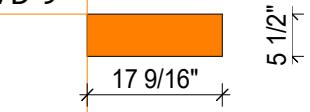
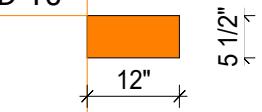
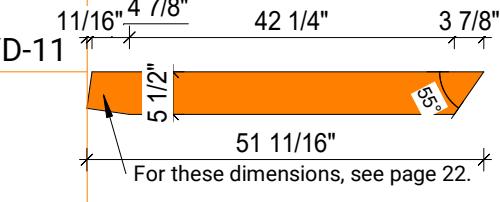
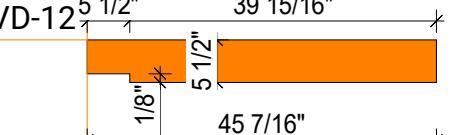
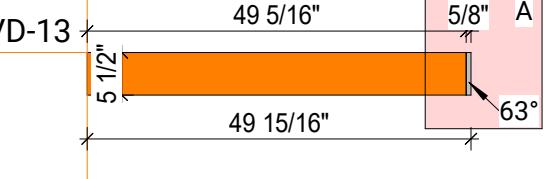
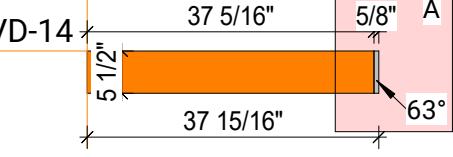
| VERSION | DATE | PROJECT | PAGE NO |
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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 17 |

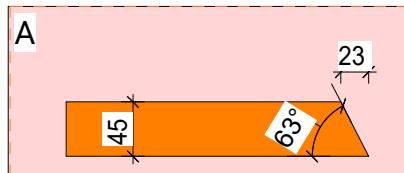
4.3. Cut List for Dormer

| | | | | | |
|--------|--|-----|--|---|--|
| VD-1 | | QTY | <table border="1"><tr><td>2</td><td></td></tr></table> | 2 | |
| 2 | | | | | |
| VD-1.1 | | QTY | <table border="1"><tr><td>4</td><td></td></tr></table> | 4 | |
| 4 | | | | | |
| VD-2 | | QTY | <table border="1"><tr><td>2</td><td></td></tr></table> | 2 | |
| 2 | | | | | |
| VD-3 | | QTY | <table border="1"><tr><td>1</td><td></td></tr></table> | 1 | |
| 1 | | | | | |
| VD-4 | | QTY | <table border="1"><tr><td>1</td><td></td></tr></table> | 1 | |
| 1 | | | | | |
| VD-5 | | QTY | <table border="1"><tr><td>2</td><td></td></tr></table> | 2 | |
| 2 | | | | | |
| VD-6 | | QTY | <table border="1"><tr><td>5</td><td></td></tr></table> | 5 | |
| 5 | | | | | |
| VD-7 | | QTY | <table border="1"><tr><td>2</td><td></td></tr></table> | 2 | |
| 2 | | | | | |

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4. Cut List

| | | |
|-------|---|----------|
| VD-8 |  | QTY 1 |
| VD-9 |  | QTY 6 |
| VD-10 |  | QTY 6 |
| VD-11 |  <p>For these dimensions, see page 22.</p> | QTY 5 |
| VD-12 |  | QTY 5 |
| VD-13 |  | QTY 2 |
| VD-14 |  | QTY 2 |



4. Cut List

| | | |
|------------------------------------|--|---------------------------------------|
| VD-15 | | QTY <input type="text" value="2"/> |
| VD-16 | | QTY <input type="text" value="2"/> |
| | | |
| VD-17 | | QTY <input type="text" value="2"/> |
| For these dimensions, see page 23. | | |
| SB-1 | | QTY <input type="text" value="3"/> |

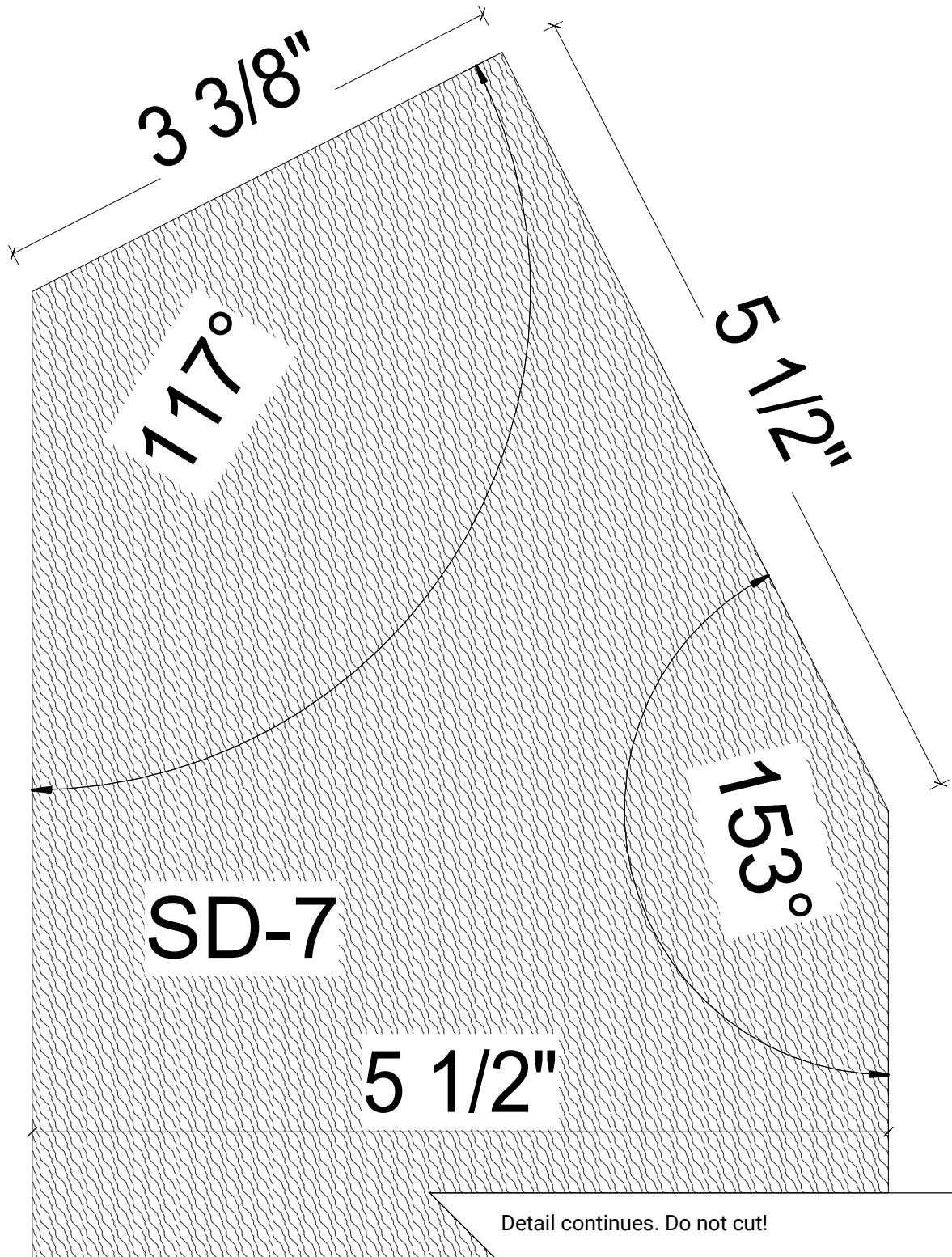


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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 20 |



4.4. SD-6 detail tip cut template

Please check with ruler that measurements haven't changed, after printing.



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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 21 |



4.5. VD-11 detail tip cut template

Please check with ruler that measurements haven't changed, after printing.

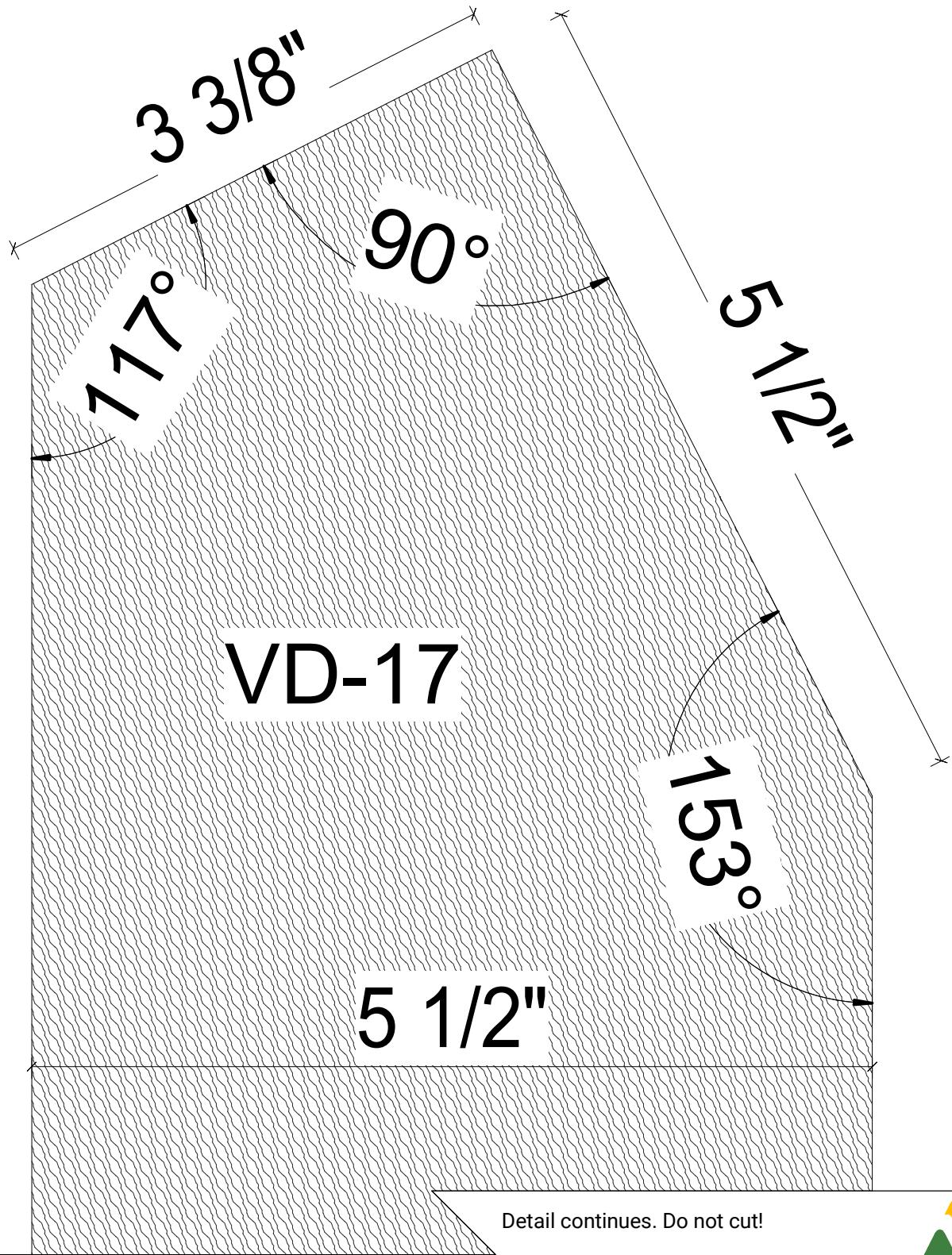


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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 22 |



4.6. VD-17 detail tip cut template

Please check with ruler that measurements haven't changed, after printing.



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|---------|-----------|--------------------|---------|
| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 23 |

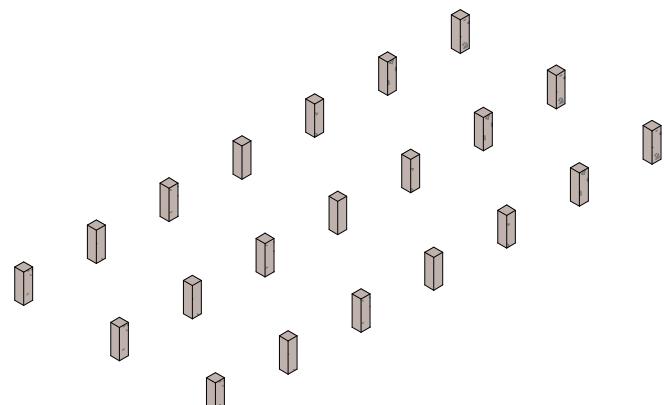
This guide does not include instructions how to build a foundation. Check your local requirements for tiny houses, some areas may have special restrictions for foundations.

For **SOLO+** we recommend post, stripe or screw foundation, but please keep in mind:

- Use a foundation solution that is appropriate for your location.
- Build the foundation below the freezing point.
- Use hydro-isolation stripes under the sill beams.
- Build water and sewage interconnect with foundation

Post Foundation

As the name suggests, a post foundation consists of concrete piers that are set deep into the ground to bear the weight of the structure. Tiny house builders often choose to use post foundations because it's easy to build and is less expensive than other choices. This type of foundation is best suited for smaller buildings, but less ideal in areas where earthquakes or hurricanes are common. Also, homes that sit top post foundation are more susceptible to developing sagging and creaking floors.



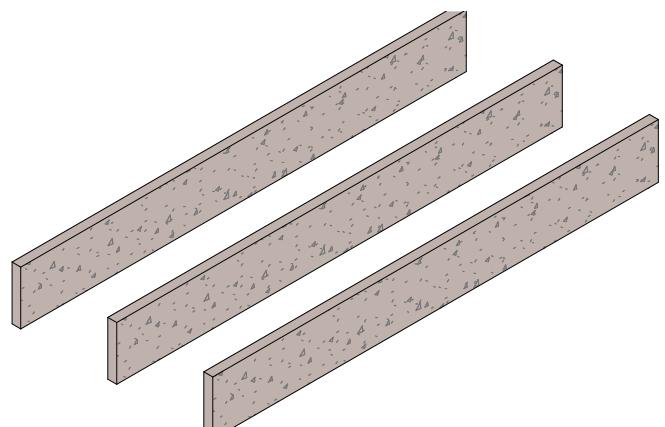
Screw Pile Foundation

When it comes to screw pile foundations, there are piles that are screwed into the ground. There is no excavating of dirt required. A pile is essentially a large screw that holds the foundation of a structure on top of it.



Stripe Foundation

Stripe foundations are one of the most commonly used foundations. They are generally used for ground where the subsoil is of a good bearing capacity. Stripe foundations are designed for structures where the load is relatively modest, such as, low-to-medium rise domestic buildings. The traditional form of most house construction allows for the use of stripe foundations. Strip foundations consist of a continuous stripe of concrete formed centrally under load bearing walls. The continuous strip acts as support for which walls are built and is to a width to spread the load evenly of the building on the ground underneath it, supporting it.

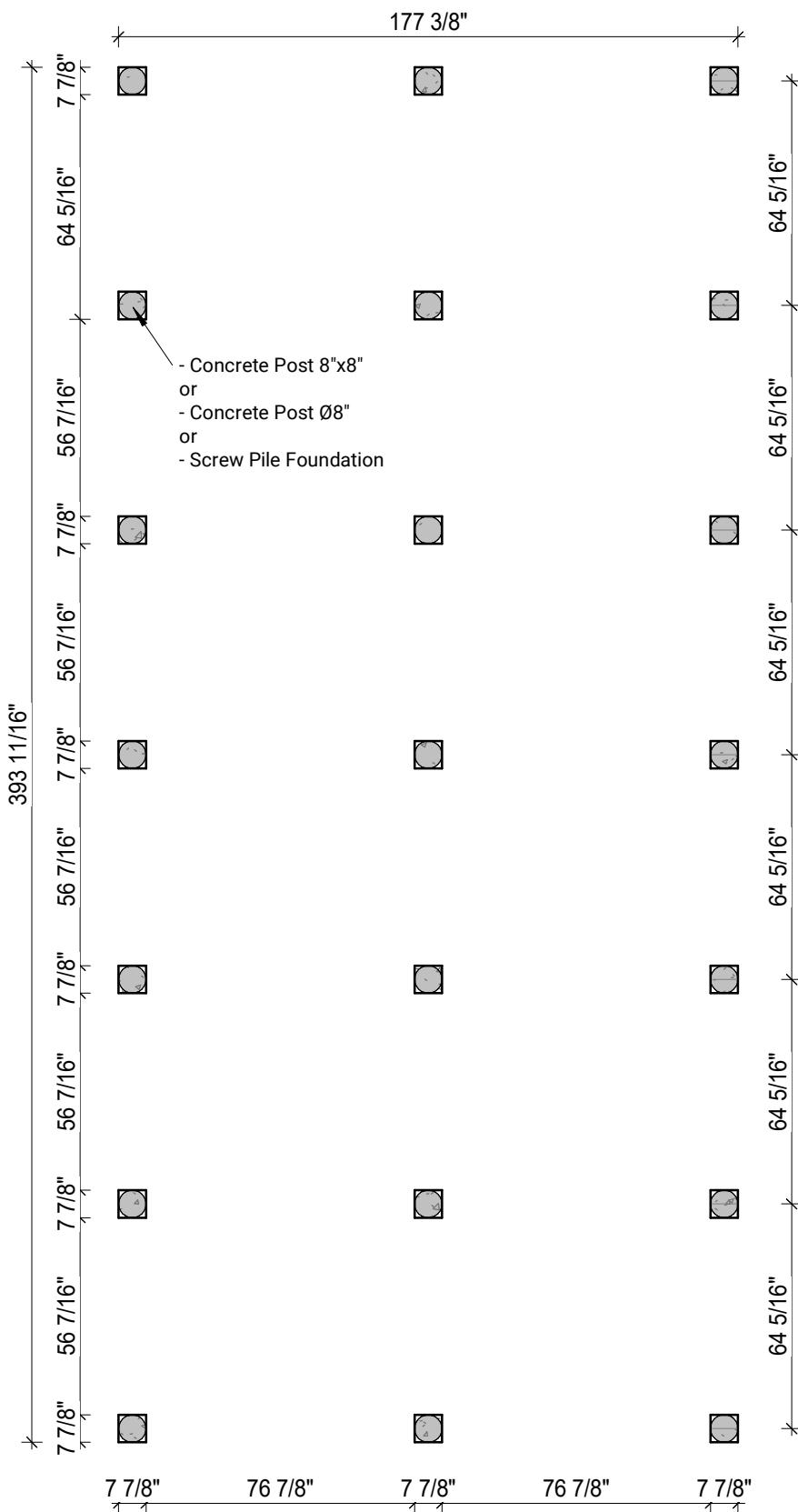


If you're still unsure about which foundations you can use for supporting a wall structure, speak to an engineer.



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|------------|------------------|---------------------------|-----------|
| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 24 |

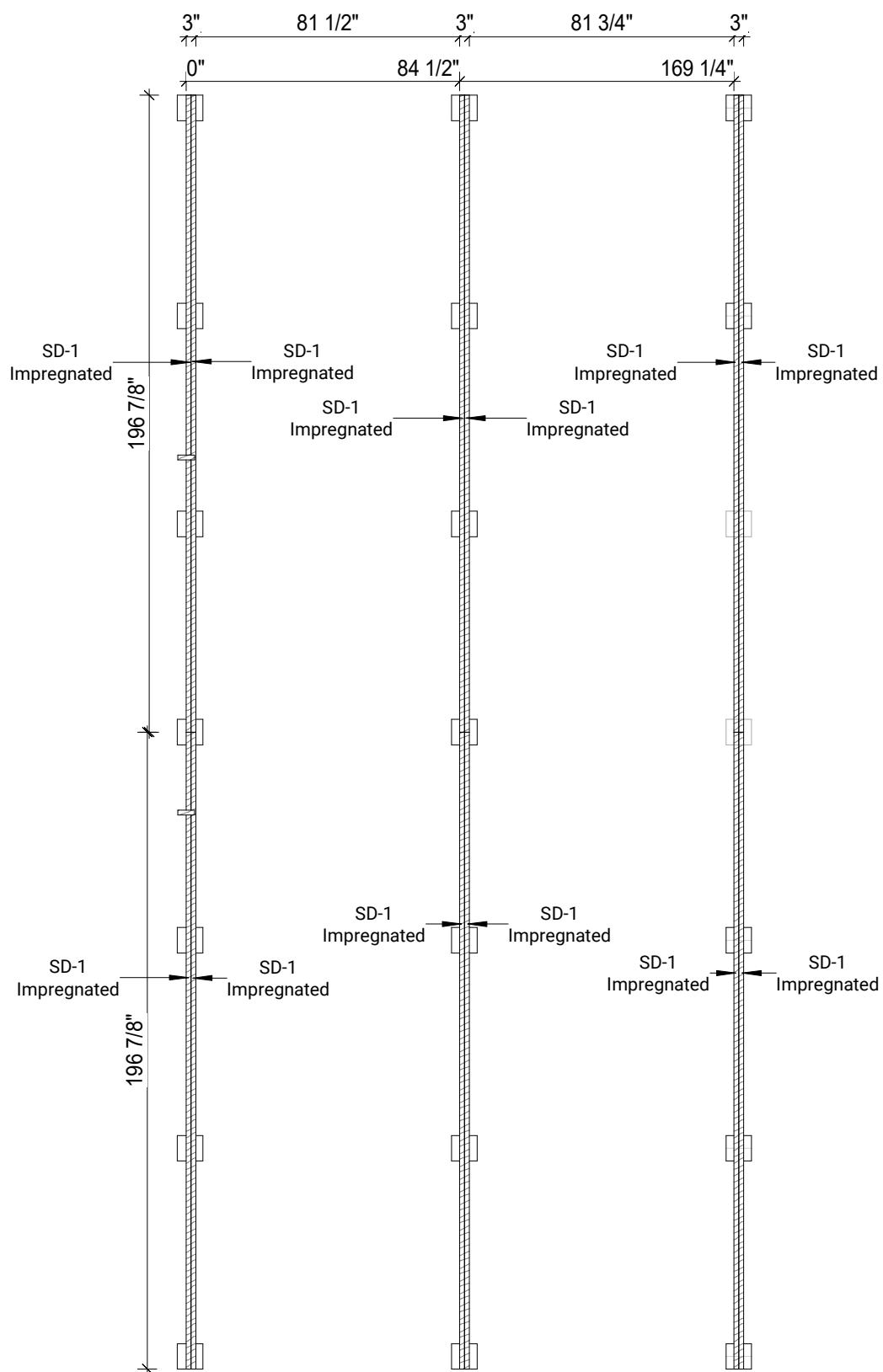
5.1. Post foundation plan with measurements



| VERSION | DATE | PROJECT | PAGE NO |
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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 25 |

5.2. Sill beams plan with measurements

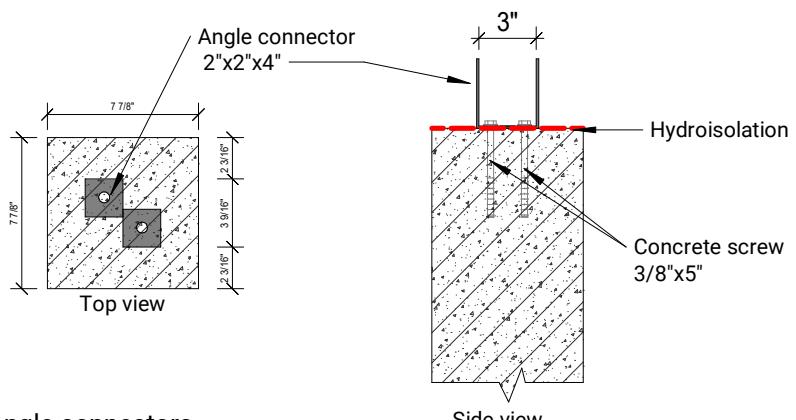
| 5.2. Sill beams | | | | | |
|-----------------|-------------|------------|-------|------|-------------|
| Type | Description | Cut Length | Count | Type | Comments |
| SD-1 | Sill beams | 196 7/8" | 12 | SD-1 | Impregnated |



5.3. Connecting sill beams

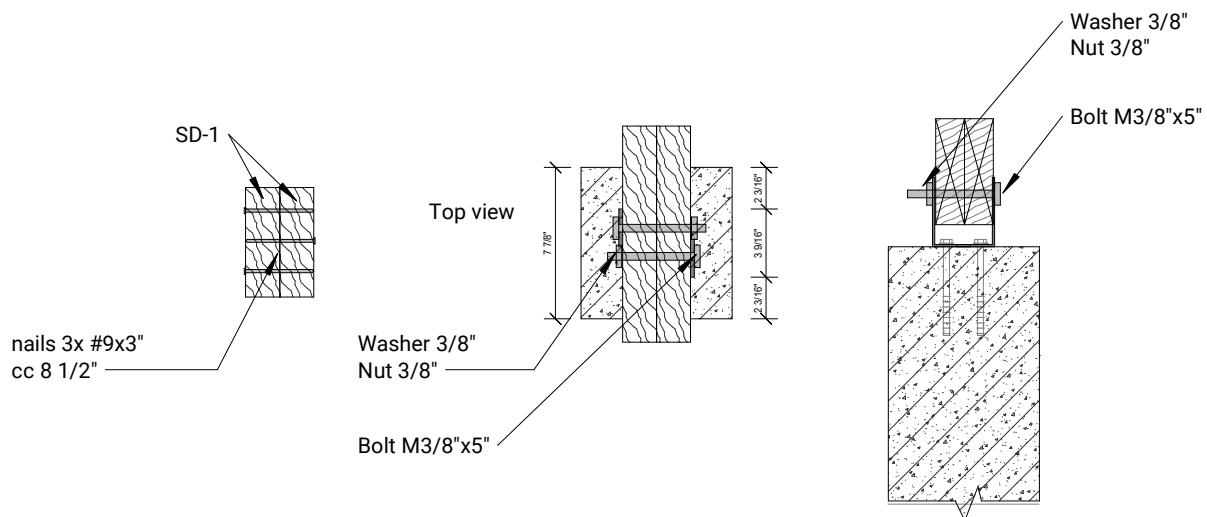
A Connect angle connectors with concrete posts

1. Build 15 concrete posts with minimal cross-section 8"x8" or Ø8" diameter if rounded.
2. Between angle connectors and concrete post add hydro-isolation (e.g. bitumen).
3. Use angle connectors for a timber structure 2"x2"x4" and connect these with 3/8"x5" concrete screws to the concrete posts.



B Connect sillbeams with angle connectors

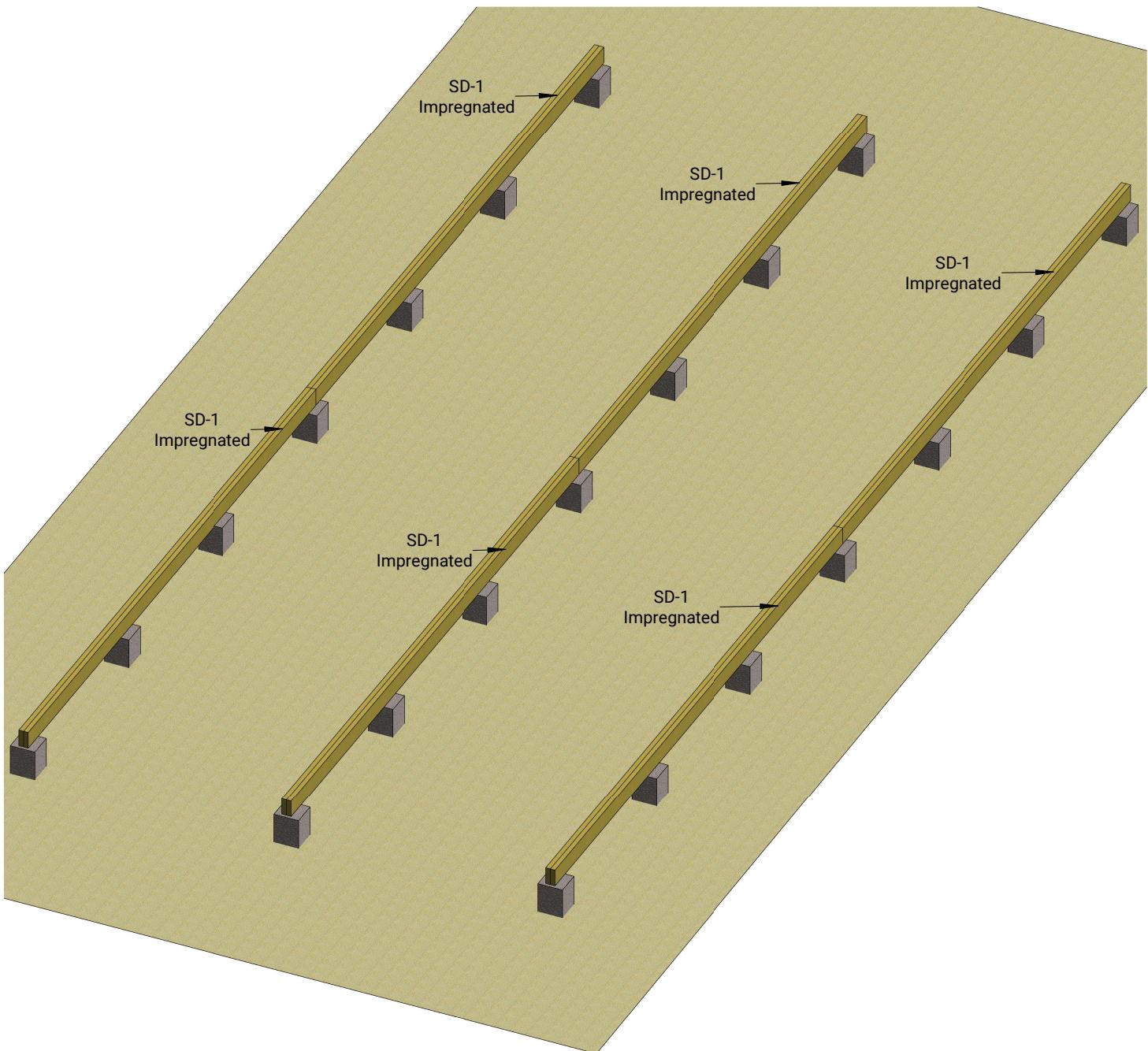
1. Connect sill beams (SD-1) with #9x3" nails, 3 pcs top to each other with 8 1/2" gap.
2. Lay nailed sill beams between connectors and fasten with M3/8"x5" bolt and 3/8" washer and 3/8" nut.



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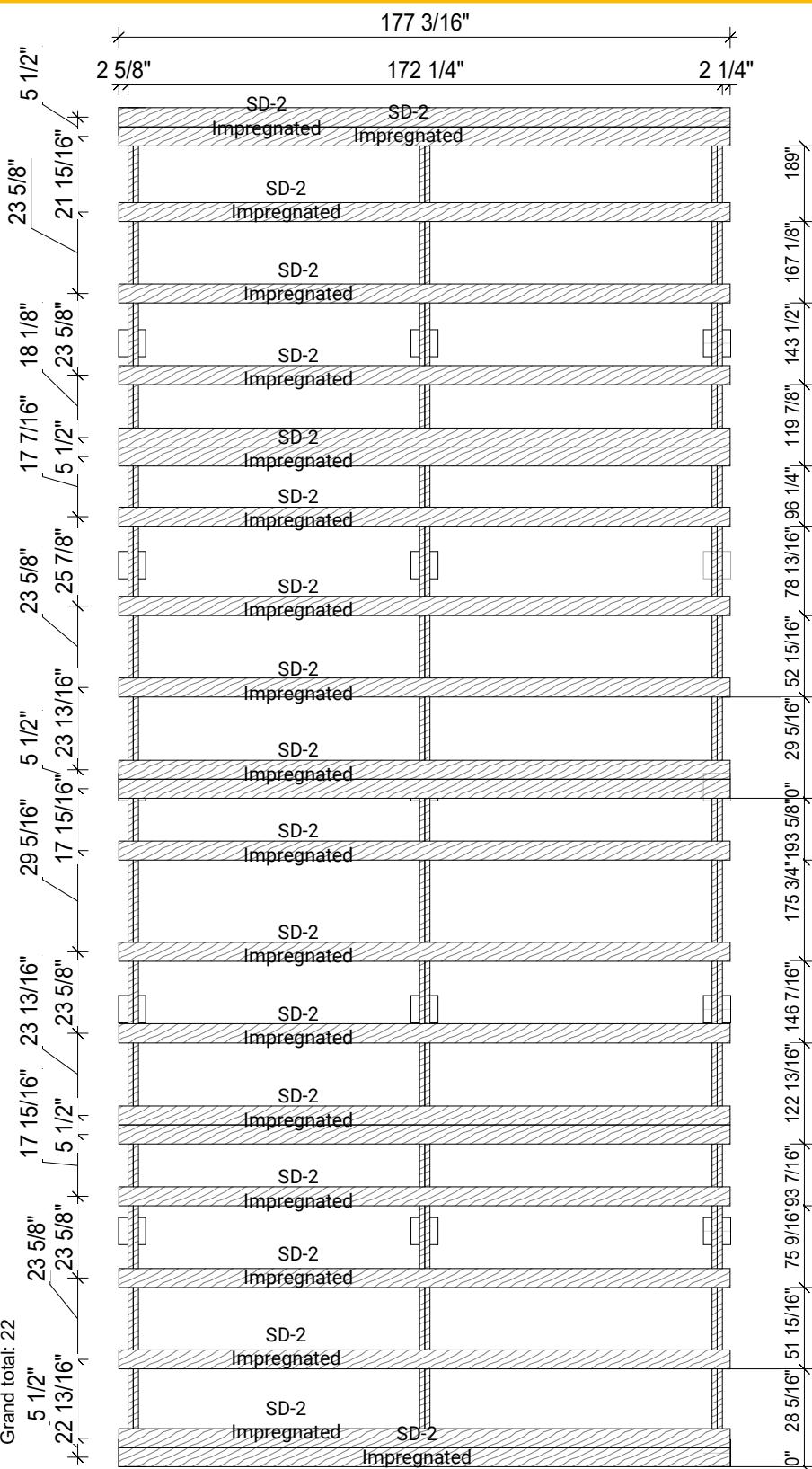
5.4. Foundation & sill beams 3D view



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|------------|------------------|---------------------------|-----------|
| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 28 |

6. Subfloor

6.1. Subfloor sleepers plan with measurements



6.1. Subfloor sleepers

| 6.1. Subfloor sleepers | | | | |
|------------------------|------------------|-------|------------|---------------|
| Type | Description | Count | Cut Length | Type Comments |
| SD-2 | Subfloor sleeper | 22 | 177 3/16" | Impregnated |



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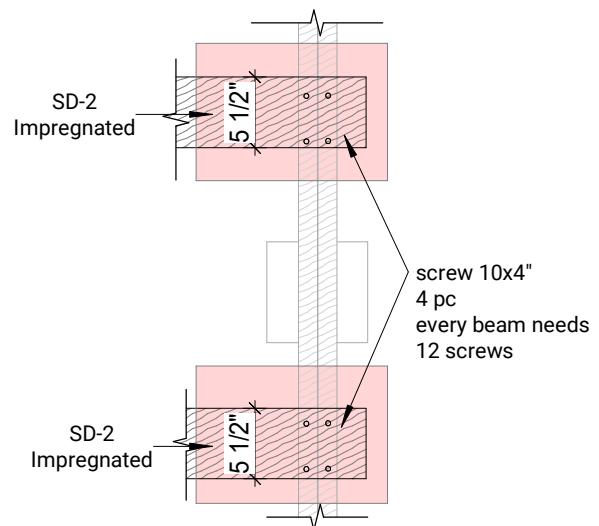
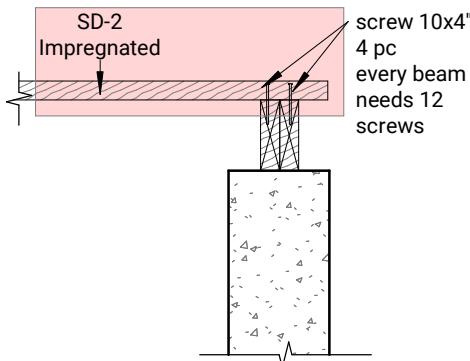
12-DEC-21

Solo+ 100 IMPERIAL

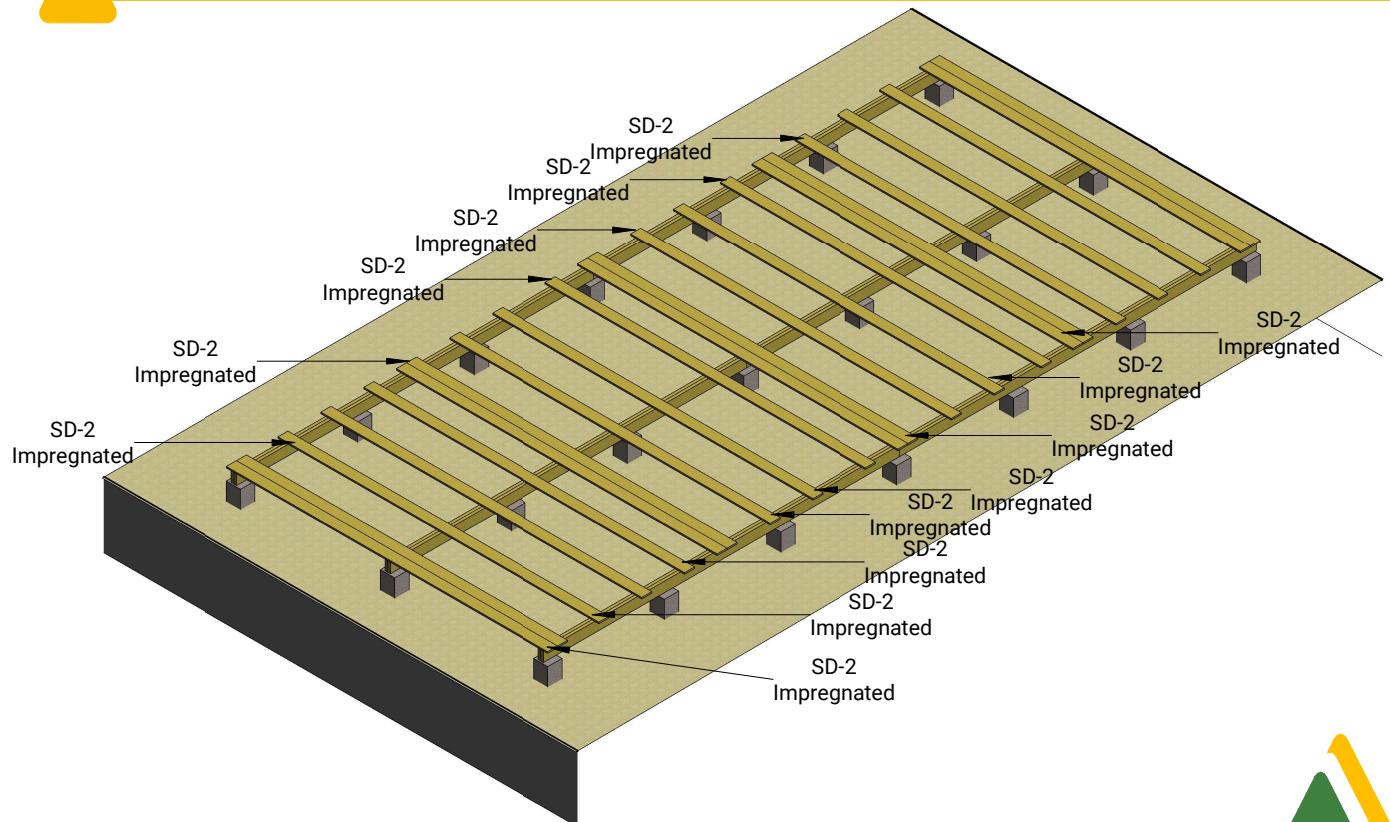
29

6.2. Attaching the subfloor sleepers

1. Measure locations of details SD-2 (see drawing with measurements).
 2. Attach details SD-2 to the details SD1 with four screws on each joint.
- Every joint needs 4 screws.



6.3. Subfloor sleepers 3D view

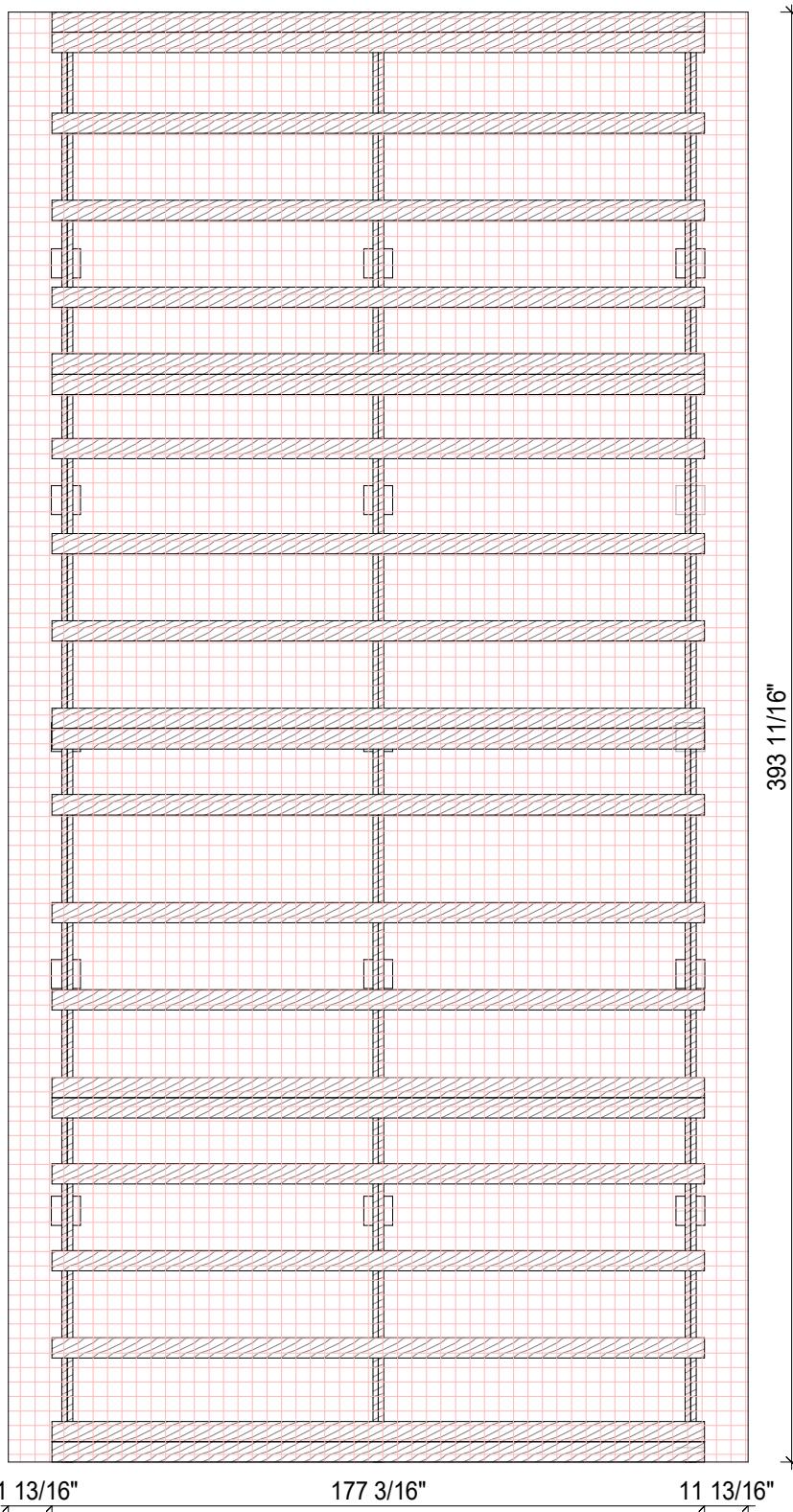
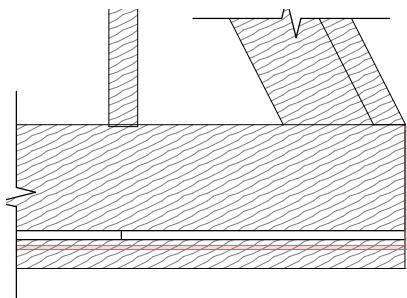


6.4. Installing the rodent wire mesh

1. Install rodent wire mesh to sleepers.
 2. Overlap rodent wire mesh on sides.
- NOTE! After You have installed trusses, fix the overlapped rodent wire mesh to A-Frame trusses.

Turn wire rodent mesh onto A-Frame trusses and fix it with staples.

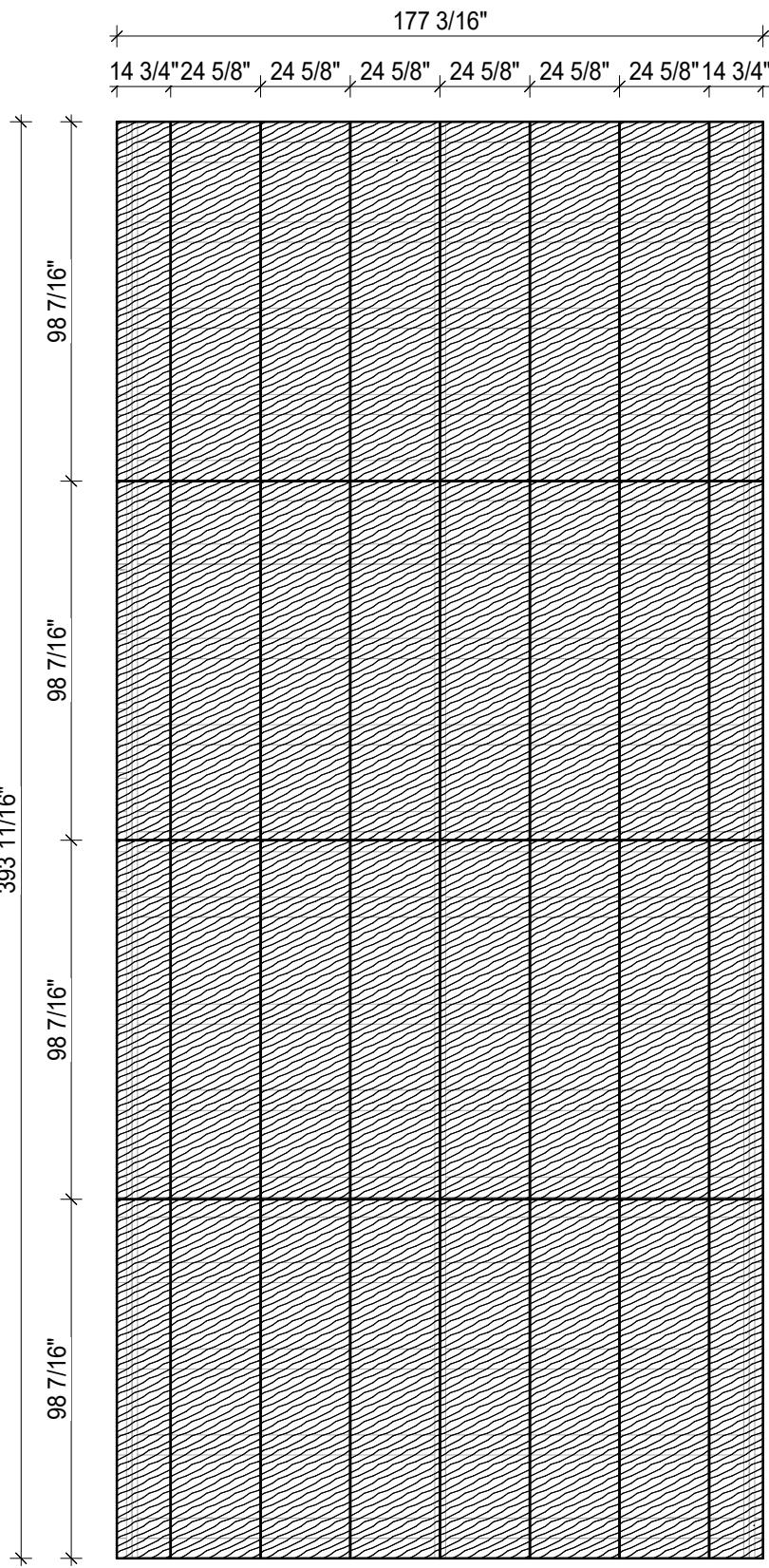
NOTE! Do it after that You have installed and fixed all A-Frame trusses!



7. Subfloor OSB sheathing

7.1. OSB layout plan with measurements

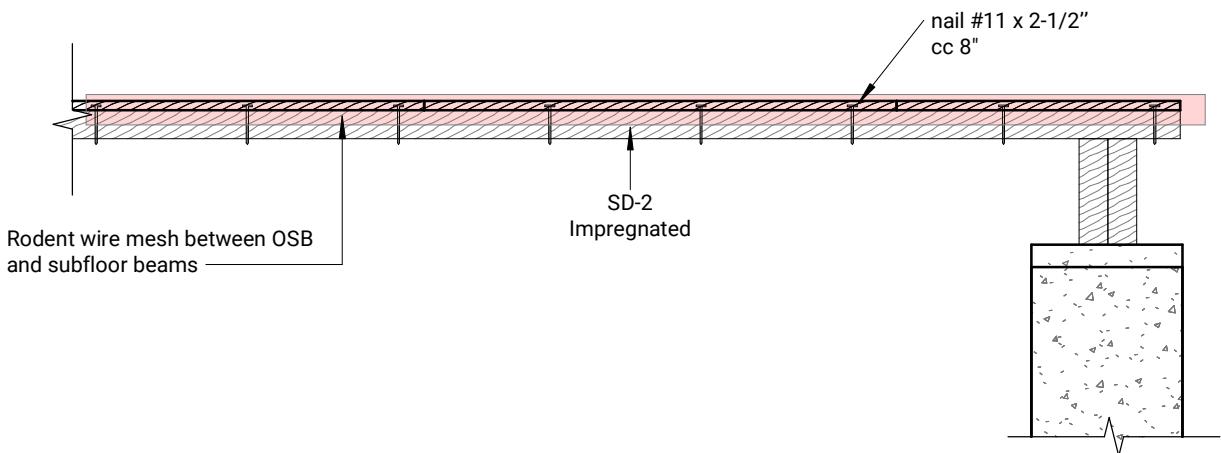
| 7.1. OSB | | | | | | |
|-----------------|------|-------|-------------------|-----------|-------------|----------|
| Type | Mark | Count | Default Thickness | Area | Description | Volume |
| OSB 12 mm | | 32 | 1/2" | 484.38 SF | subfloor | 19.07 CF |
| Grand total: 32 | | | | | | |



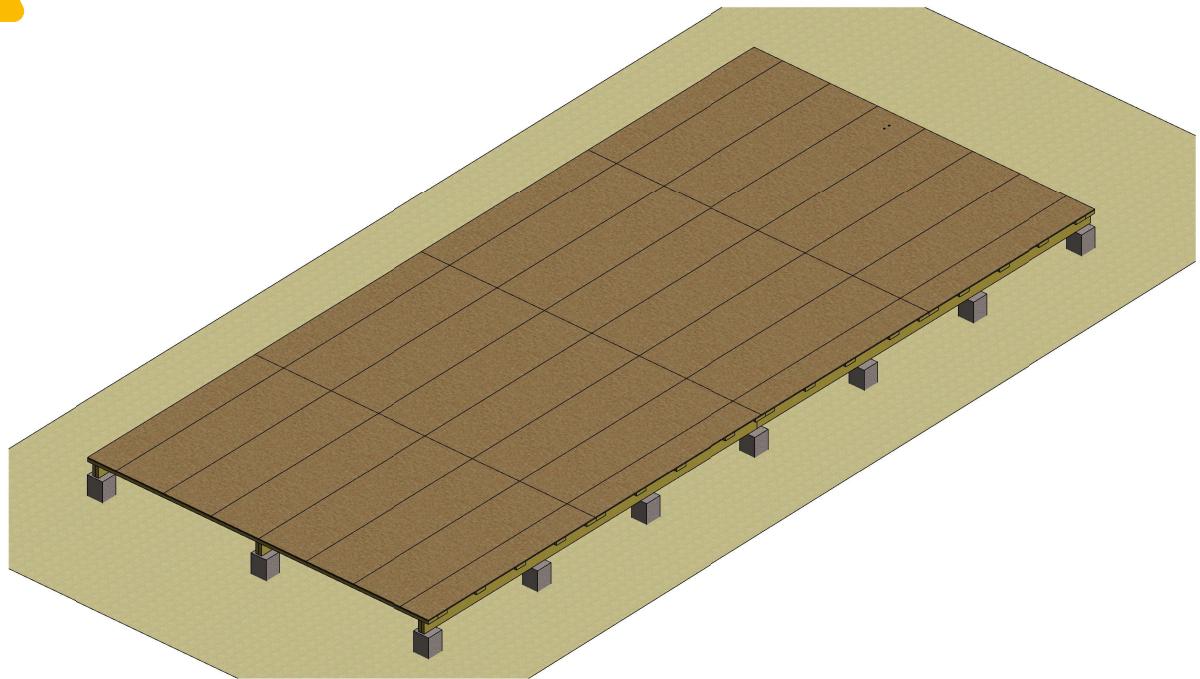
7. Subfloor OSB sheathing

7.2. OSB installation

1. Cut OSB sheets on right dimension.
2. Measure OSB locations.
3. Fasten OSB sheets onto sleepers with #11 x 2-1/2" nails.



7.3. Subfloor OSB 3D view

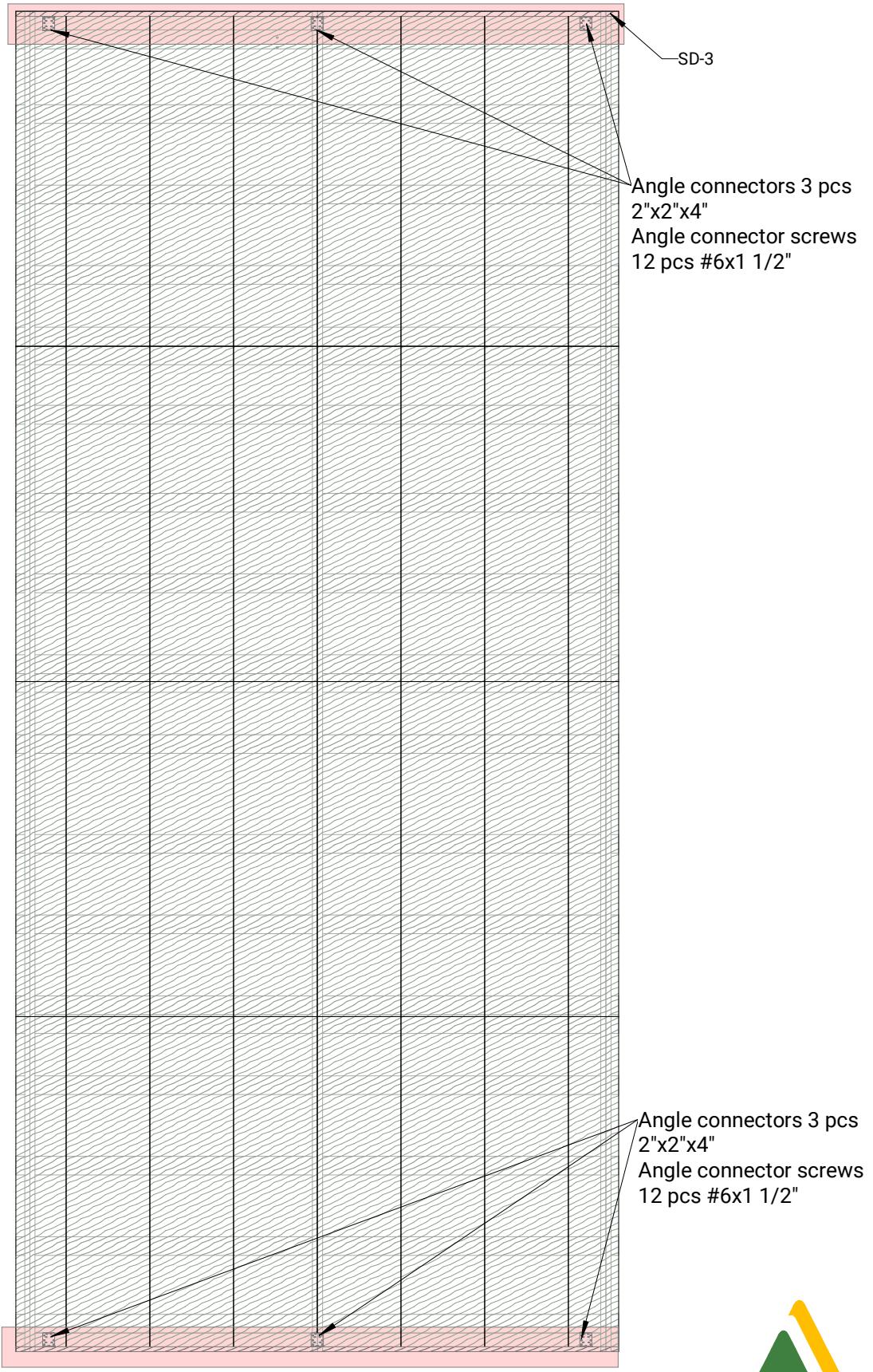


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7. Subfloor OSB sheathing

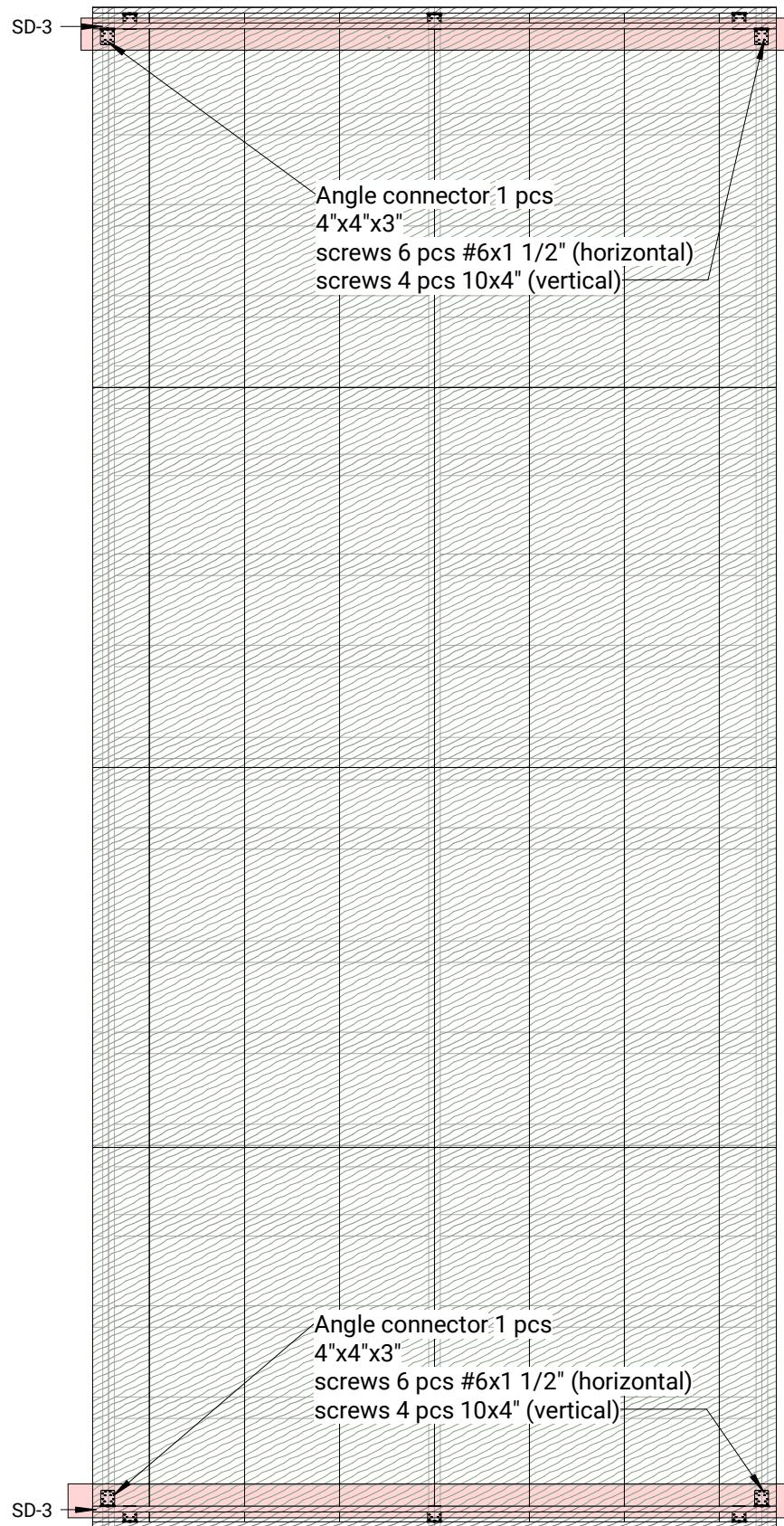
7.4. Subfloor angle connectors plan with measurements

| 7.4. Details to OSB sheathing | | | |
|-------------------------------|----------------|-------|------------|
| Type | Description | Count | Cut Length |
| SD-3 | Details to OSB | 4 | 177 3/16" |
| Grand total: 4 | | | |



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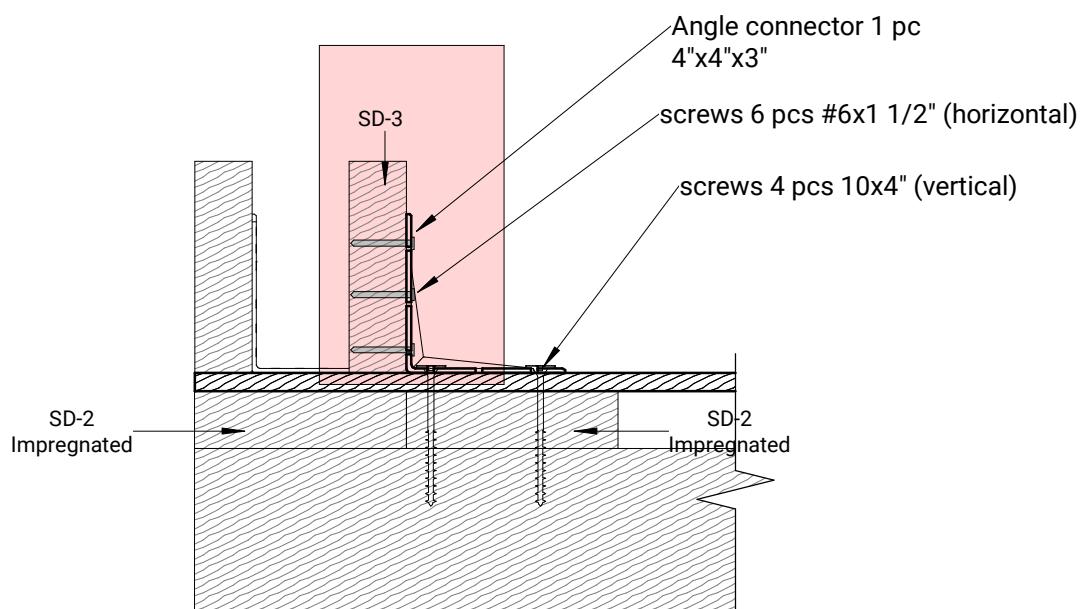
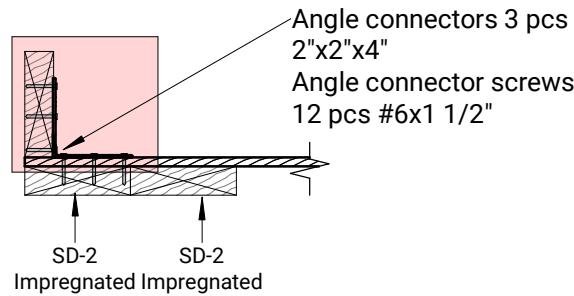
7. Subfloor OSB sheathing



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7. Subfloor OSB sheathing

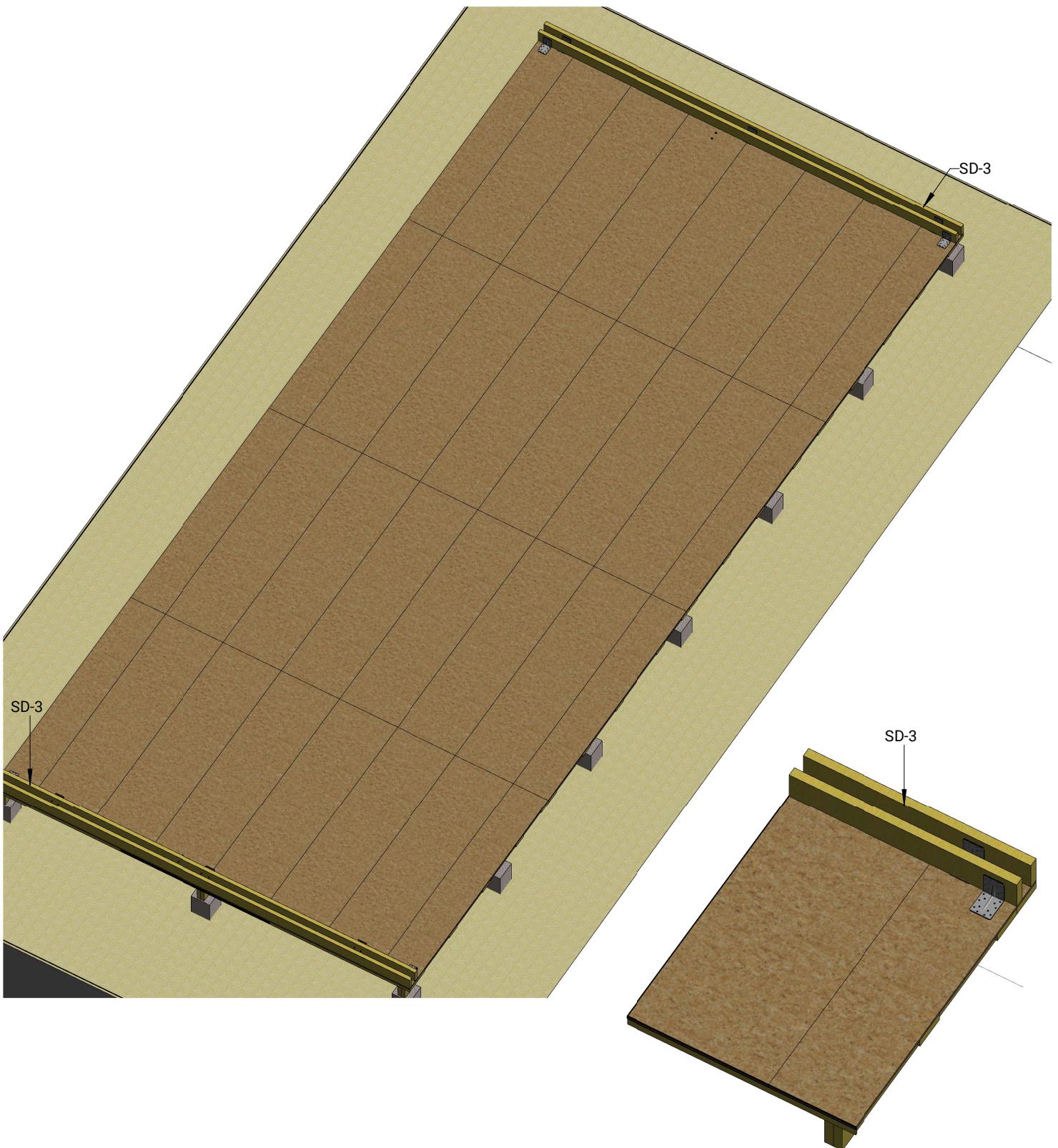
7.5. Installing detail SD-4



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7. Subfloor OSB sheathing

7.6. Subfloor 3D view



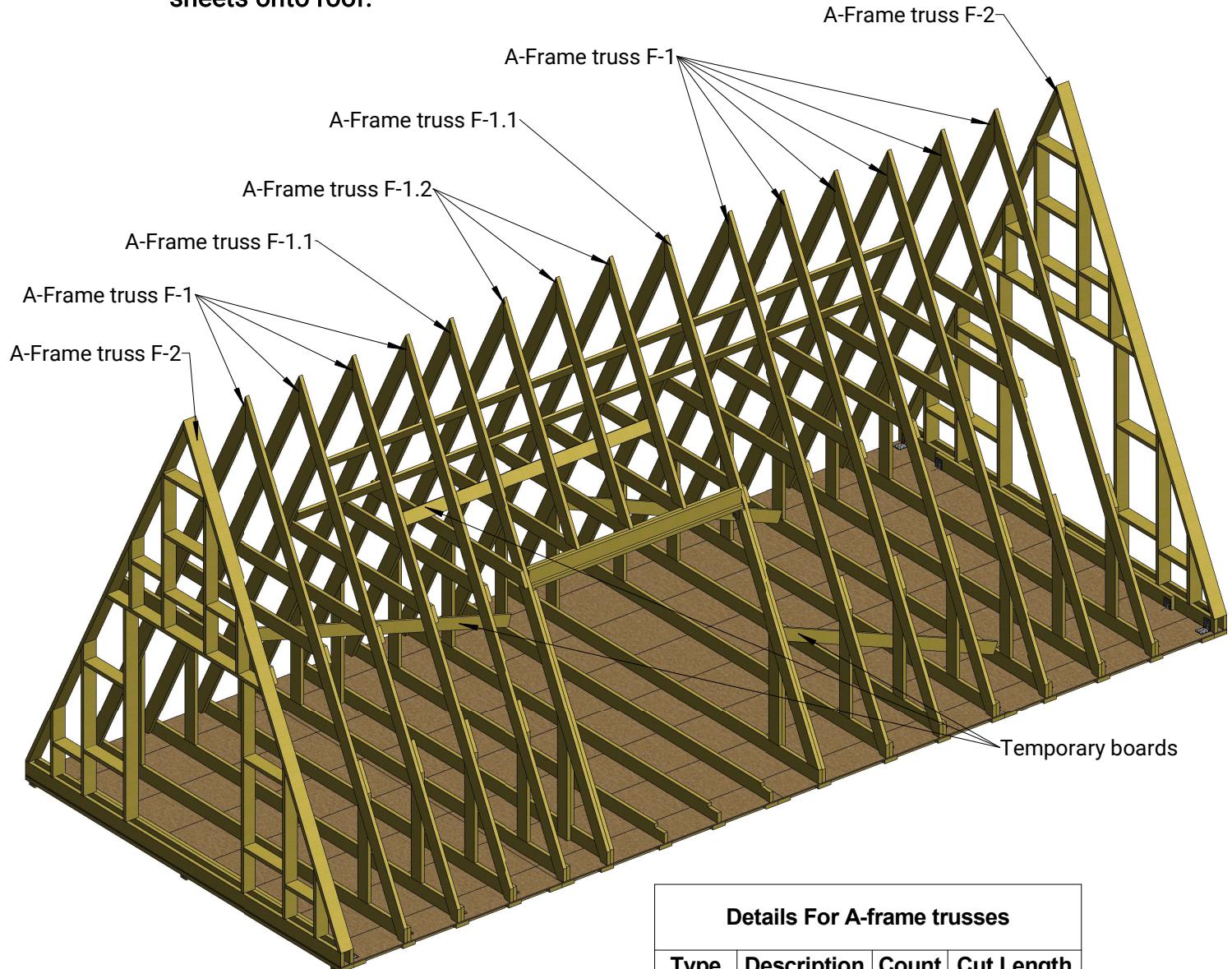
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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 37 |

8. A-frame Trusses

SOLO+100 has 4 different A-Frame trusses:

- 10 pcs of A-Frame truss F-1
- 2 pcs of A-Frame truss F-1.1 (structure is similar like F-1, but one detail is different)
- 3 pcs of A-Frame truss F-1.2 (half A-Frame truss for dormer area)
- 2 pcs of A-Frame truss F-2

NOTE! Trusses must be fixed with temporary diagonal boards. Fix diagonal boards inside of house. You can remove them after You are installed OSB sheets onto roof.



Details For A-frame trusses

| Type | Description | Count | Cut Length |
|--------|------------------|-------|------------|
| SD-5 | Truss F-1 detail | 12 | 177 3/16" |
| SD-5.1 | Truss F-1 detail | 3 | 177 3/16" |
| SD-6 | Truss F-1 detail | 27 | 200 1/8" |
| SD-6.1 | Truss F-1 detail | 3 | 92 1/16" |
| SD-7 | Truss F-1 detail | 23 | 54 9/16" |
| SD-8 | Truss F-1 detail | 13 | 89 1/8" |
| SD-8.1 | Truss F-1 detail | 3 | 84 5/8" |
| VD-1.1 | Truss F-1 detail | 4 | 47 13/16" |

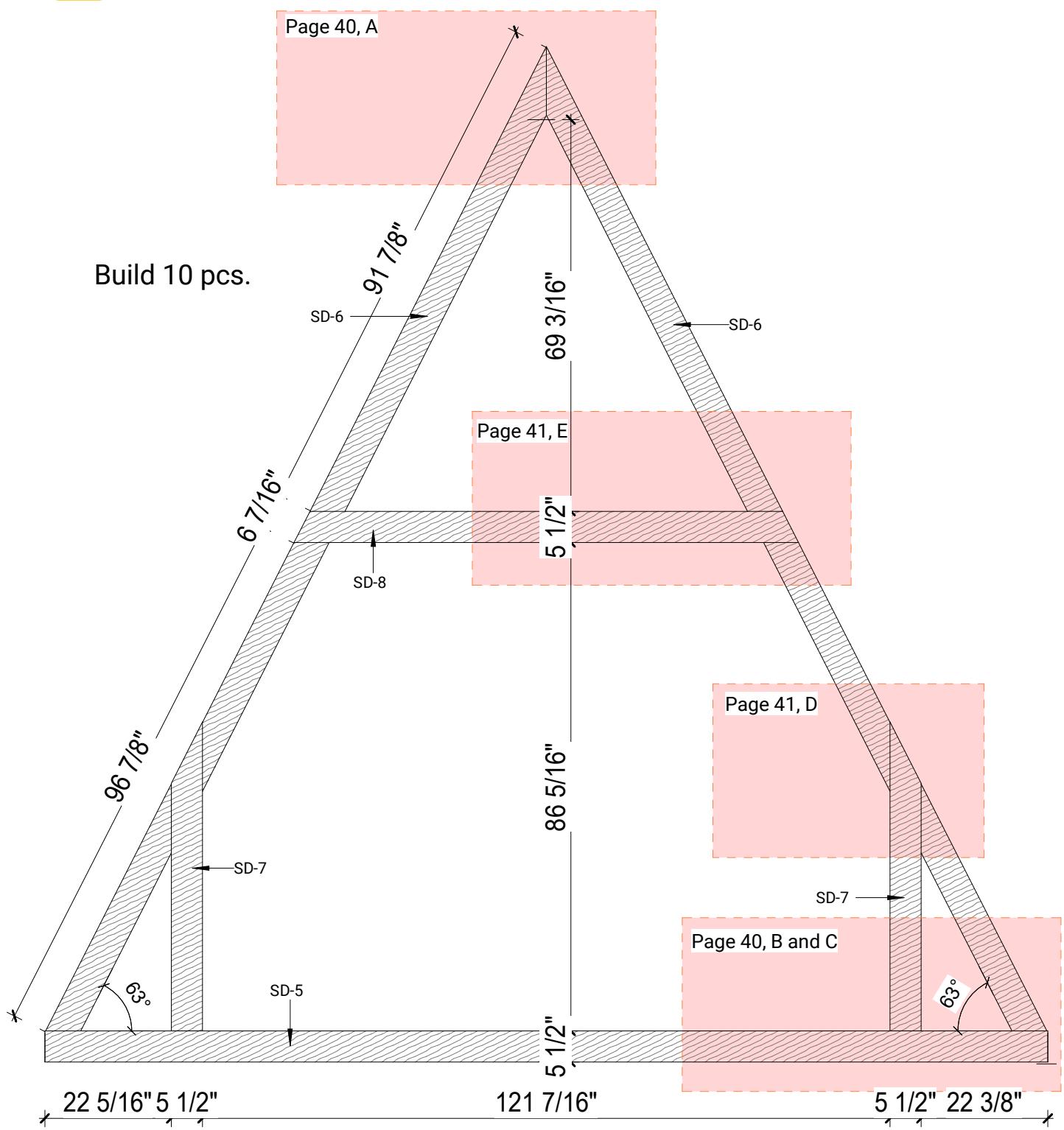
Grand total: 88



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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 38 |

8. A-frame Trusses

8.1. A-frame F-1 truss with measurements



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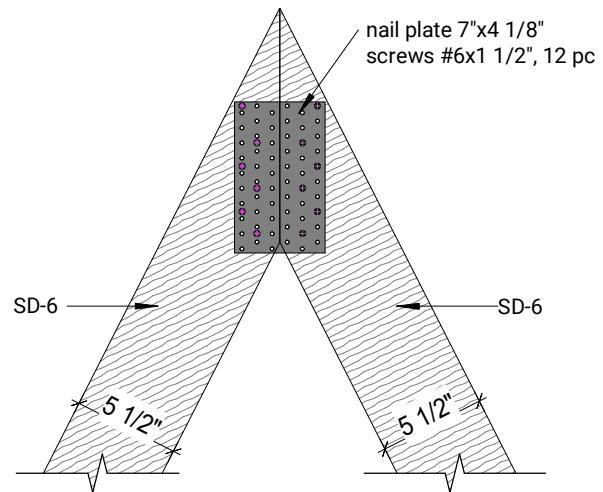
8. A-frame Trusses

8.2. Assemble the A-frame F-1 truss

A

Connecting details SD-6 (UP)

1. Connect two details SD-6 with nail plate.
2. Nail plate is only on one side.



B

Connecting details SD-5 and SD-6

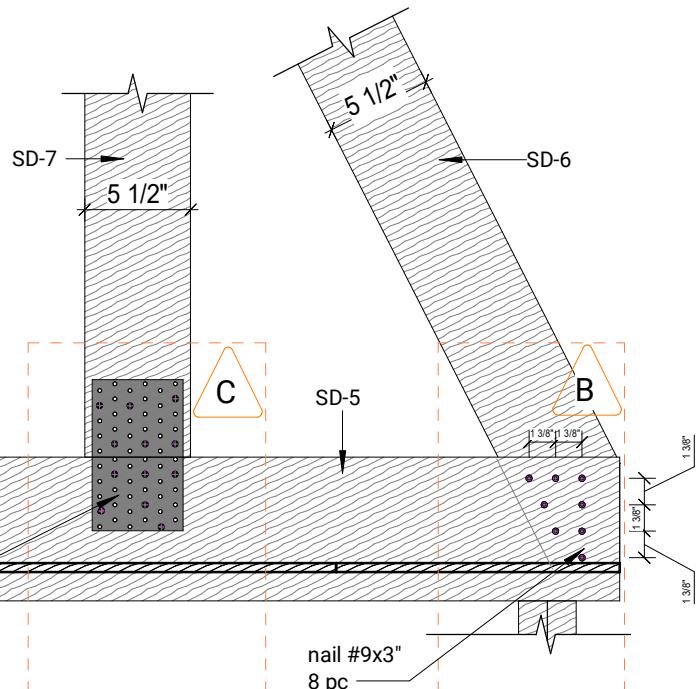
1. Connect SD-5 and SD-6 with nails #9x3".
2. Pay attention to nailing distance to wooden edges.

C

Connecting details SD-5, SD-6 and SD-7

1. Connect SD-5 and SD-6 with nails #9x3".
2. Connect SD-5 and SD-7 with nail plate.

nail plate 7"x4 1/8"
screws #6x1 1/2", 12 pc



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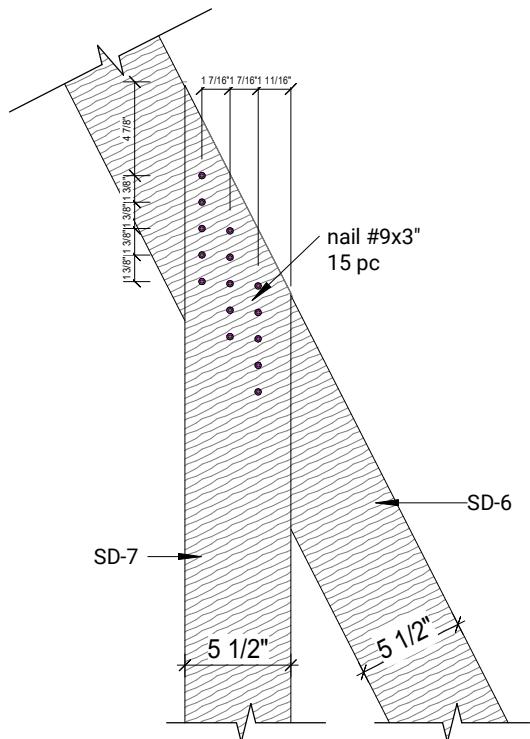
40

8. A-frame Trusses



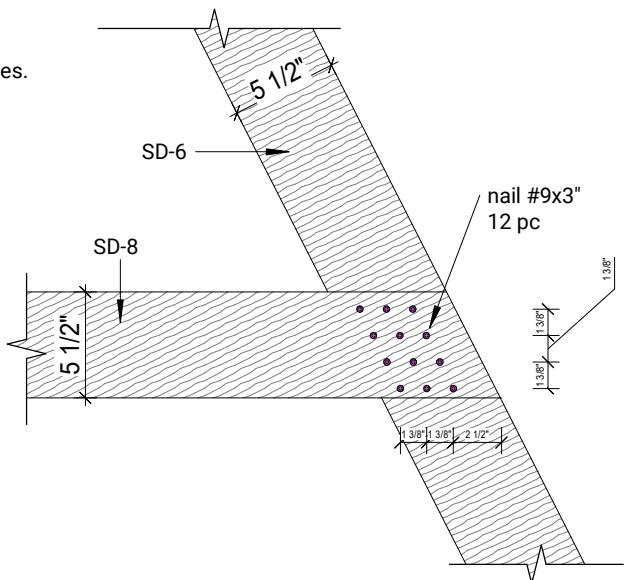
Connecting details SD-6 and SD-7

1. Connect details SD-6 and SD-7 with nails # 9x3".
2. Pay attention to nailing distance to wooden edges.



Connecting details SD-6 and SD-8

1. Connect detail SD-6 on SD-8 with 12 nails.
2. Pay attention to nailing distance to wooden edges.



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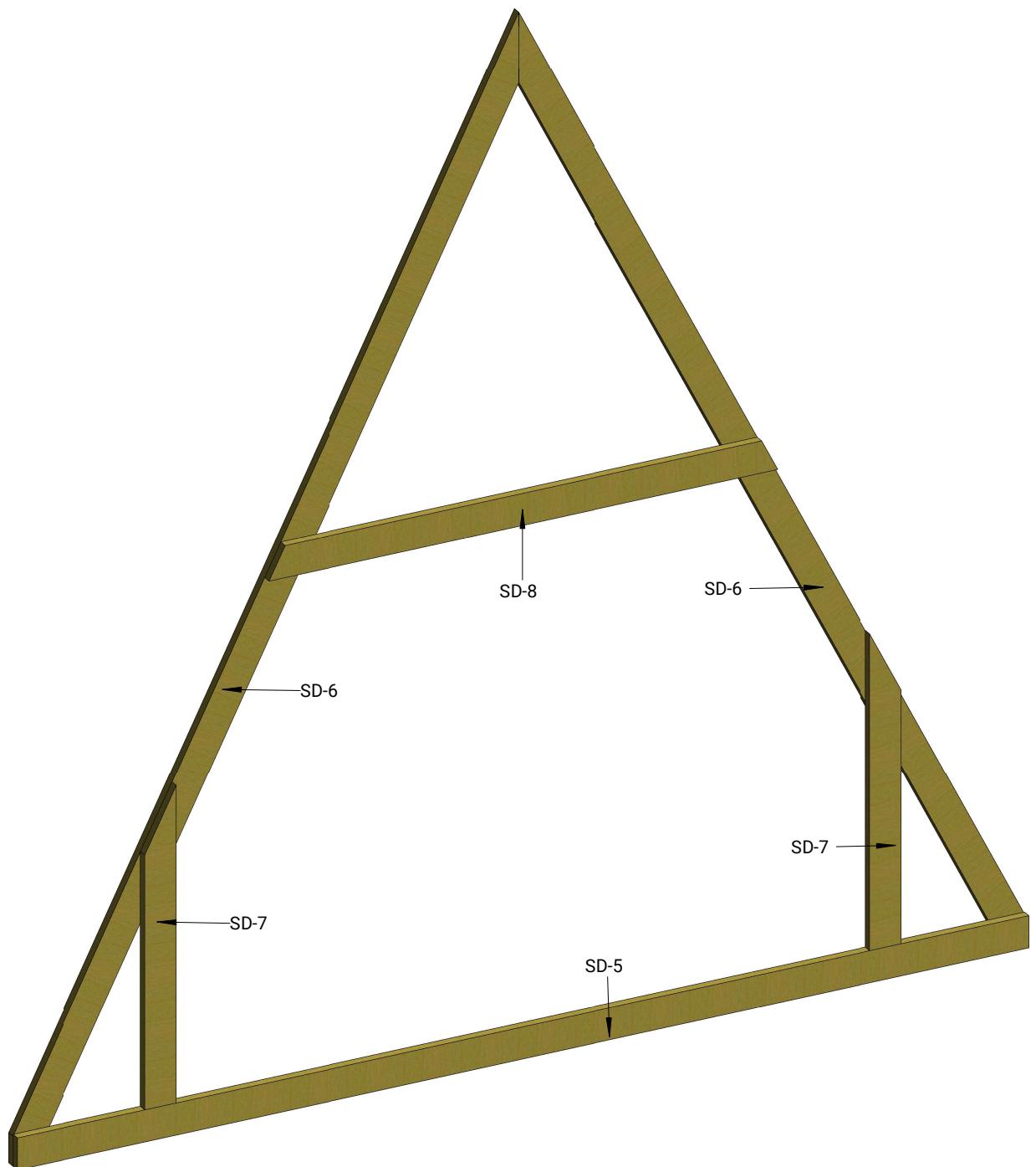
12-DEC-21

Solo+ 100 IMPERIAL

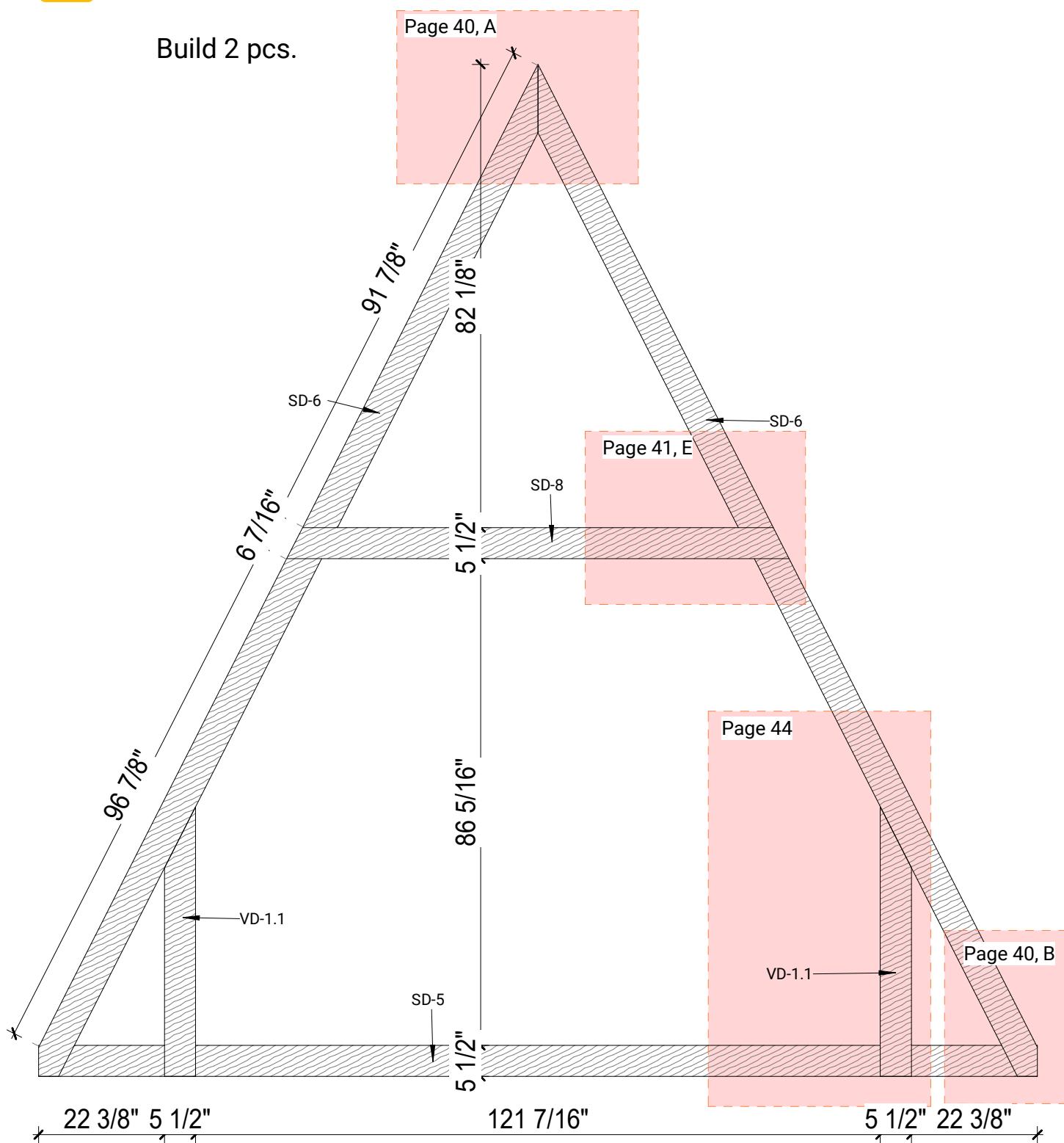
41

8.3. A-frame F-1 truss 3D view

Build 10 pcs of truss F-1.



8.4. A-frame F-1.1 truss with measurements

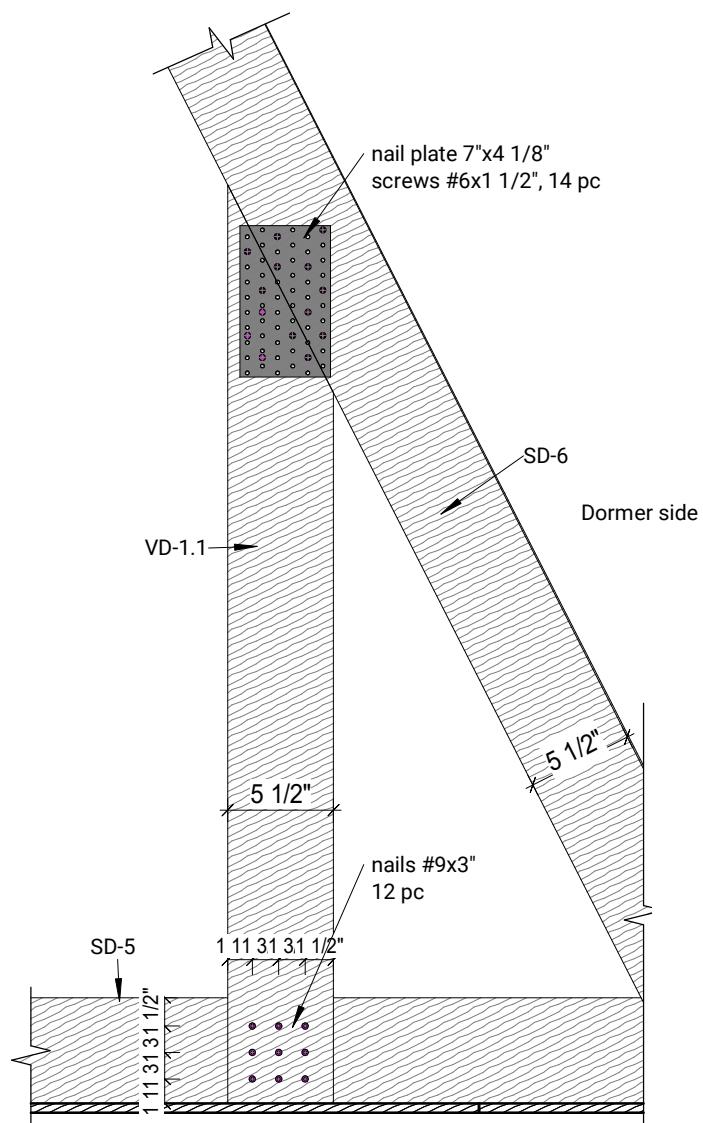


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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 43 |

8. A-frame Trusses

8.5. Assemble the A-frame F-1.1 truss

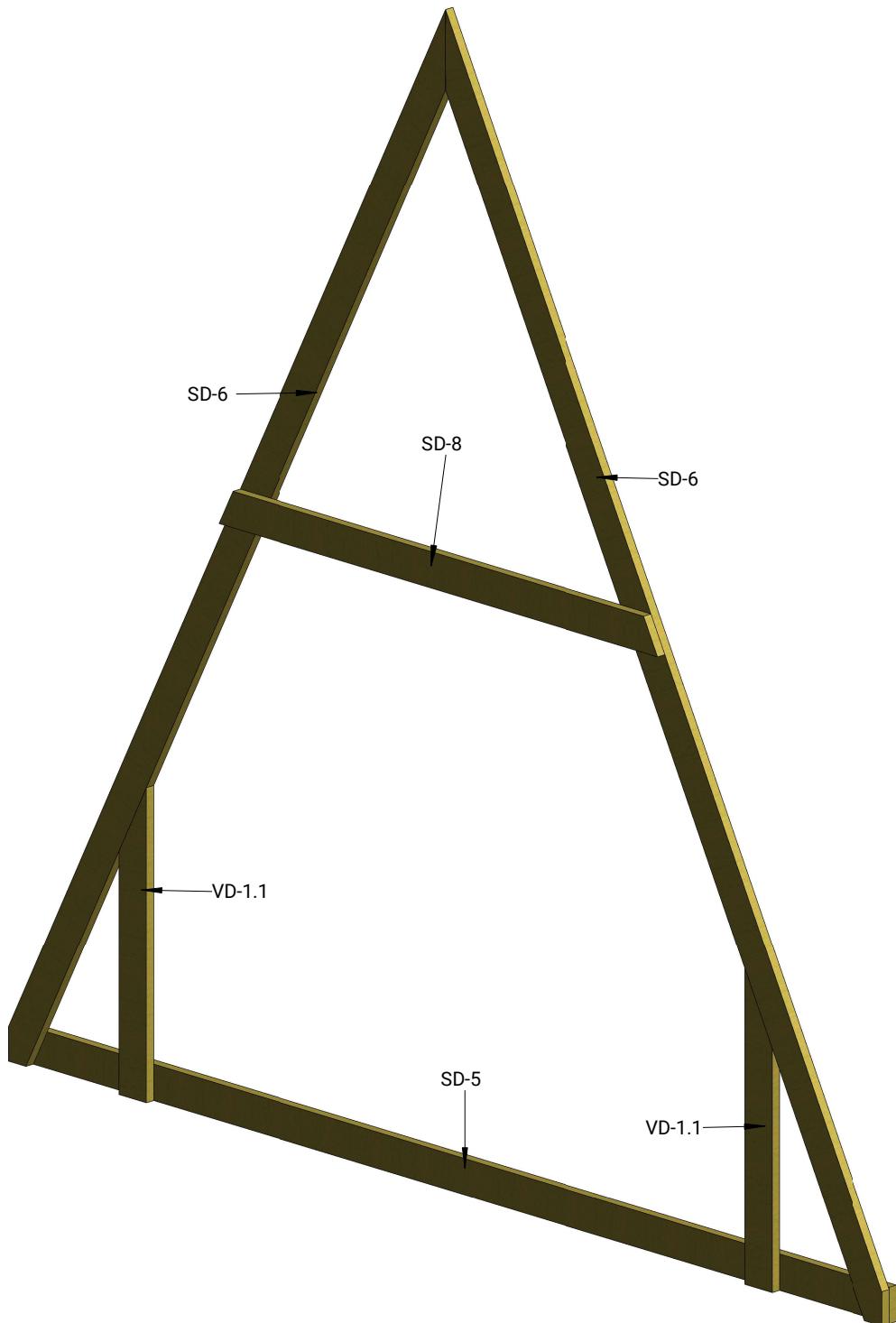
1. Connect SD-5 and VD-1.1 with nails #9x3".
2. Connect VD-1.1 and SD-6 with nail plate.



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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 44 |

8.6. A-frame F-1.1 truss 3D view

Build 2 pcs of A-Frame truss F-1.1



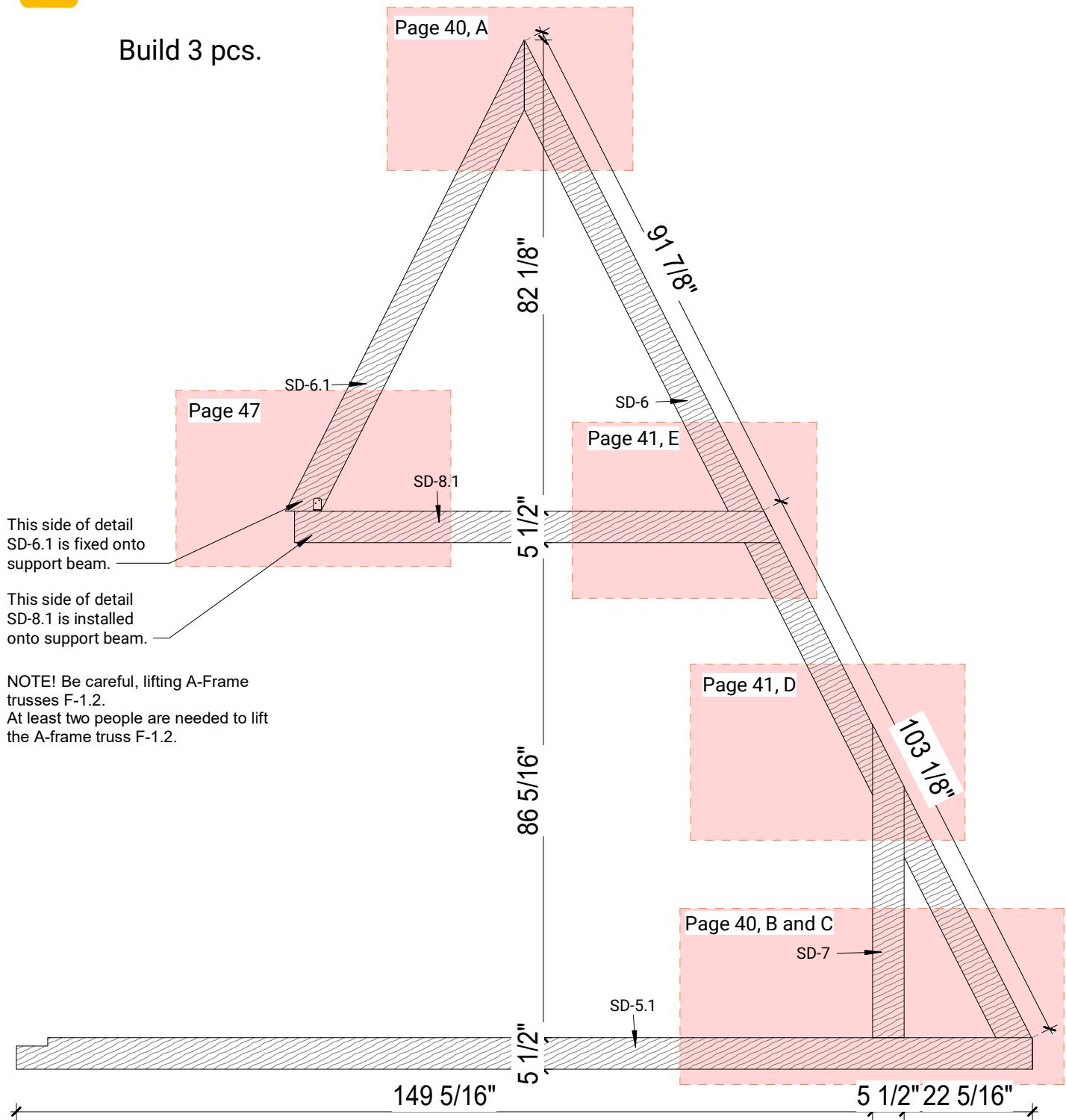
| VERSION | DATE | PROJECT | PAGE NO |
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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 45 |



8.7. A-frame F-1.2 truss with measurements



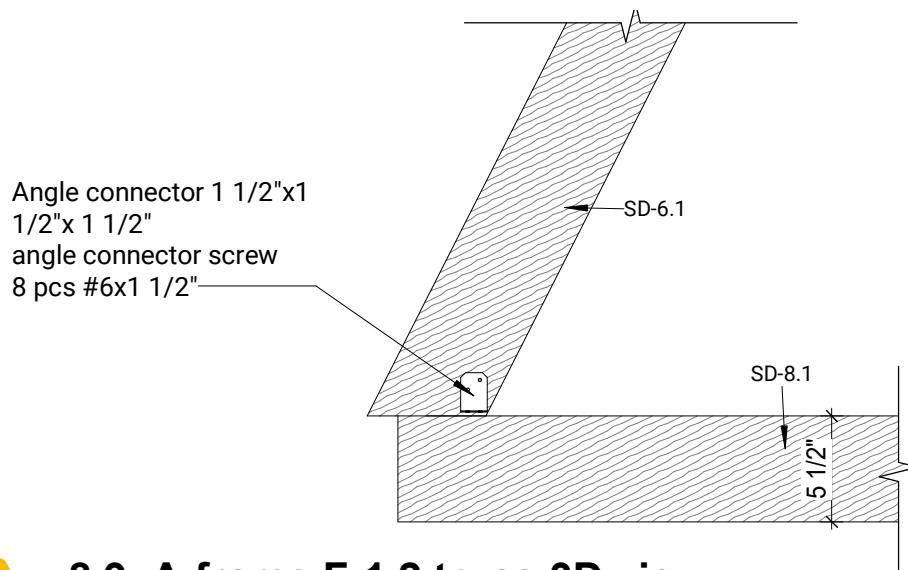
Build 3 pcs.



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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 46 |

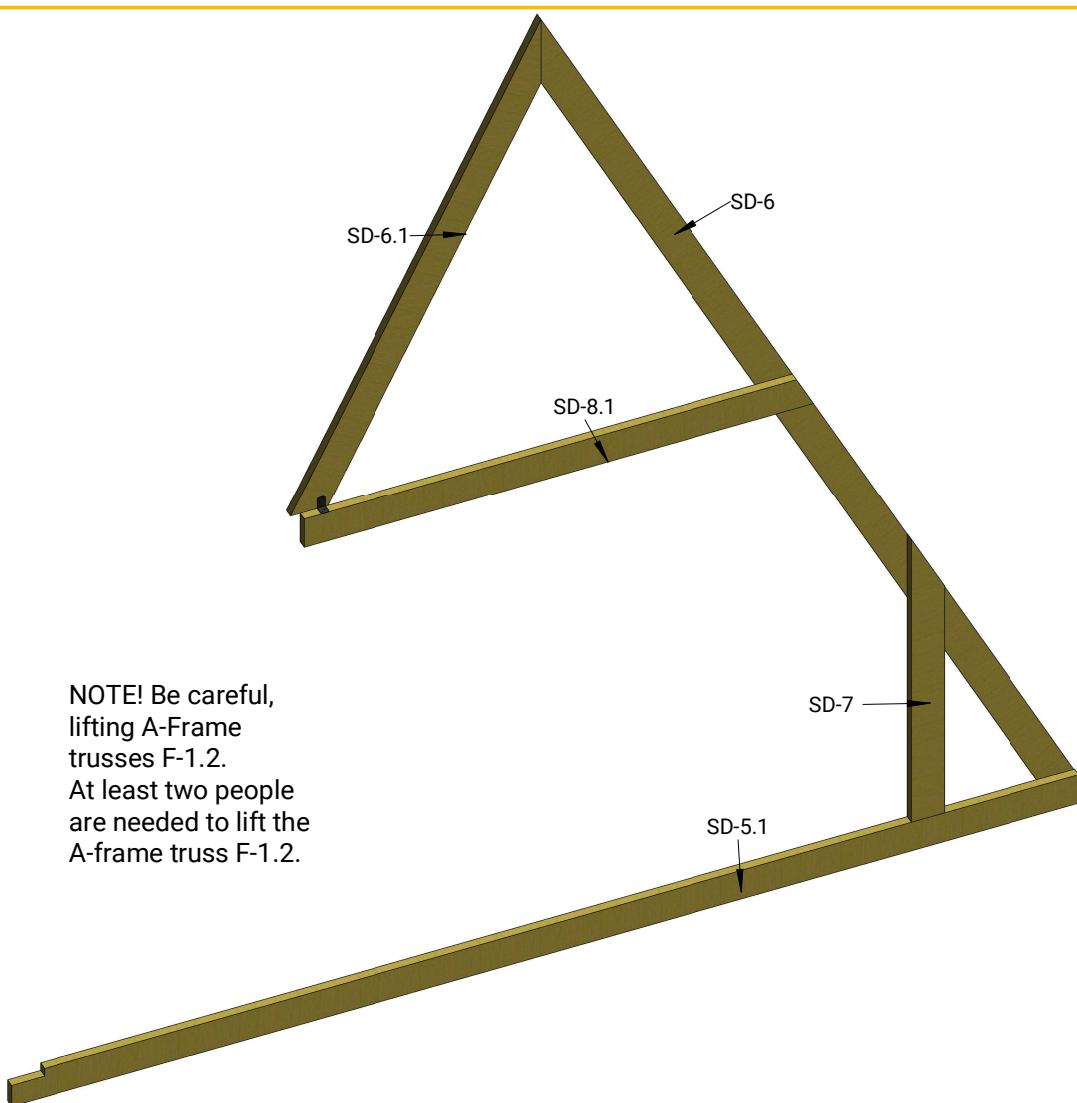


8.8. Assemble the A-frame F-1.2 truss



8.9. A-frame F-1.2 truss 3D view

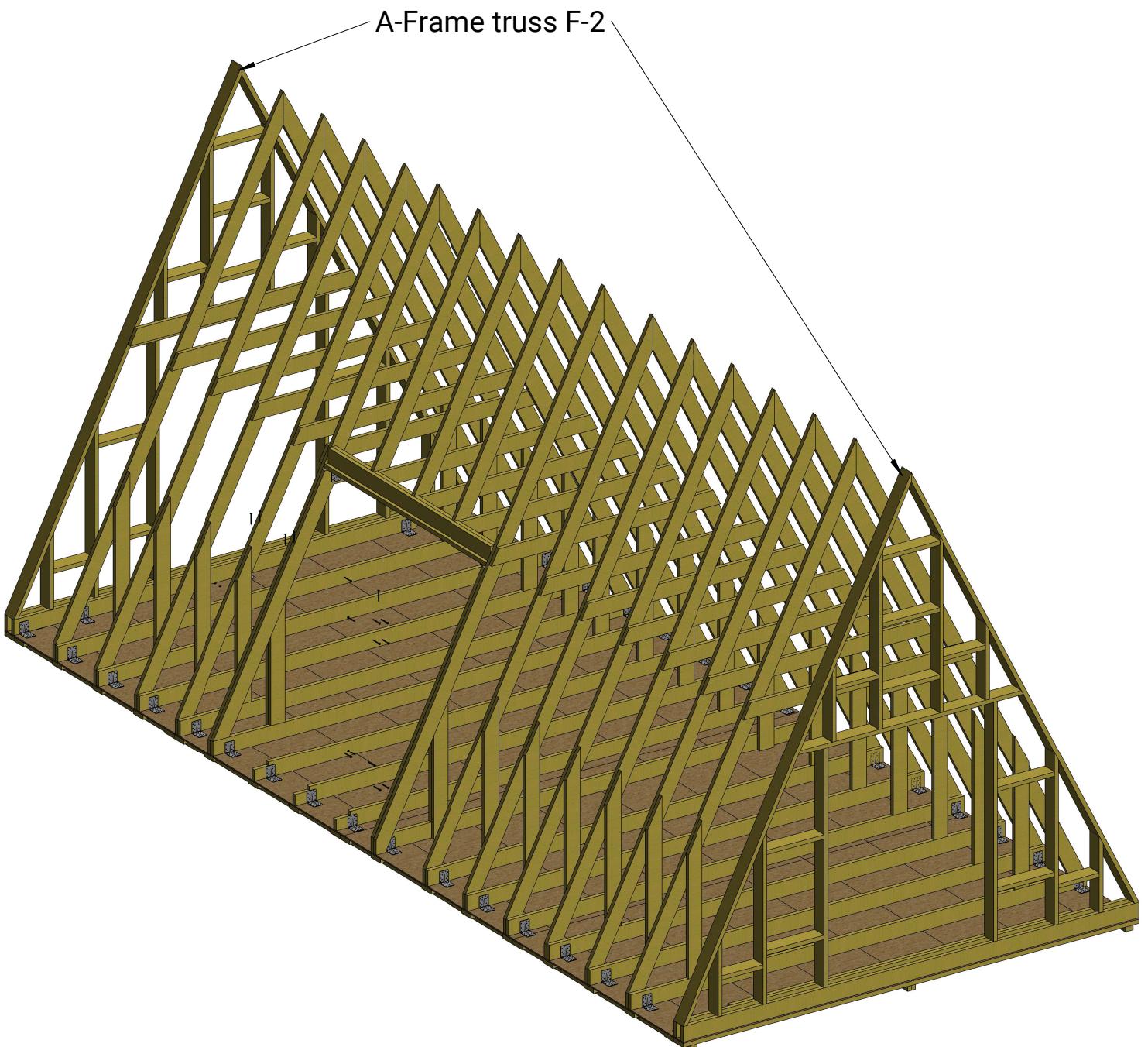
NOTE! Be careful,
lifting A-Frame
trusses F-1.2.
At least two people
are needed to lift the
A-frame truss F-1.2.



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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 47 |



8.10. A-frame F-2 truss 3D view



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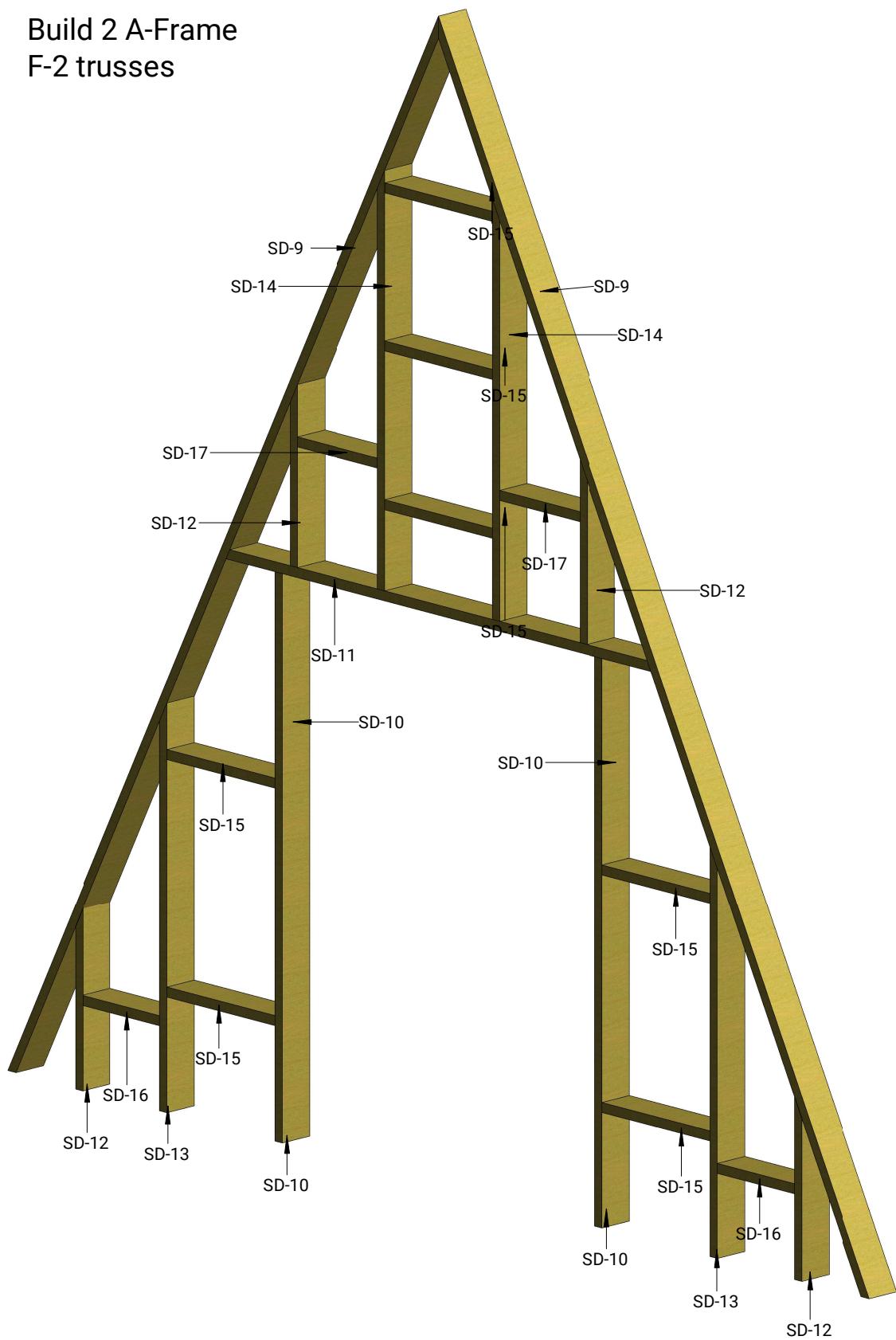
12-DEC-21

Solo+ 100 IMPERIAL

48

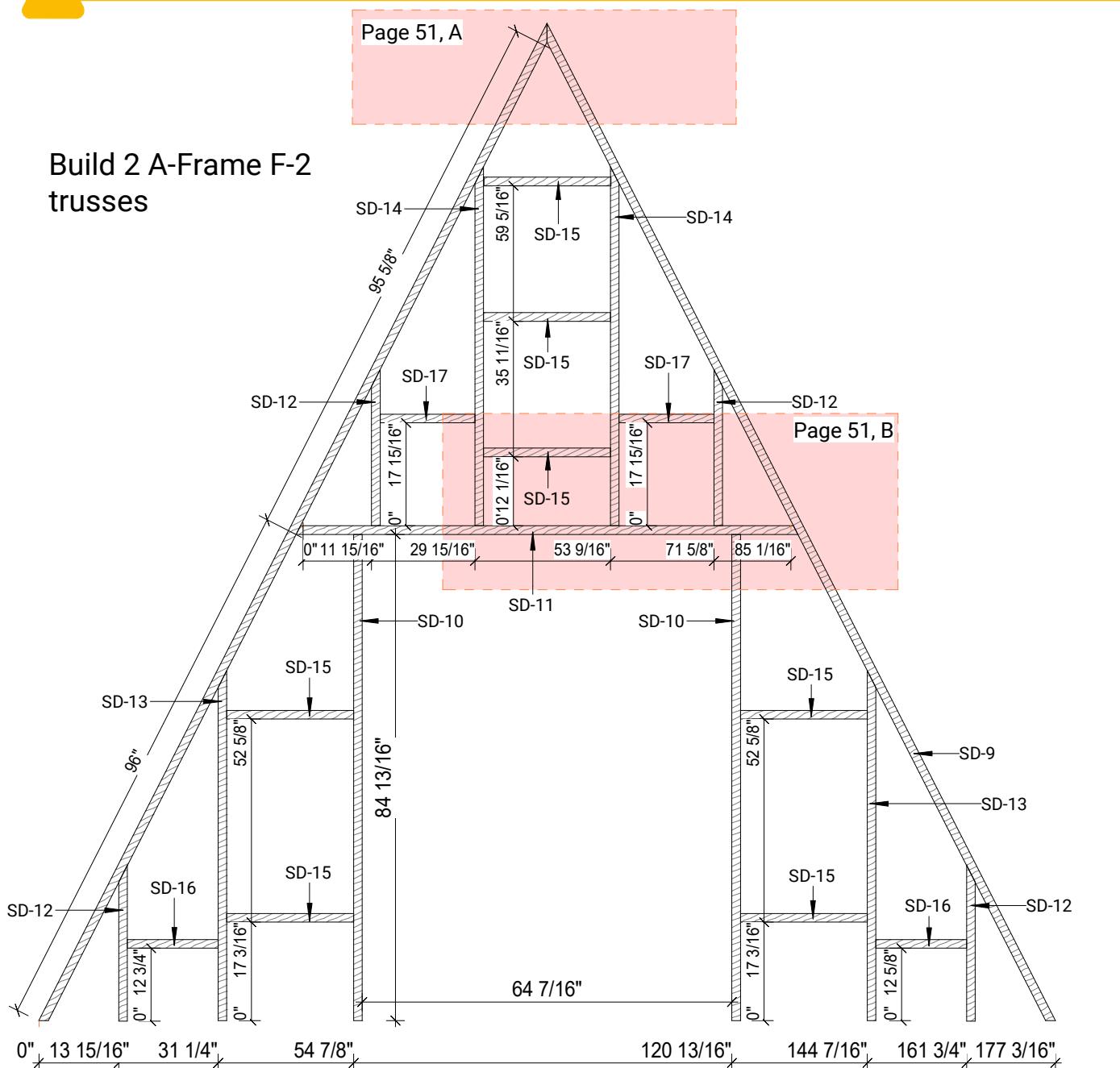
8.11. A-frame F-2 truss details

Build 2 A-Frame F-2 trusses



8. A-frame Trusses

8.12. A-frame F-2 truss with measurements



8.12. Details for A-frame trusses F-2

| Type | Description | Count | Cut Length |
|-------|-------------|-------|------------|
| SD-9 | Truss F-2 | 4 | 195 3/16" |
| SD-10 | Truss F-2 | 4 | 84 13/16" |
| SD-11 | Truss F-2 | 2 | 87 7/16" |
| SD-12 | Truss F-2 | 8 | 27 1/4" |
| SD-13 | Truss F-2 | 4 | 61 1/16" |
| SD-14 | Truss F-2 | 4 | 62 5/8" |
| SD-15 | Truss F-2 | 14 | 22 1/8" |
| SD-16 | Truss F-2 | 4 | 15 13/16" |
| SD-17 | Truss F-2 | 4 | 16 9/16" |

Grand total: 48

| VERSION | DATE | PROJECT | PAGE NO |
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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 50 |

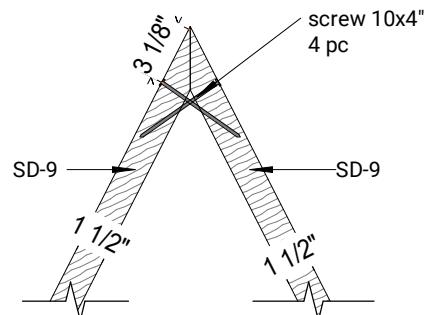
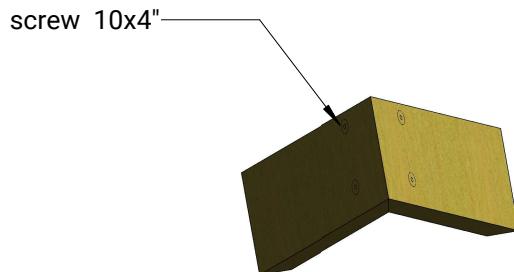
8. A-frame Trusses

8.13. Assemble the A-frame F-2 truss

A

Connecting details SD-9 (UP)

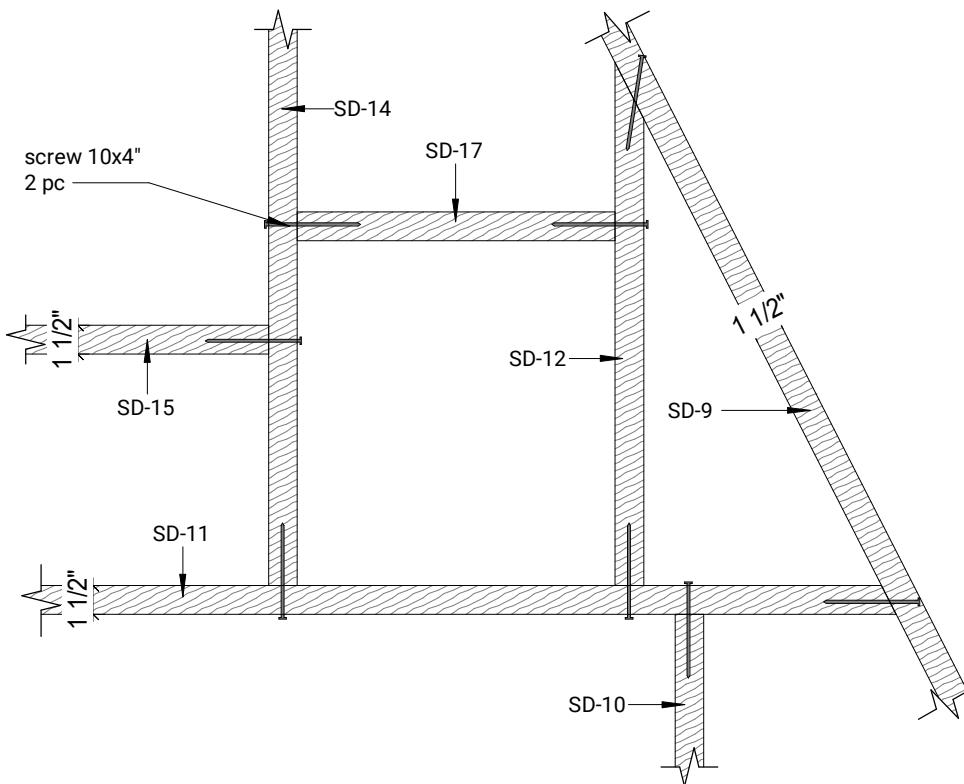
1. Connect two details SD-9 with screws 10x4".
2. Use 4 screws, 2 screws for each detail.



B

Connecting details (posts, horizontal)

1. Connect all details of A-Frame truss F-2 like shown on drawing.
2. All joints need at least 2 screws, 10x4".
3. Every detail must be fixed with 4 screws.



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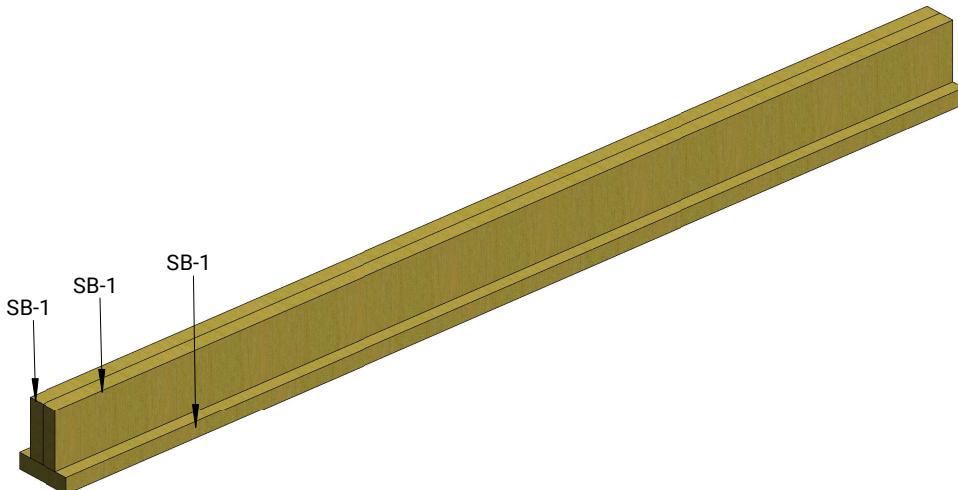
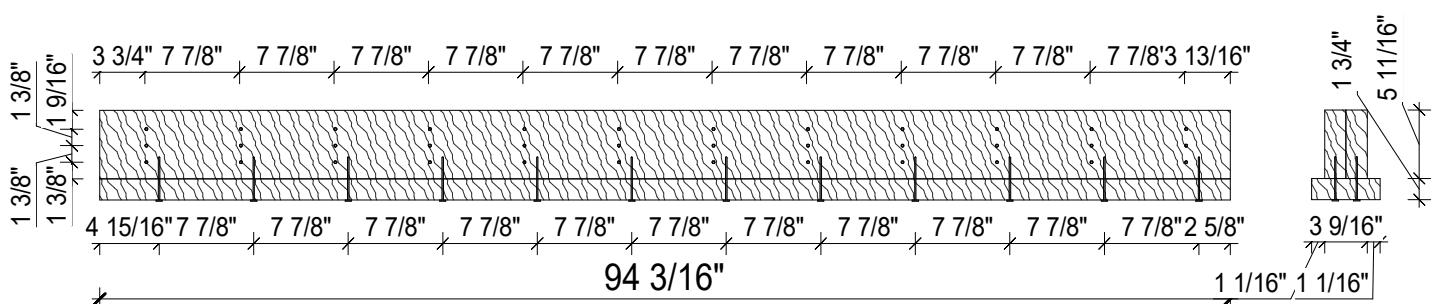
12-DEC-21

Solo+ 100 IMPERIAL

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9.1. Assemble the support beam



9.1. Details for support beam building

| Type | Description | Count | Cut Length |
|------|--------------|-------|------------|
| SB-1 | Support beam | 3 | 94 3/16" |

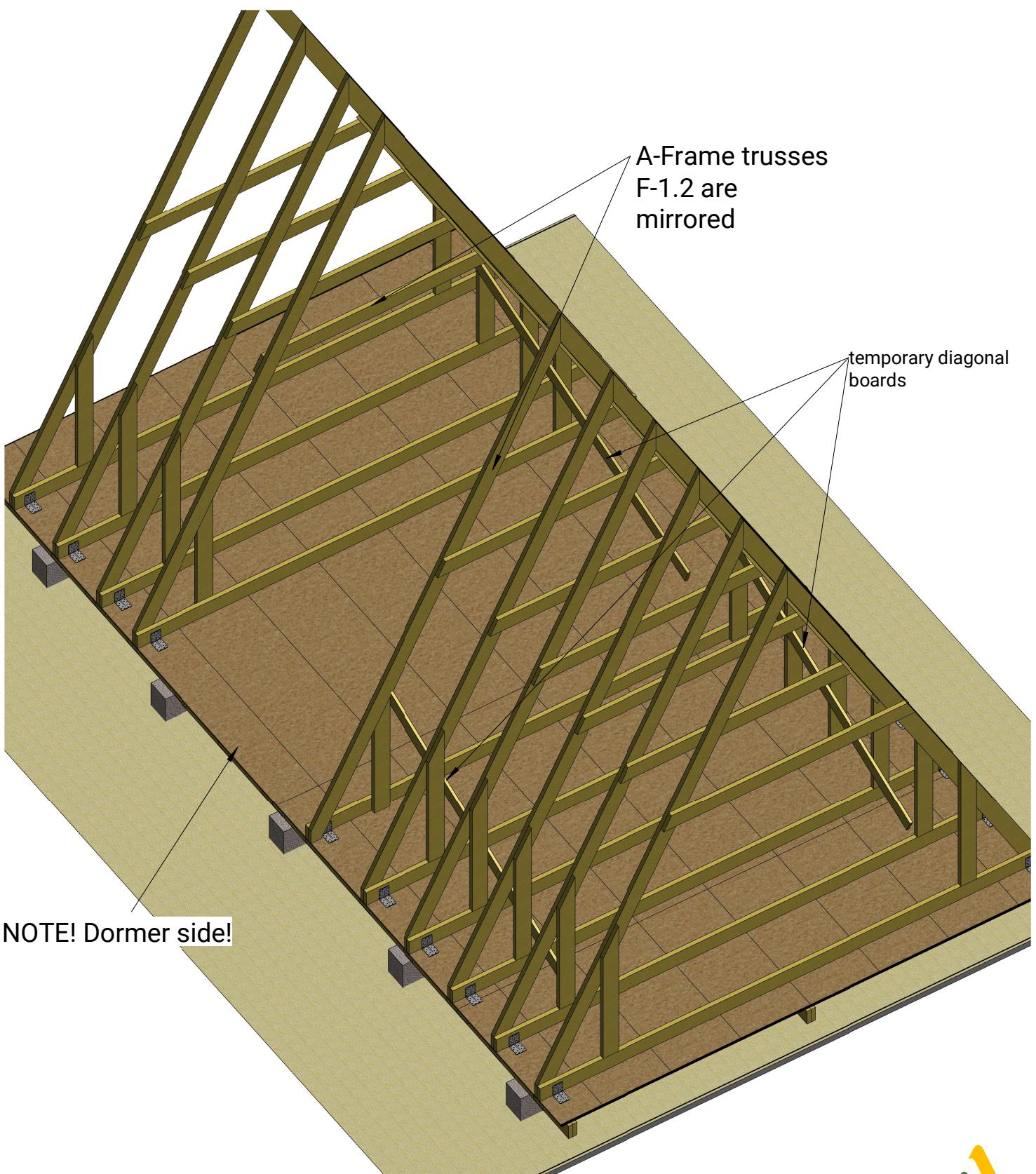
Grand total: 3



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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 52 |

10. Installing A-Frames

10.1. Installing A-frame F-1 trusses



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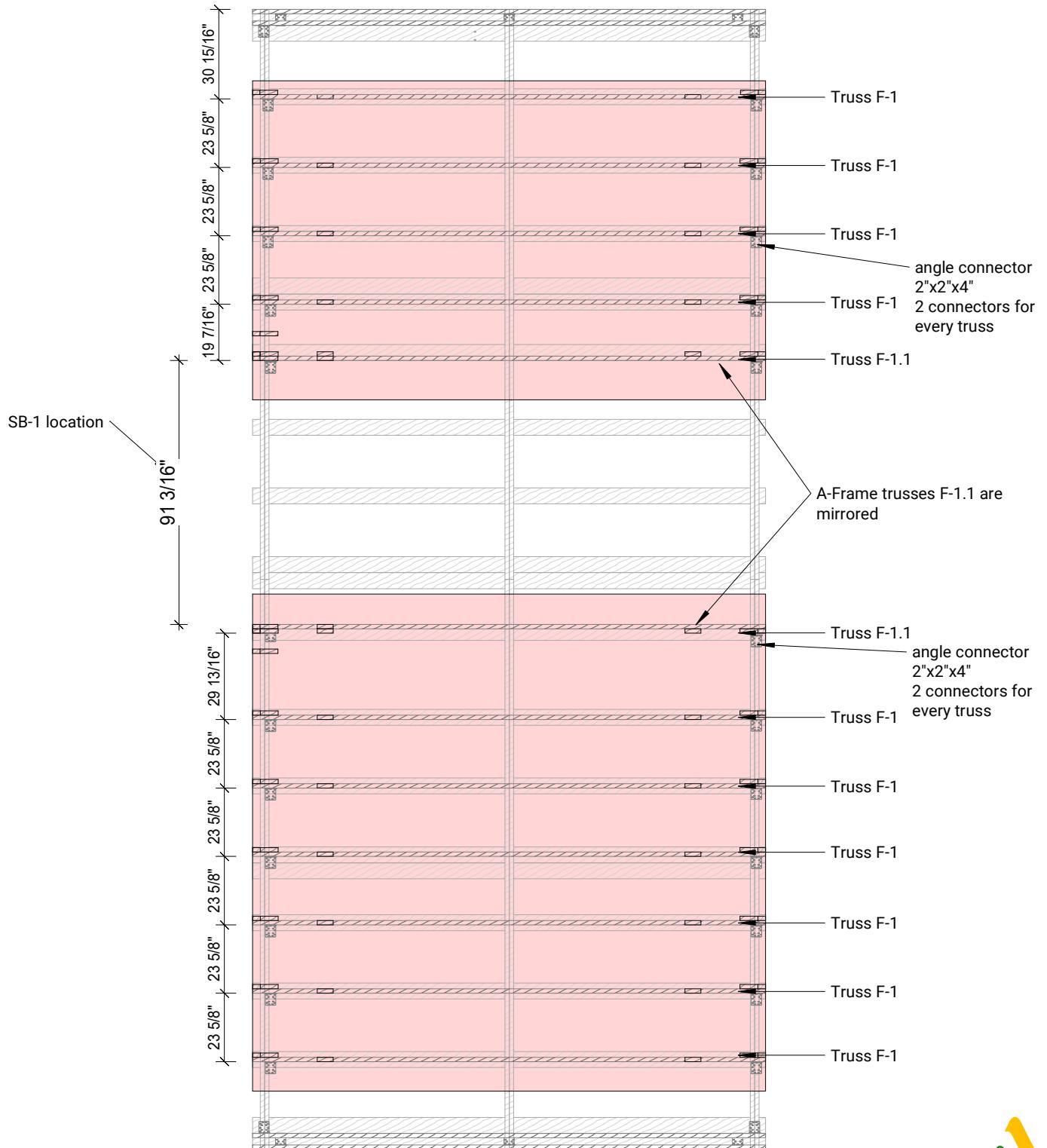
Solo+ 100 IMPERIAL

53

10. Installing A-Frames

10.2. A-frame F-1 trusses layout plan with measurements

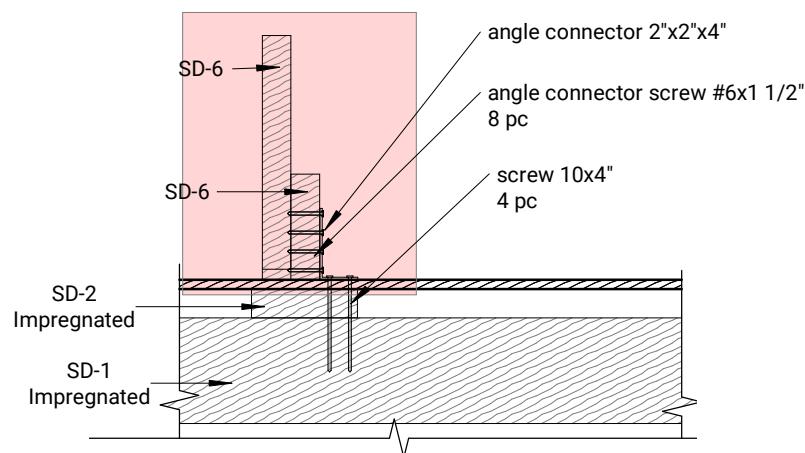
Install A-Frame trusses F-1 (10pcs) and F-1.1(2 pcs).
NOTE! Measure SB-1 beam location.



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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 54 |



10.3. Connecting A-frame F-1 trusses to underfloor

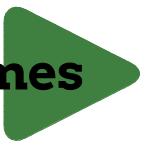


NOTE! Every truss must be located above the detail SD-2!



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|------------|------------------|---------------------------|-----------|
| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 55 |

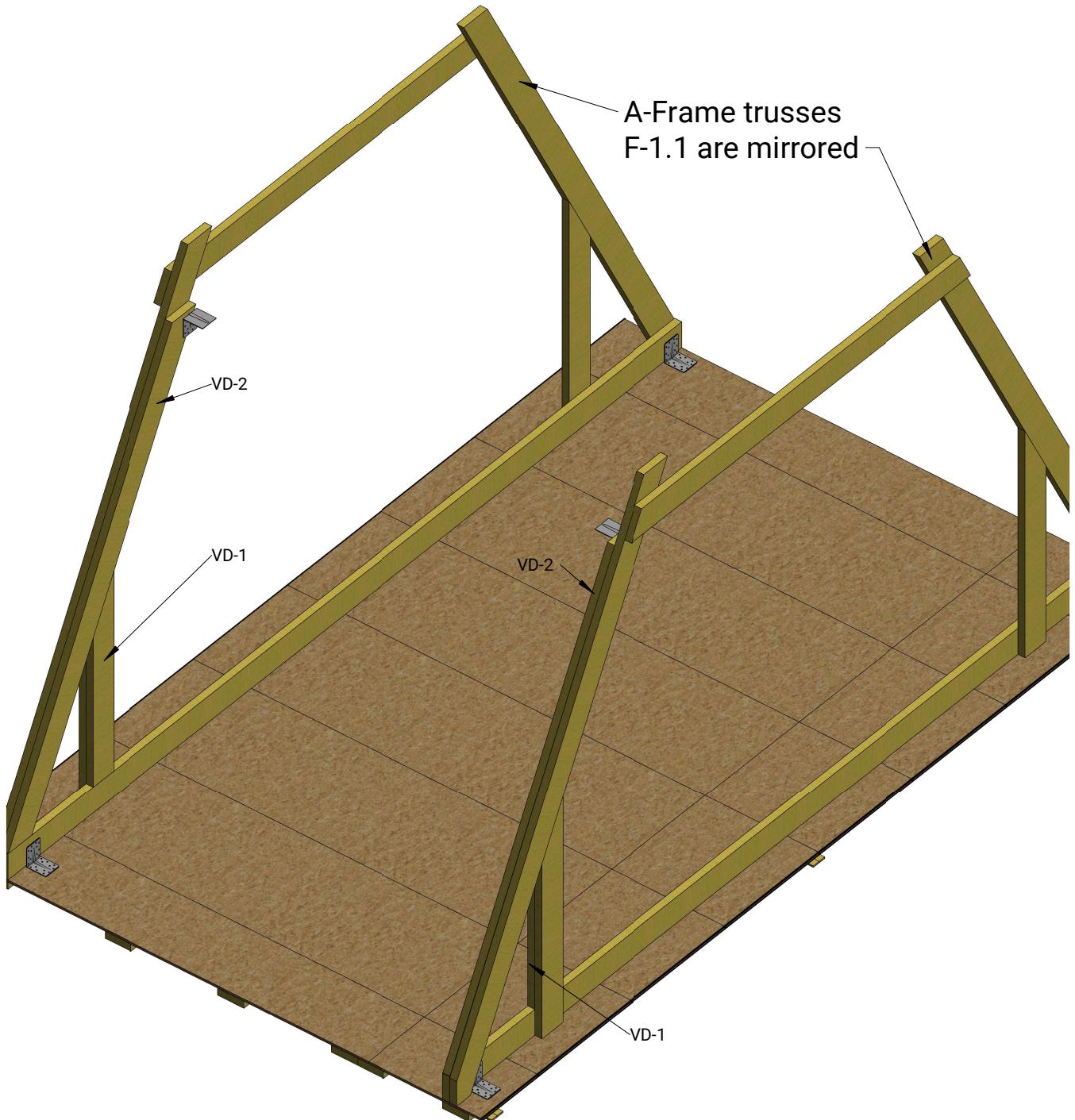
10. Installing A-Frames



10.4. Installing details VD-1 and VD-2



1. Measure the distance between A-Frame trusses F-1.1.
2. Install details VD-1 on the dormer side to the A-Frame truss F-1.1, fix details with nails #9x3".
3. Install details VD-2 on the dormer side to the A-Frame truss F-1.1, fix details with nails #9x3".
4. Fix angle connectors as shown on 3d picture and on the next page.



10.4. Details for support beam installing

| Type | Description | Count | Cut Length |
|------|-----------------------------|-------|------------|
| VD-1 | Support beam install detail | 2 | 42 7/16" |
| VD-2 | Support beam install detail | 2 | 98" |

Grand total: 4



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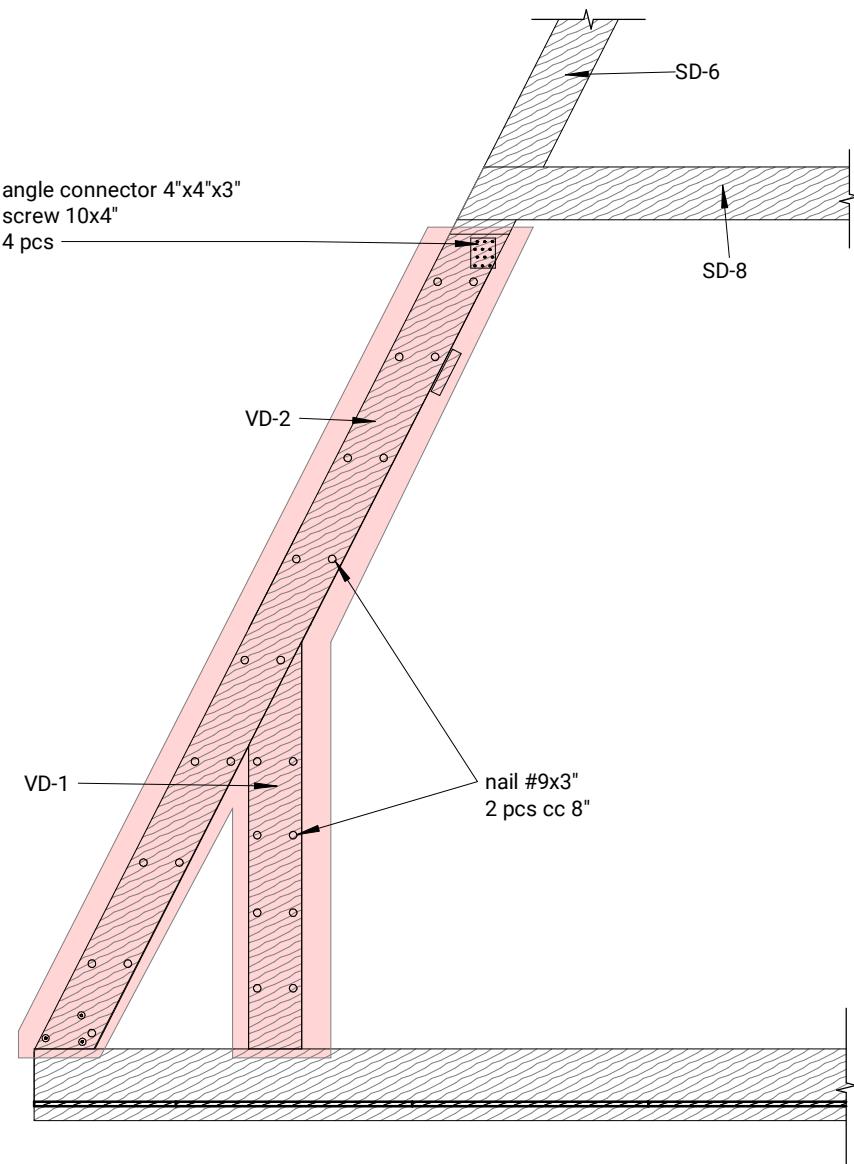
Solo+ 100 IMPERIAL

56

10. Installing A-Frames

10.5. Connecting details for Support Beam

1. Install details VD-1 on the dormer side to the A-Frame truss F-1.1, fix details with nails #9x3".
2. Install details VD-2 on the dormer side to the A-Frame truss F-1.1, fix details with nails #9x3".
3. Fix angle connectors 4"x4"x4".

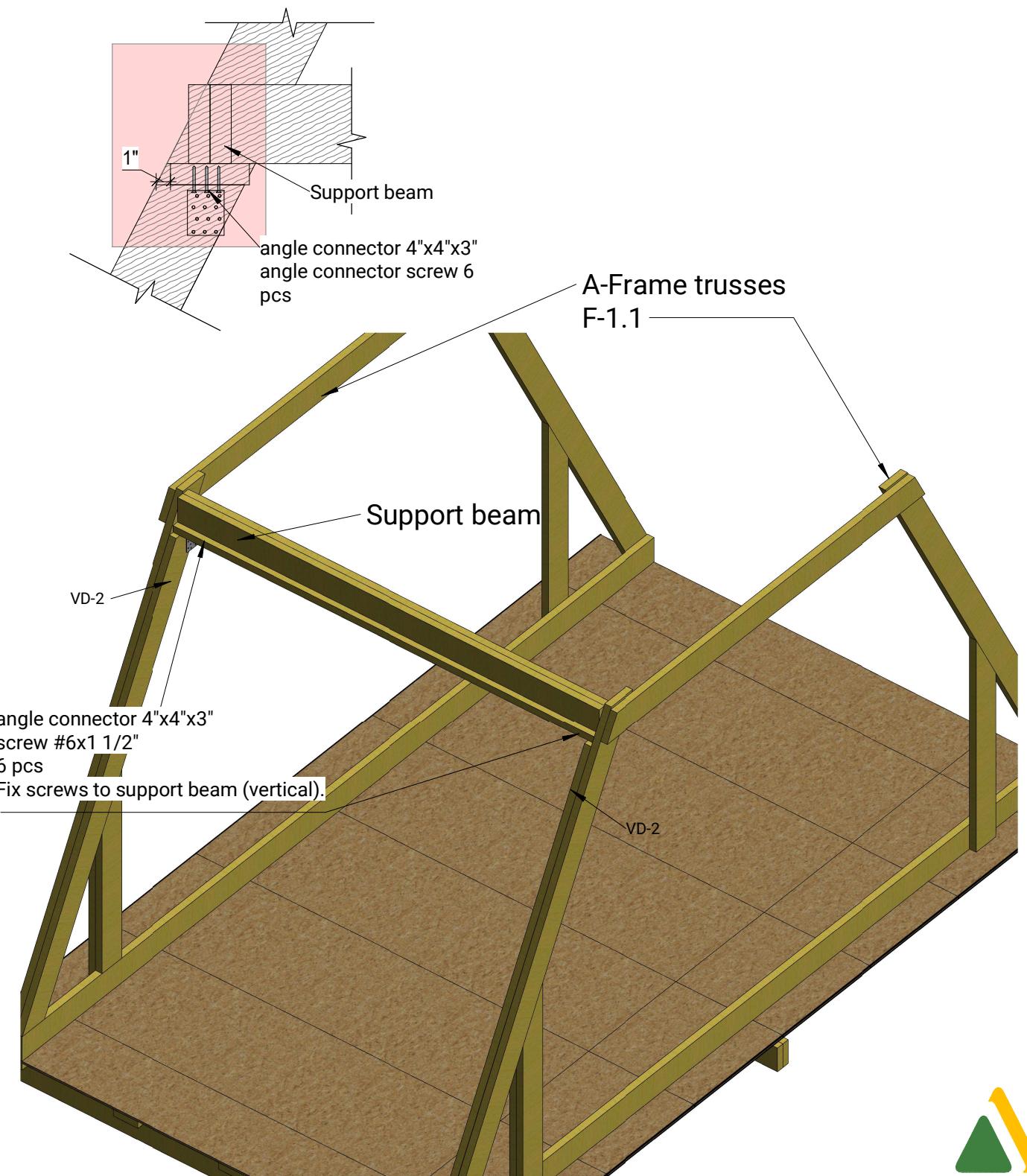


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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 57 |

10. Installing A-Frames

10.6. Connecting the Support Beam

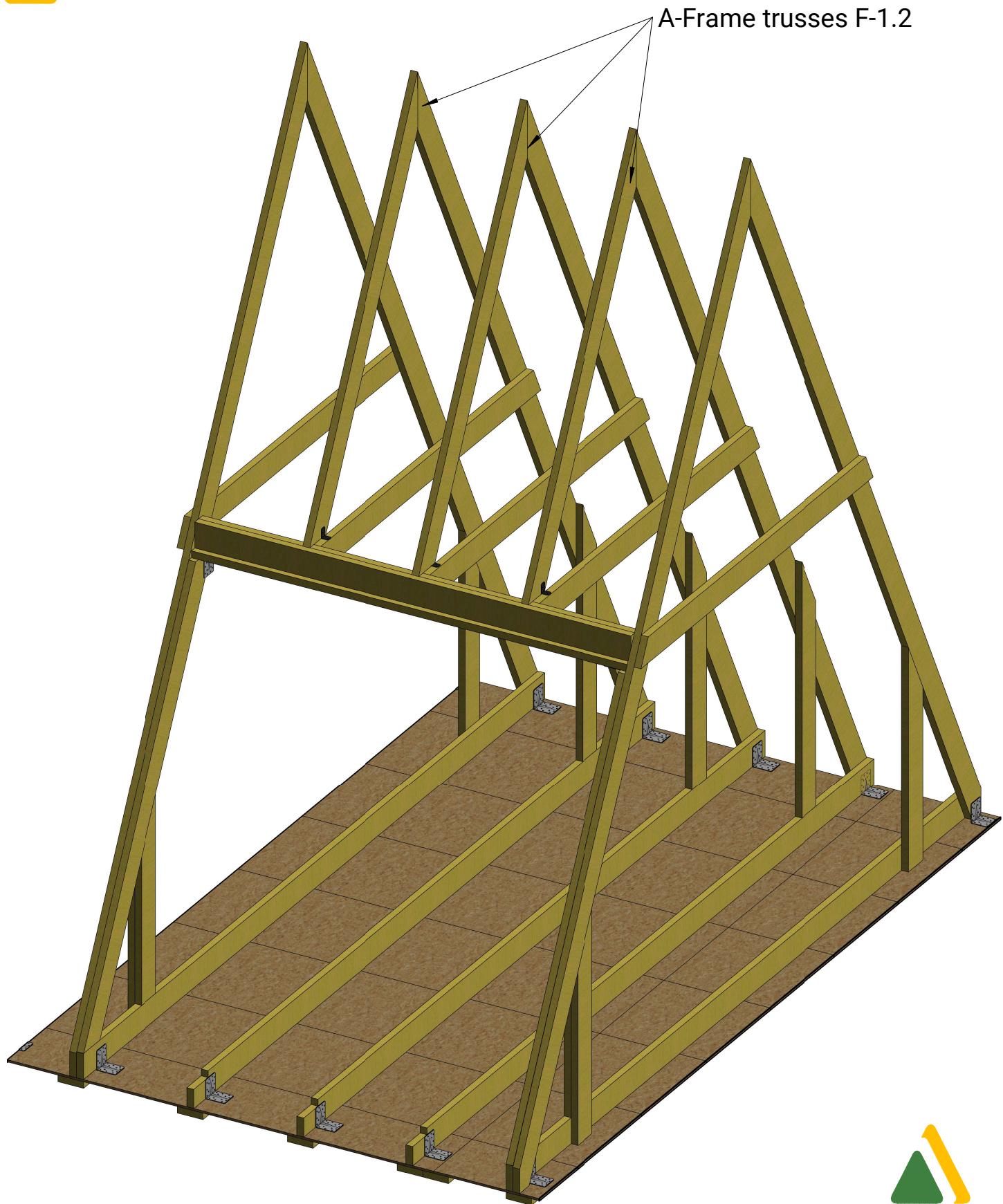
1. Lift support beam onto details VD-2 and angle connectors.
2. Measure location of support beam.
3. Fix support beam with angle connector screws #6x1 1/2".



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10. Installing A-Frames

10.7. Installing A-frame F-1.2 trusses



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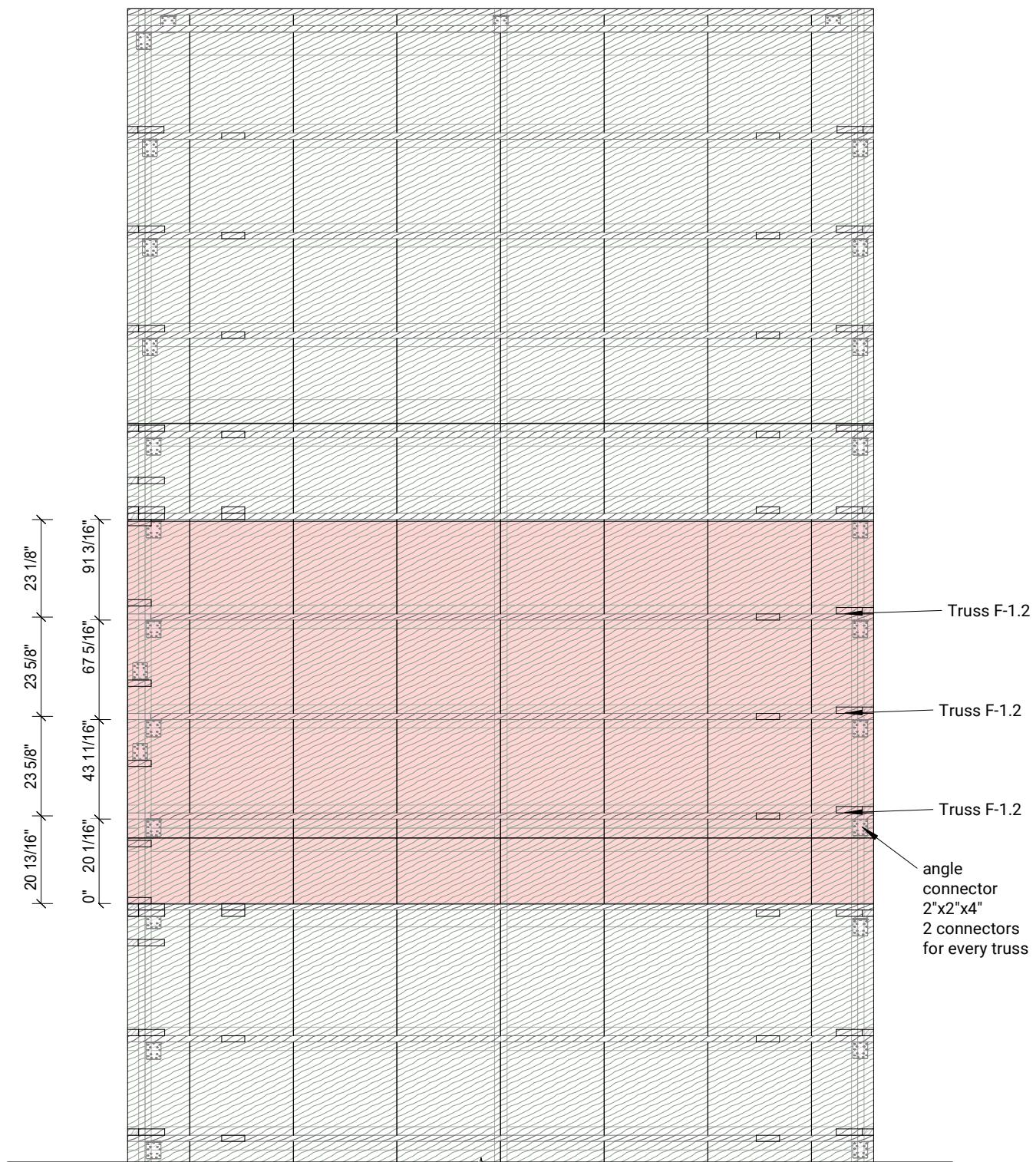
12-DEC-21

Solo+ 100 IMPERIAL

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10. Installing A-Frames

10.8. A-frame F-1.2 trusses layout plan with measurements



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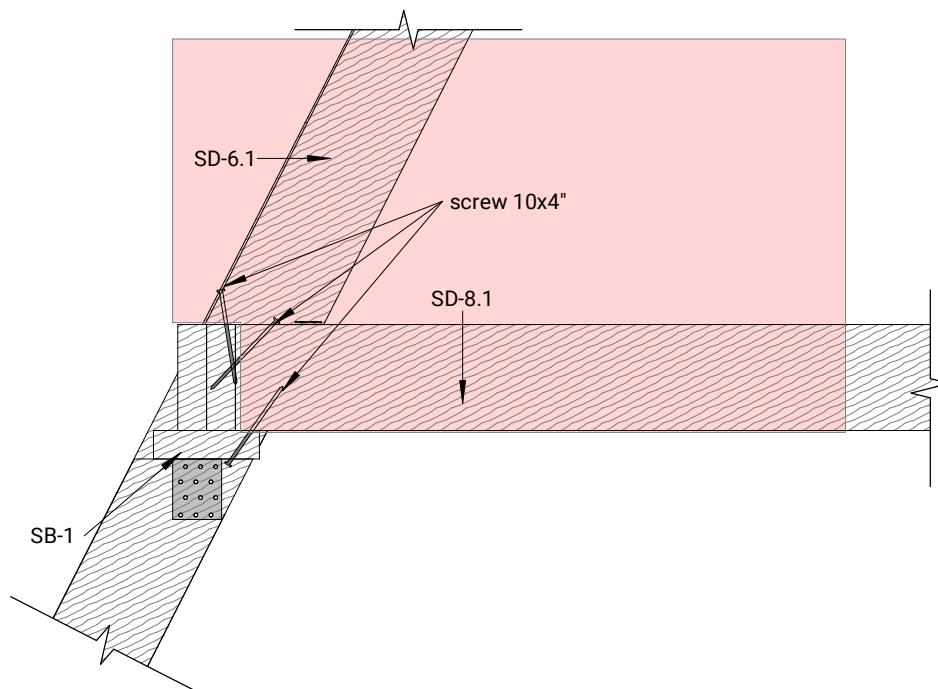
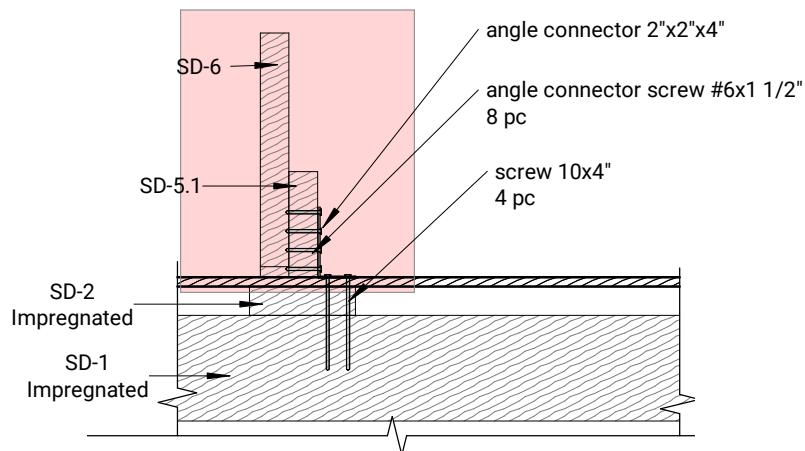
60

10. Installing A-Frames



10.9. Connecting A-frame F-1.2 trusses to underfloor

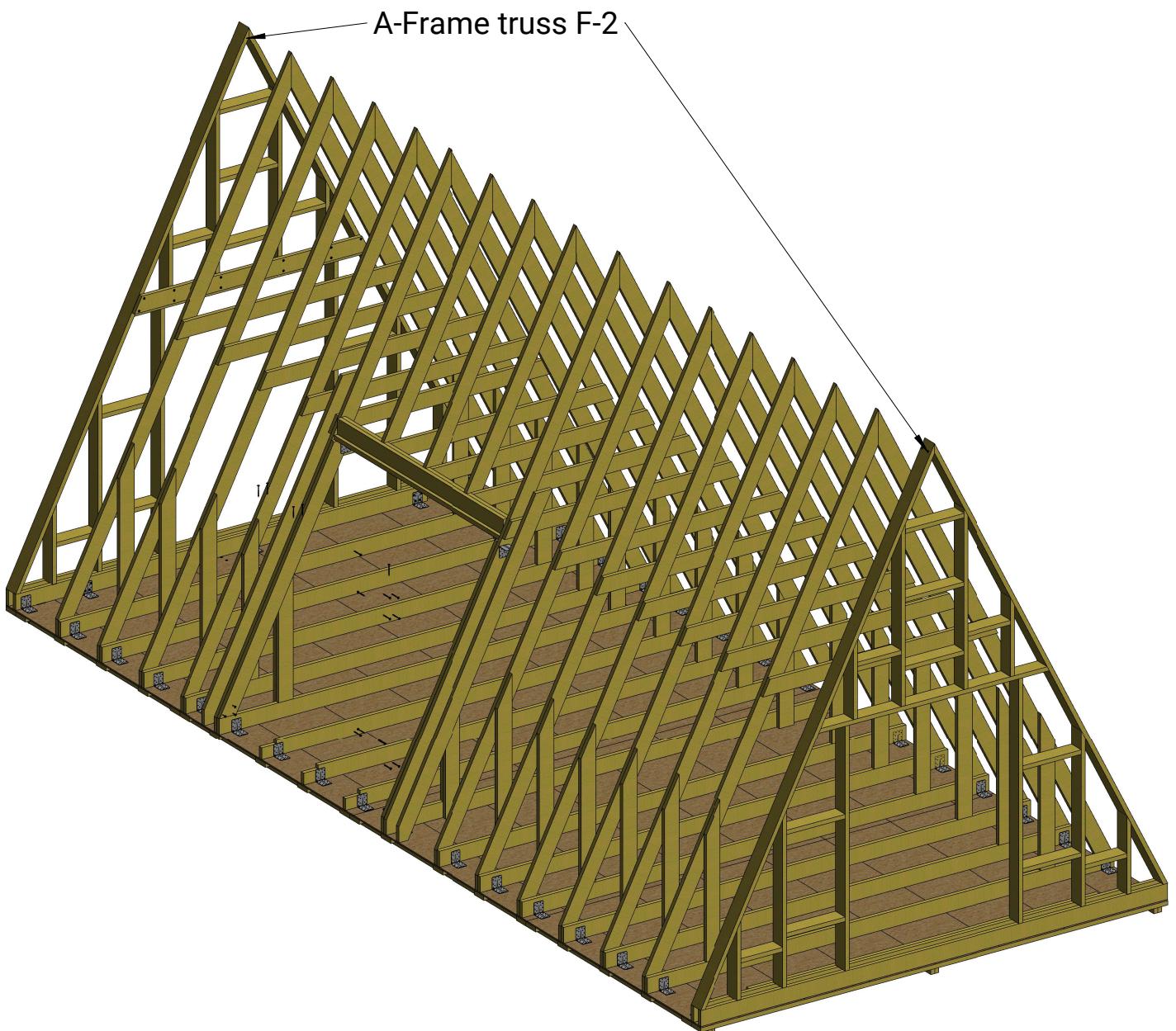
1. Measure A-Frame trusses F-1.2 locations.
2. Lift A-Frame trusses onto support beam.
3. Fix A-Frame trusses onto foundation with angle connectors and screws.
4. Fix A-Frame trusses onto support beam with screws (3 screws to each truss).



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10. Installing A-Frames

10.10. Installing A-frame F-2 trusses



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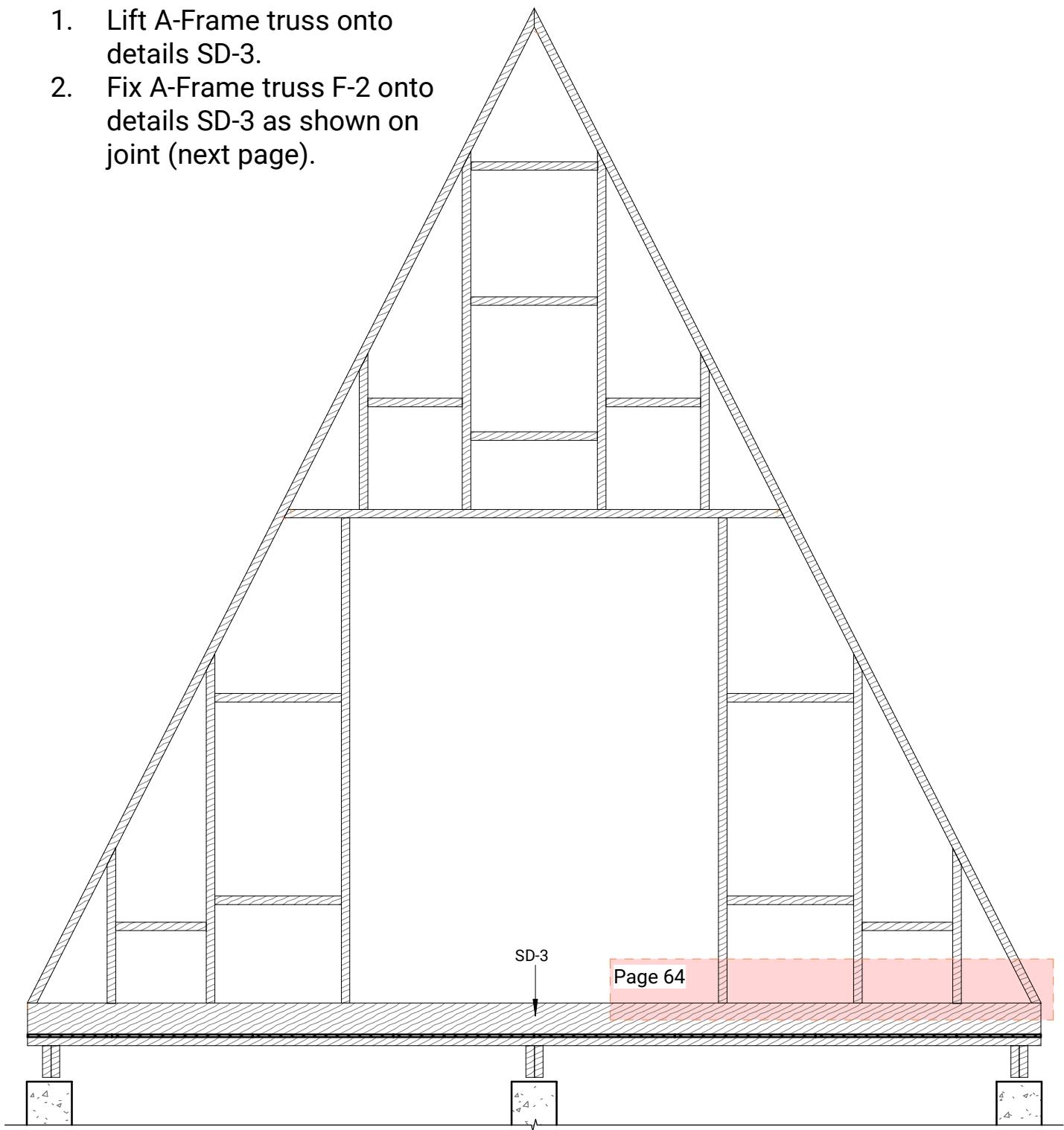
Solo+ 100 IMPERIAL

62

10. Installing A-Frames

10.11. Installing the A-frame F-2 trusses to SD-4

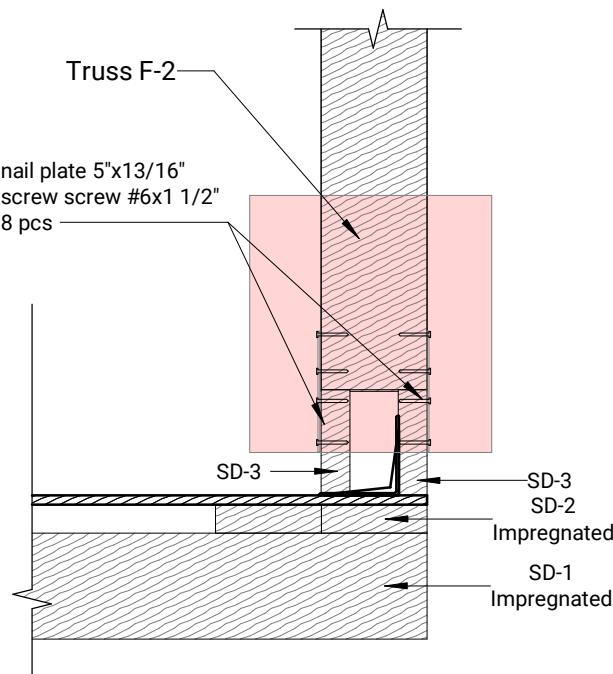
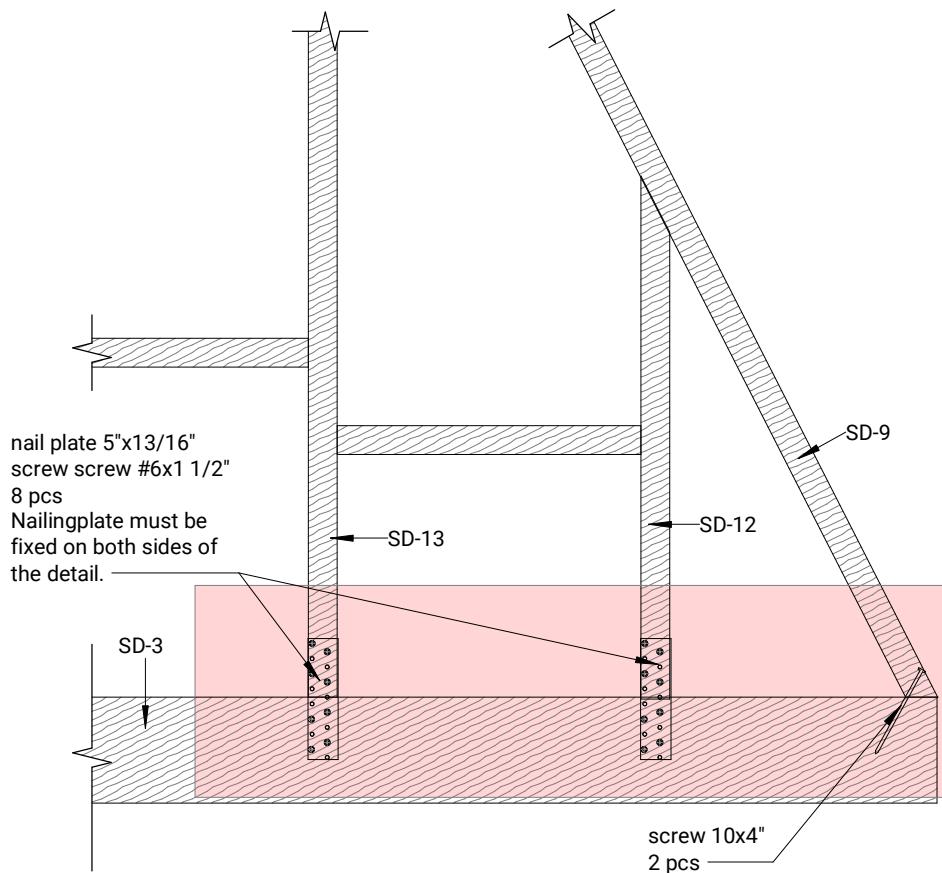
1. Lift A-Frame truss onto details SD-3.
2. Fix A-Frame truss F-2 onto details SD-3 as shown on joint (next page).



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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 63 |

10. Installing A-Frames

10.12. Connecting the A-frame F-2 trusses

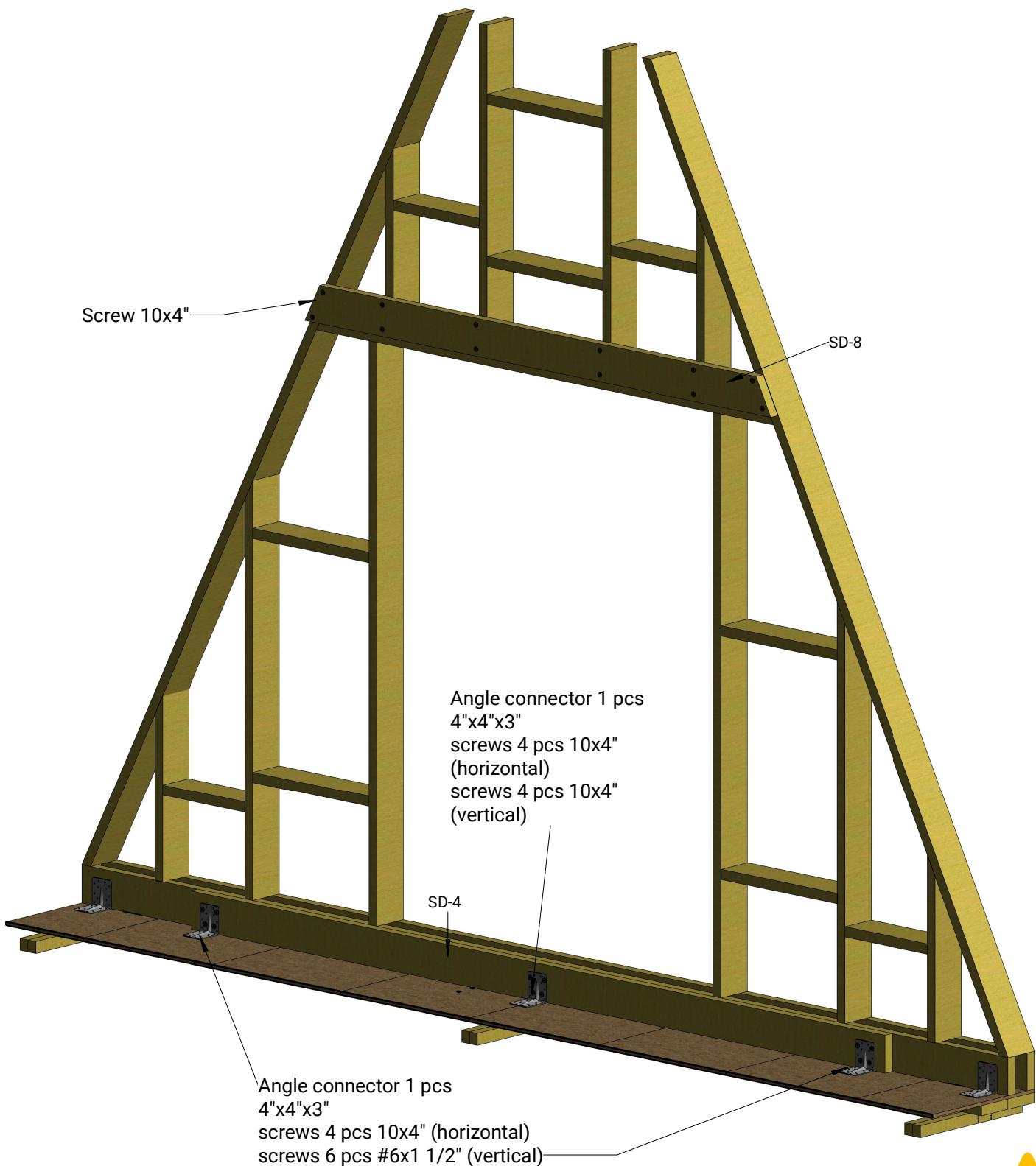


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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 64 |

10. Installing A-Frames

10.13. Details SD-4 and SD-8

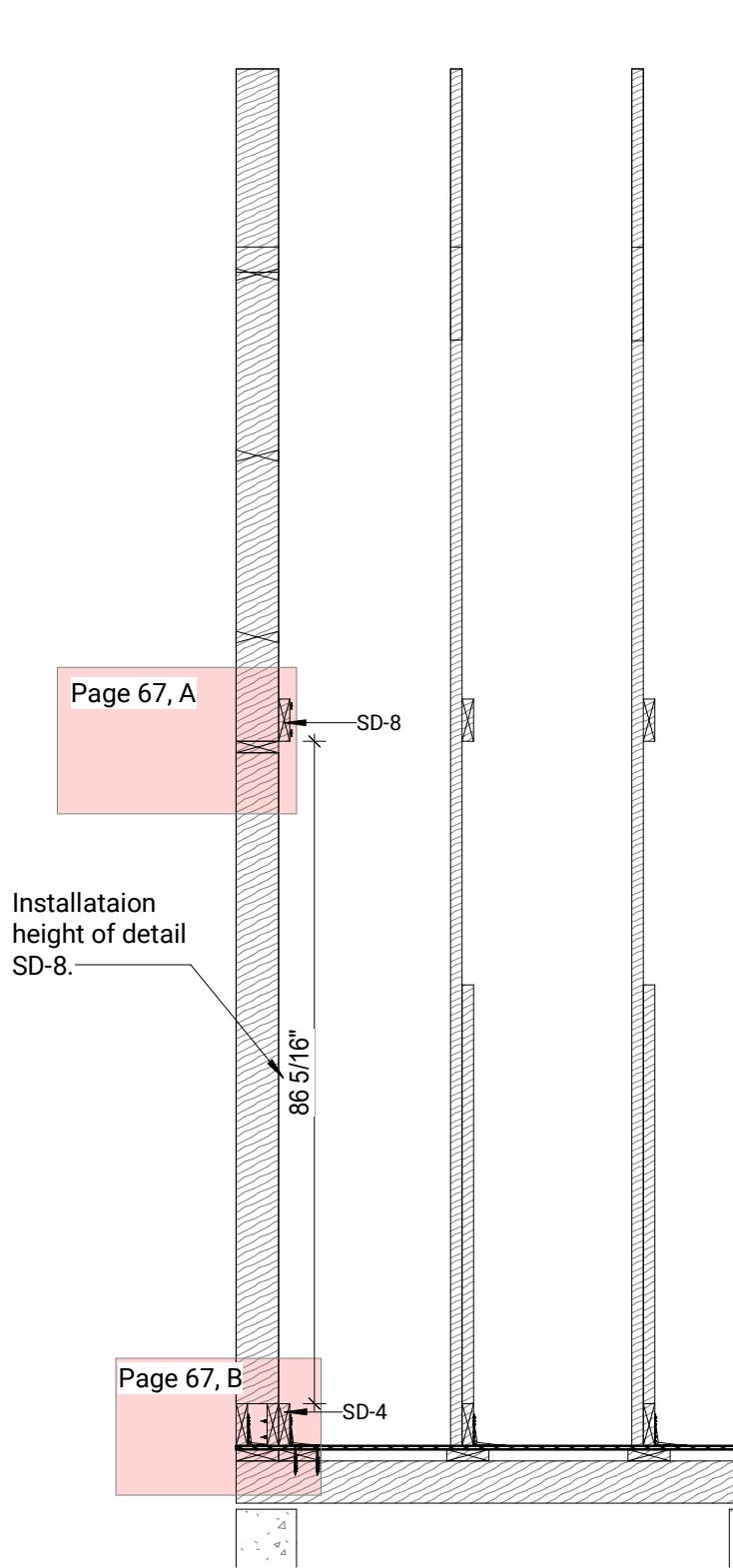
Install detail SD-8 only on the loft side.



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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 65 |

10. Installing A-Frames

10.14. Details SD-4 & SD-8 plan with measurements



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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 66 |

10. Installing A-Frames

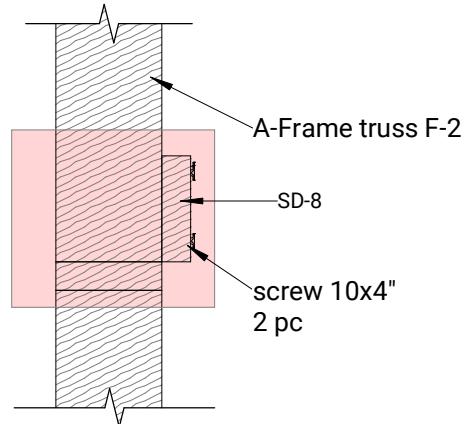


10.15. Connecting details SD-4 and SD-8 onto A-Frame truss F-2

A

Connecting details SD-8

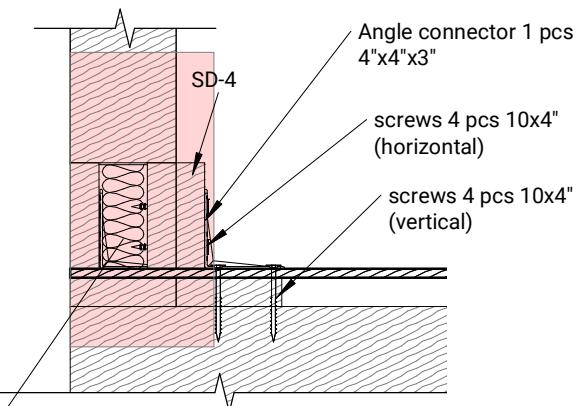
1. Fix detail SD-8 with screws 10x4" to A-Frame truss F-2 (loft side, see architectural drawing).
2. 2 screws to each detail of A-Frame truss F-2 (see next page).



B

Connecting details SD-4

1. Fix detail SD-4 with 3 angle connector and screws 10x4" and #6x1 1/2" to A-Frame truss F-2.
2. Angle connectors need different type screws vertical and horizontal placing.



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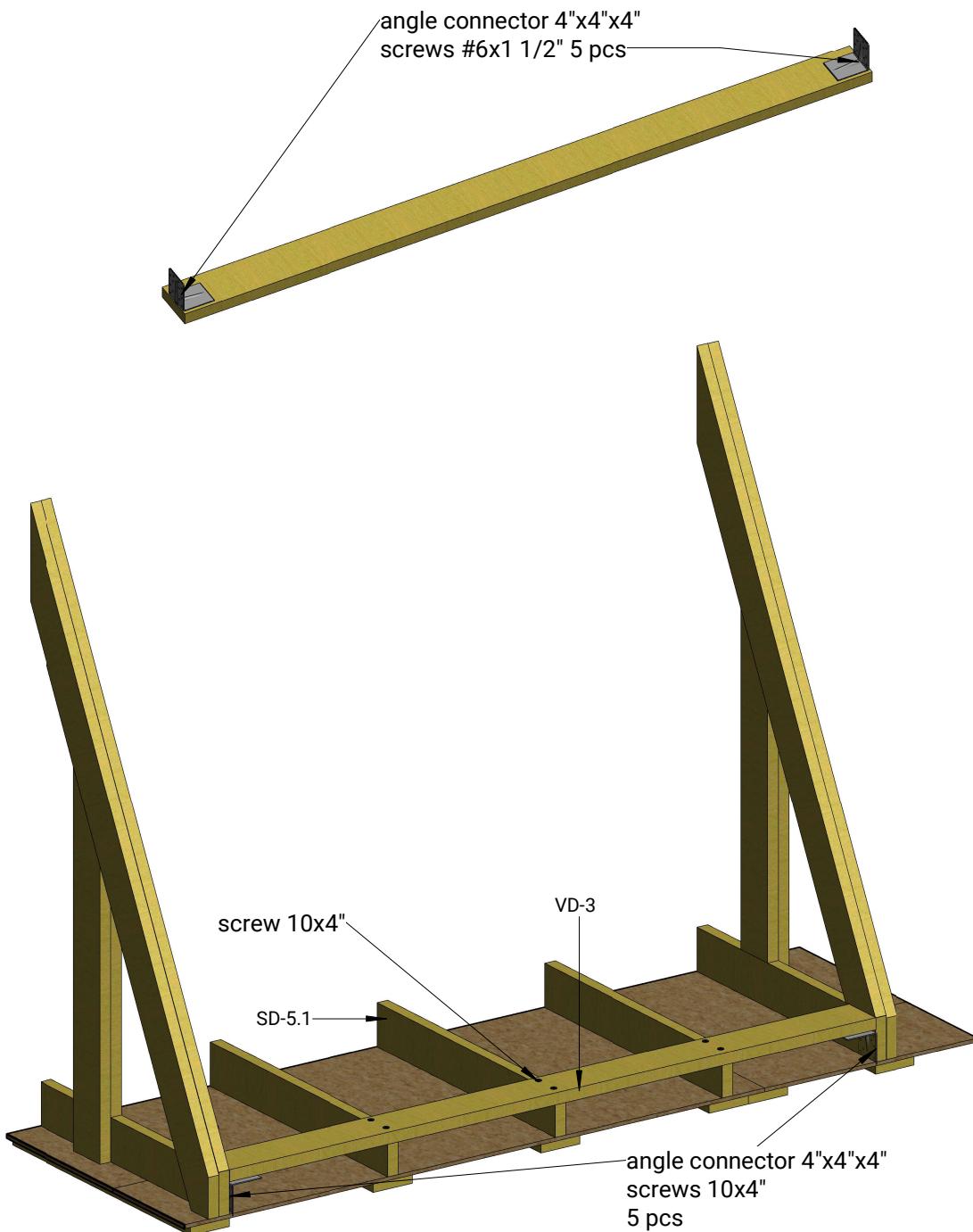
Solo+ 100 IMPERIAL

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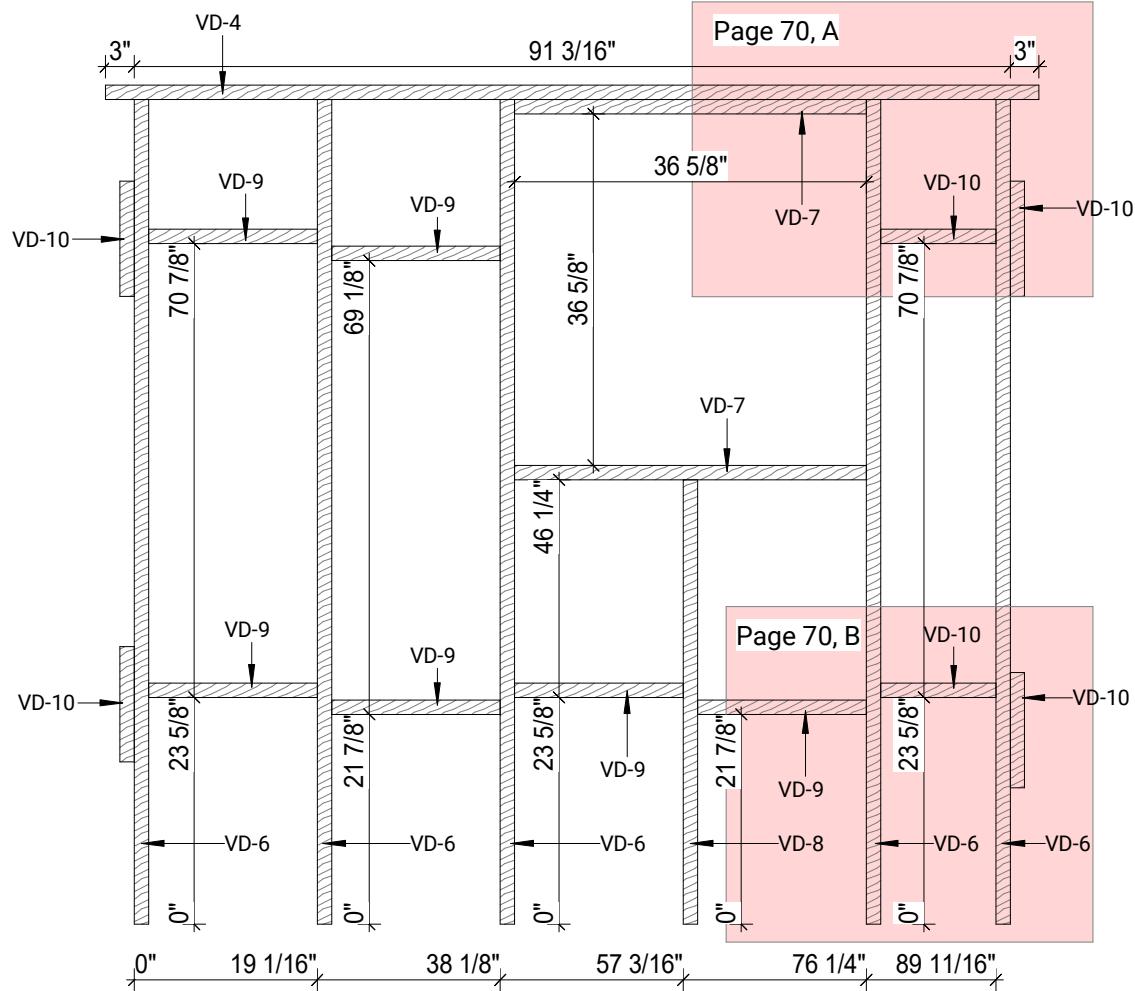


11.1. Installing detail VD-3



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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 68 |

11.2. Dormer plan with measurements



| 11.2. Dormer details | | | |
|----------------------|---------------|-------|------------|
| Type | Description | Count | Cut Length |
| VD-4 | Dormer detail | 1 | 97 3/16" |
| VD-5 | Dormer detail | 2 | 85 13/16" |
| VD-6 | Dormer detail | 5 | 85 7/8" |
| VD-7 | Dormer detail | 2 | 36 5/8" |
| VD-8 | Dormer detail | 1 | 46 1/4" |
| VD-9 | Dormer detail | 6 | 17 9/16" |
| VD-10 | Dormer detail | 6 | 12" |

Grand total: 23

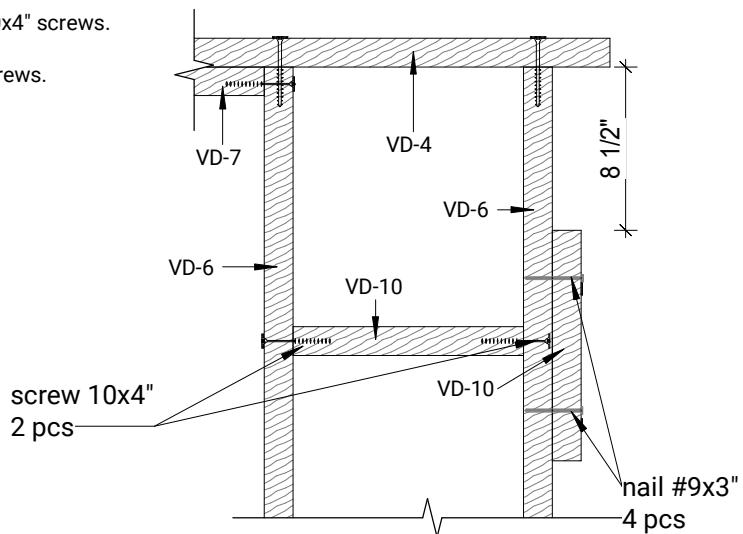
| VERSION | DATE | PROJECT | PAGE NO |
|---------|-----------|--------------------|---------|
| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 69 |

11.3. Connecting dormer details

A

Connecting dormer details

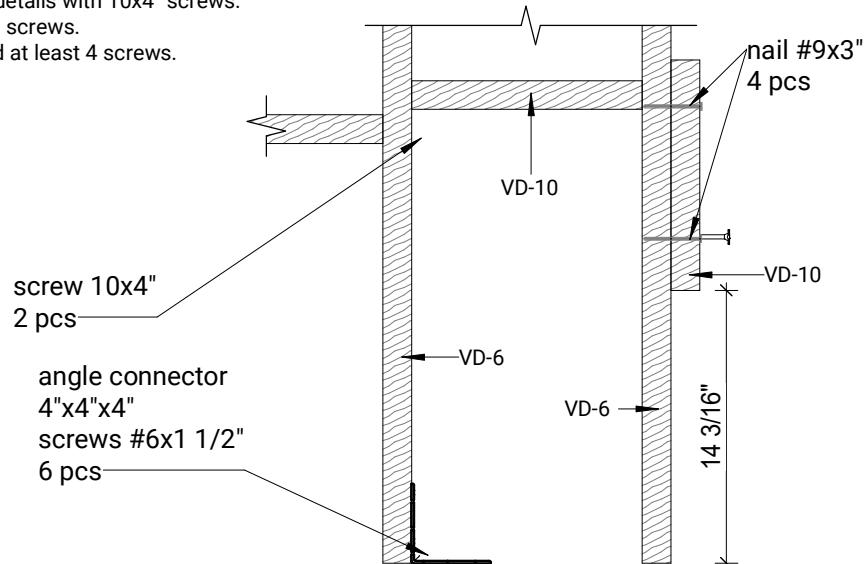
1. Connect dormer details with 10x4" screws.
2. Every joint need 2 screws.
3. Every details need at least 4 screws.



B

Connecting dormer details

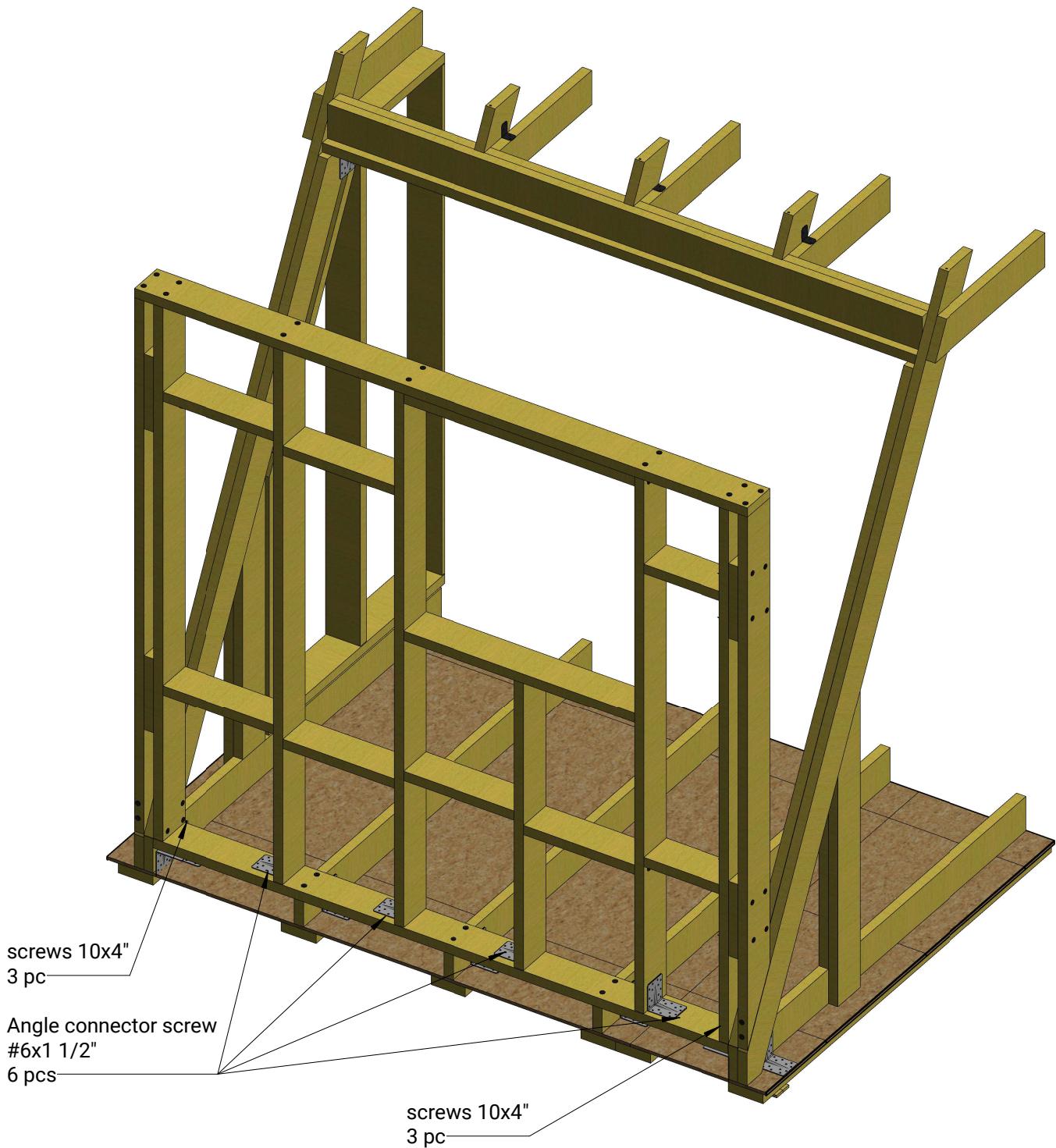
1. Install angle connector to details VD-6.
2. Connect dormer details with 10x4" screws.
3. Every joint need 2 screws.
4. Every details need at least 4 screws.





11.4. Installing dormer

1. Install dormer between A-Frame trusses and onto detail VD-1.
2. Fix dormer with 3 screws onto A-Frame truss on both sides.
3. Fix angle connectors onto detail VD-1 and dormer.



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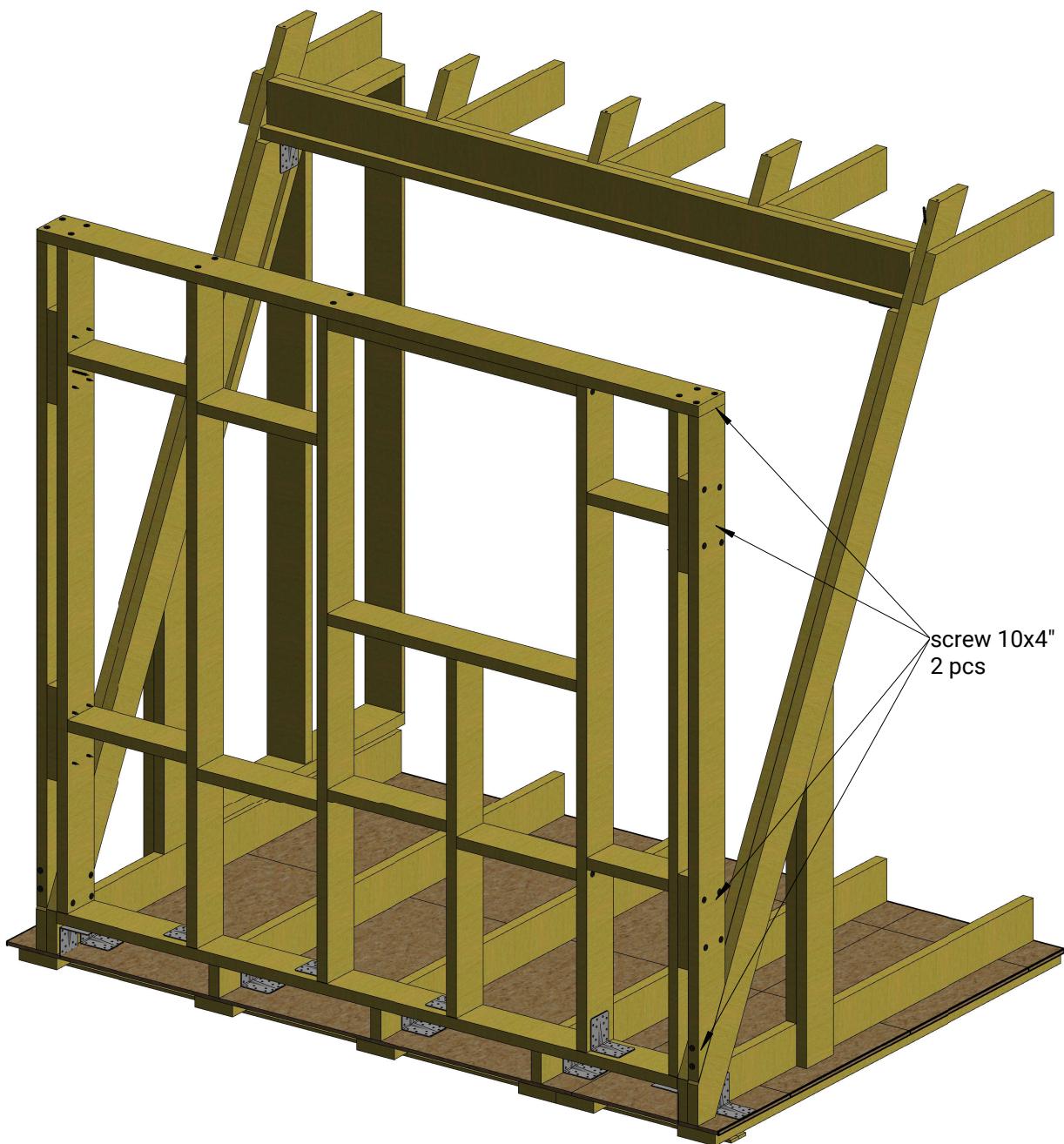
Solo+ 100 IMPERIAL

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11.5. Installing detail VD-5 onto Dormer

1. Install details VD-5 onto dormer and A-Frame truss.
2. Use screws 10x4".

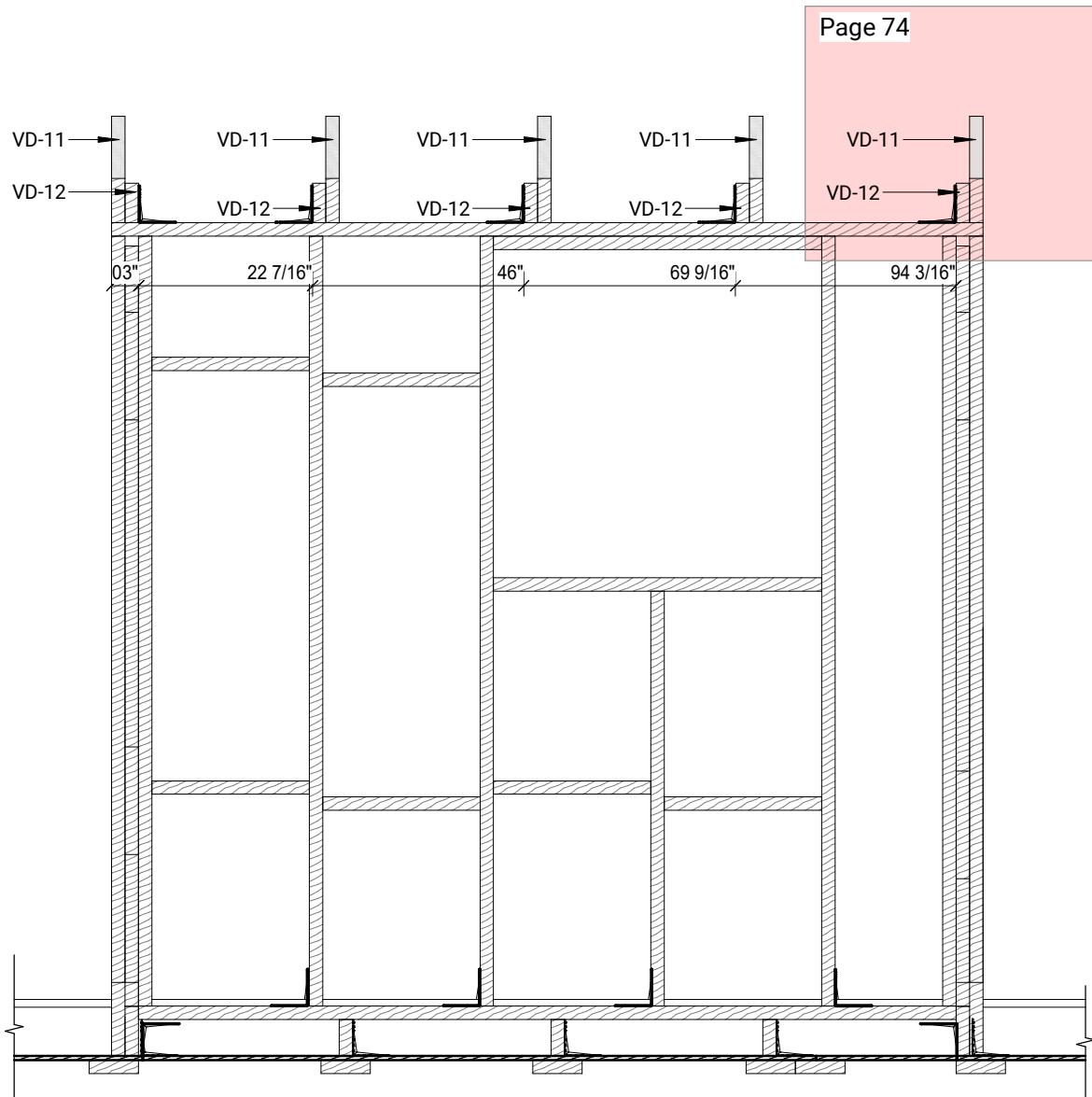


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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 72 |



11.6. Dormer roof details with measurements

1. Measure locations of details VD-12.
 2. Install details VD-11 and VD-12 to connect SOLO+ 100 and dormer.



11.6. Dormer roof details

| Type | Description | Count | Cut Length |
|-------|-------------|-------|------------|
| VD-11 | Dormer roof | 5 | 51 11/16" |
| VD-12 | Dormer roof | 5 | 45 7/16" |

Grand total: 10



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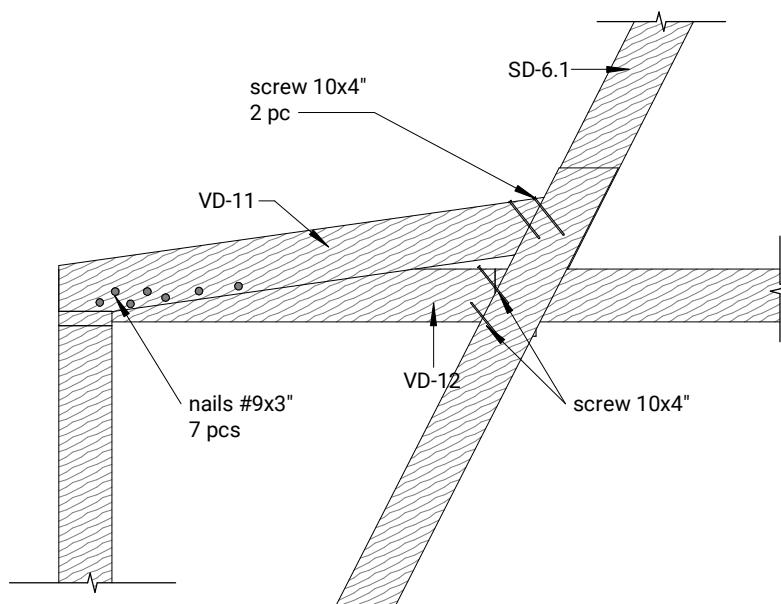
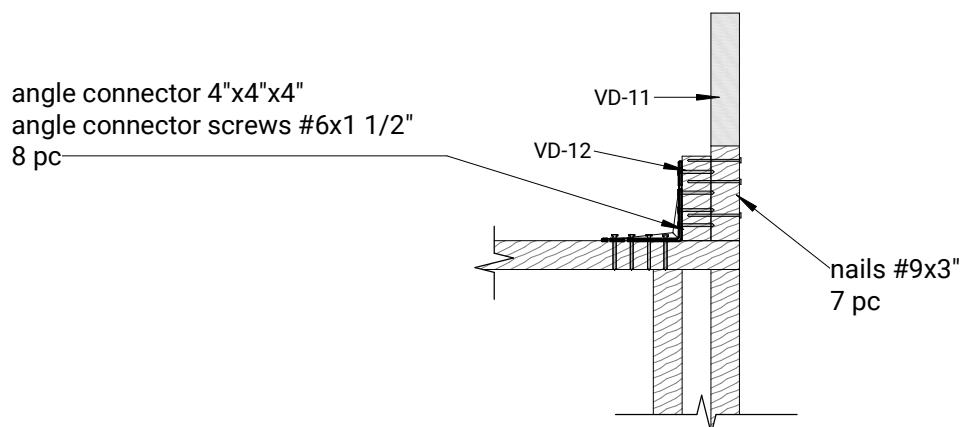
Solo+ 100 IMPERIAL

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11.7. Connecting dormer roof details

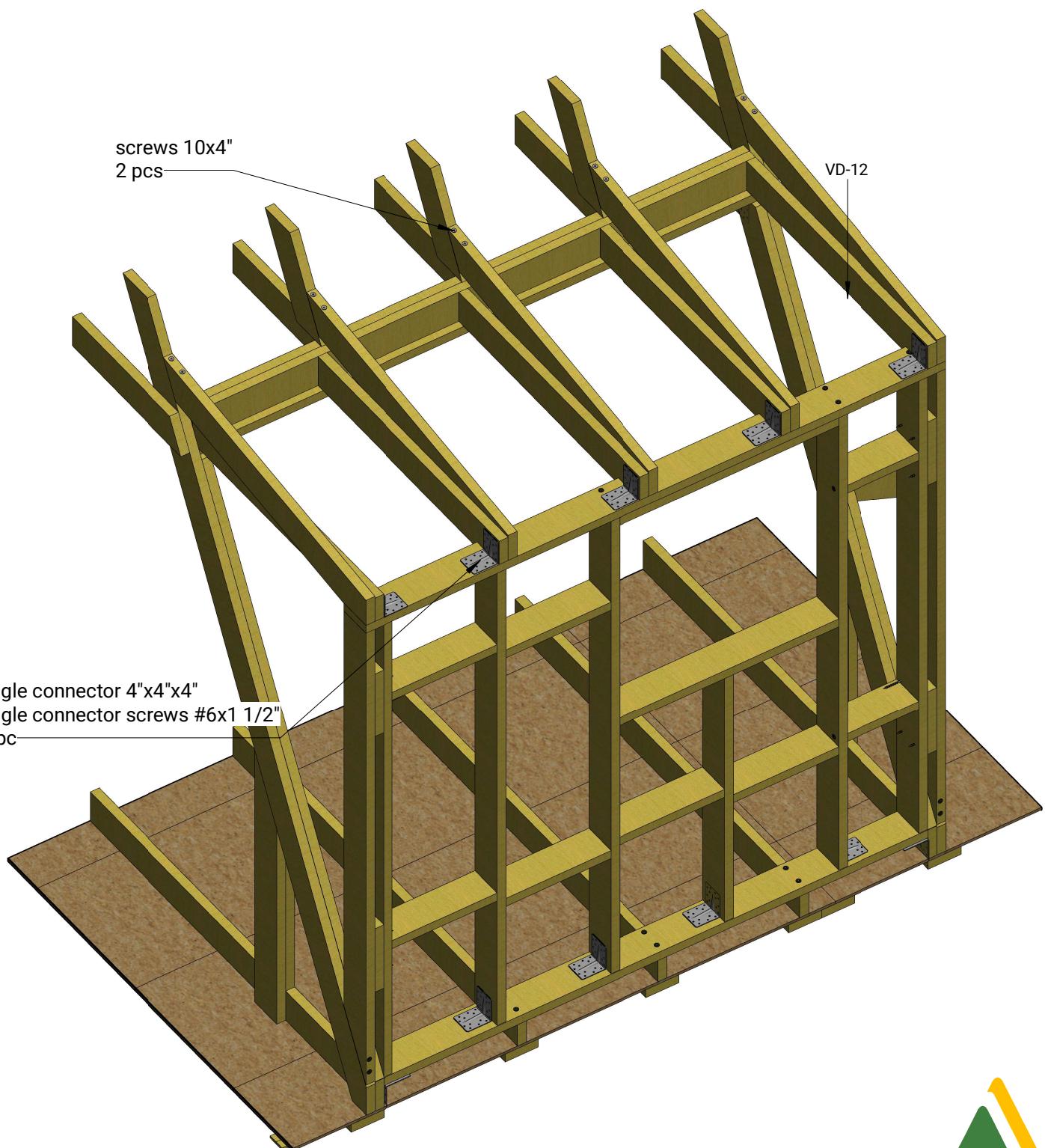
1. Install detail VD-12 on place and fix it with angle connector and screws.
2. Connect detail VD-12 and support beam with screws 10x4".
3. Install detail VD-11 and fix it with nails onto detail VD-12.
4. Connect detail VD-11 onto main truss.



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11.8. Installing dormer roof



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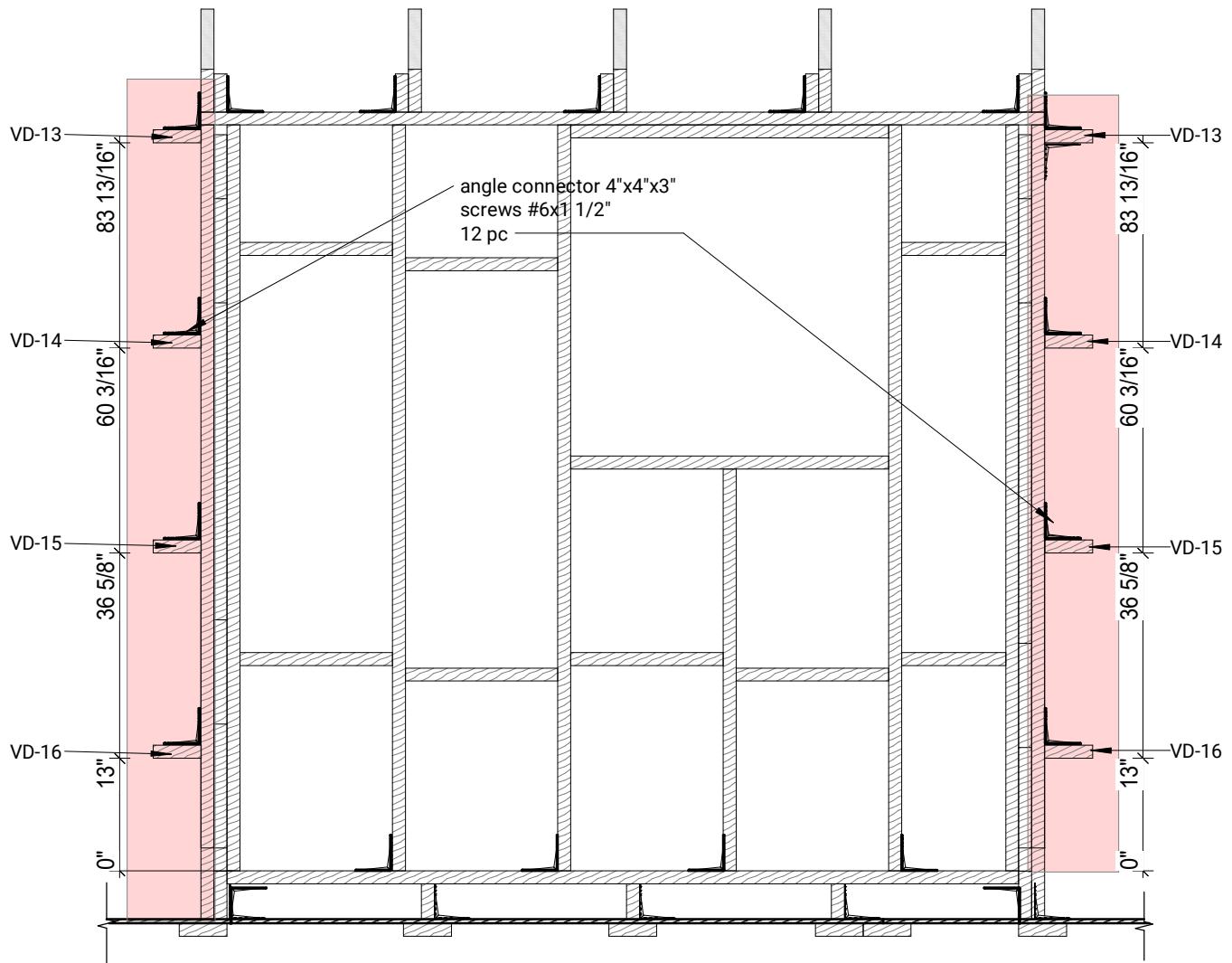
75



11.9. Dormer side details plan with measurements 1



1. Measure locations of details VD-13 - VD-16.
2. Fix angle connectors onto dormer and connect details onto angle connectors.
3. Every detail need 2 angle connector.



11.9. Dormer install details

| Type | Description | Count | Cut Length |
|-------|-----------------------|-------|------------|
| VD-13 | Dormer install detail | 2 | 49 15/16" |
| VD-14 | Dormer install detail | 2 | 37 15/16" |
| VD-15 | Dormer install detail | 2 | 25 7/8" |
| VD-16 | Dormer install detail | 2 | 13 7/8" |
| VD-17 | Dormer install detail | 2 | 122 9/16" |

Grand total: 10



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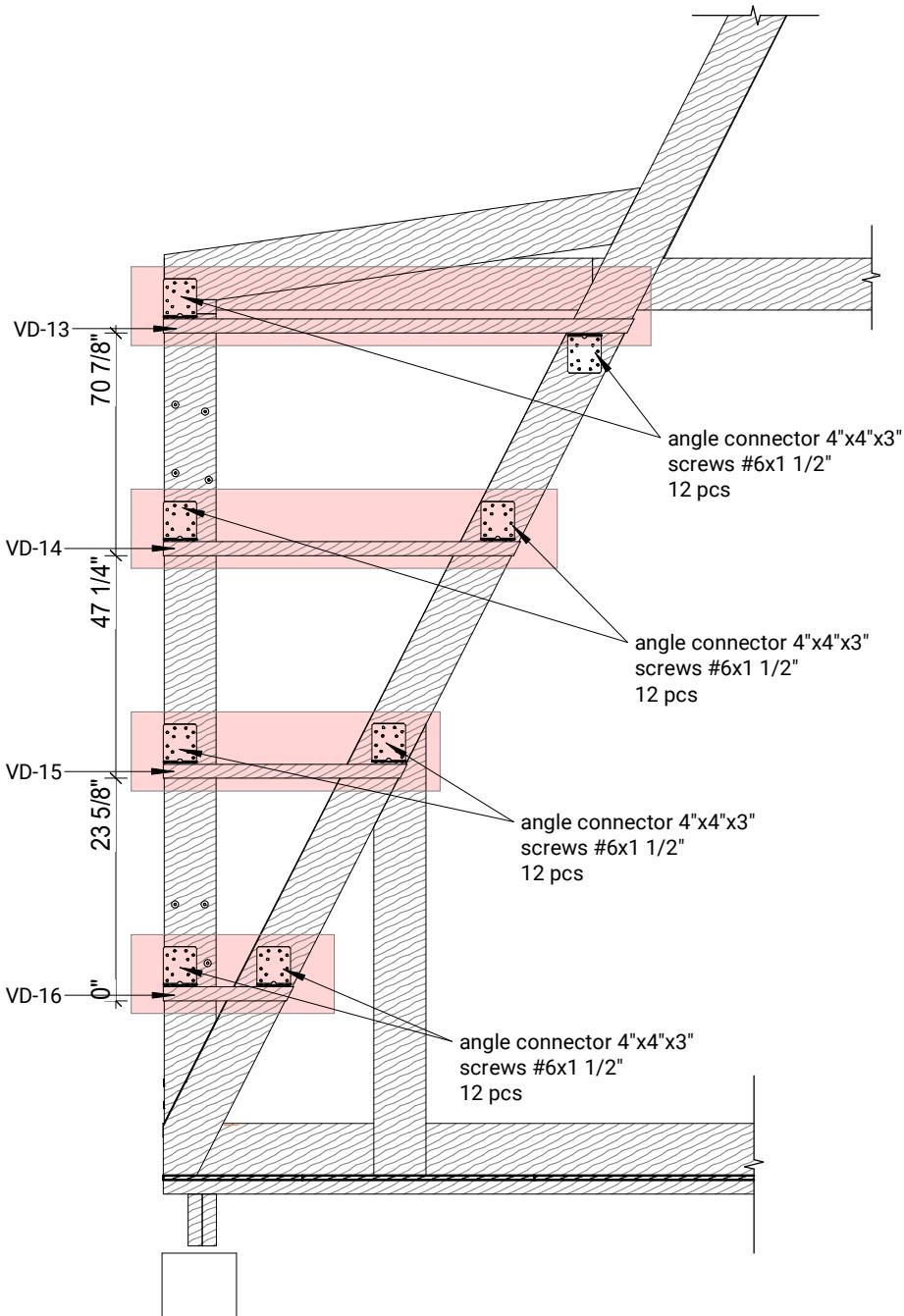
12-DEC-21

Solo+ 100 IMPERIAL

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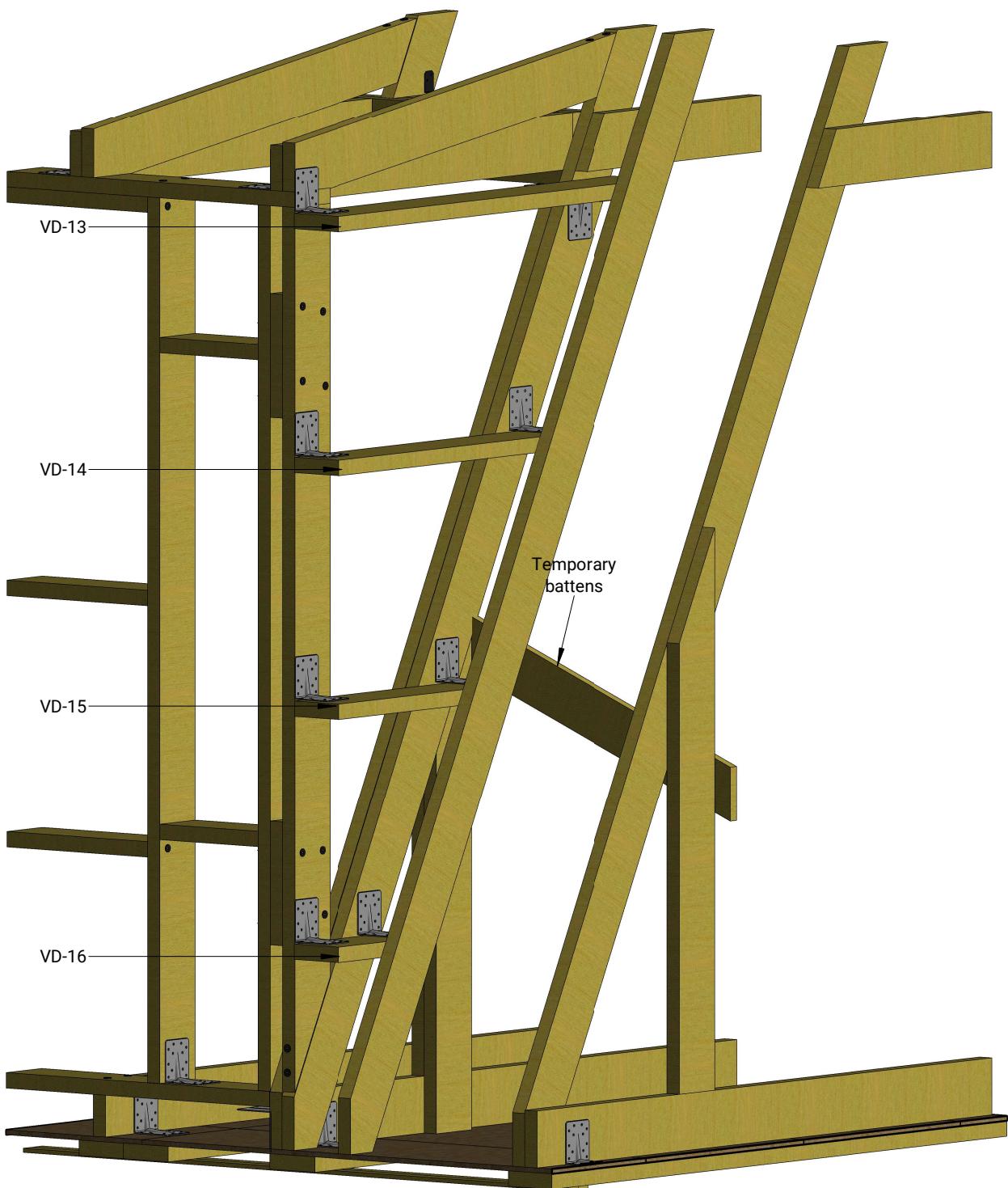
11.10. Dormer side details plan with measurements 2



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| 1.1 | 12-DEC-21 | Solo+ 100 IMPERIAL | 77 |

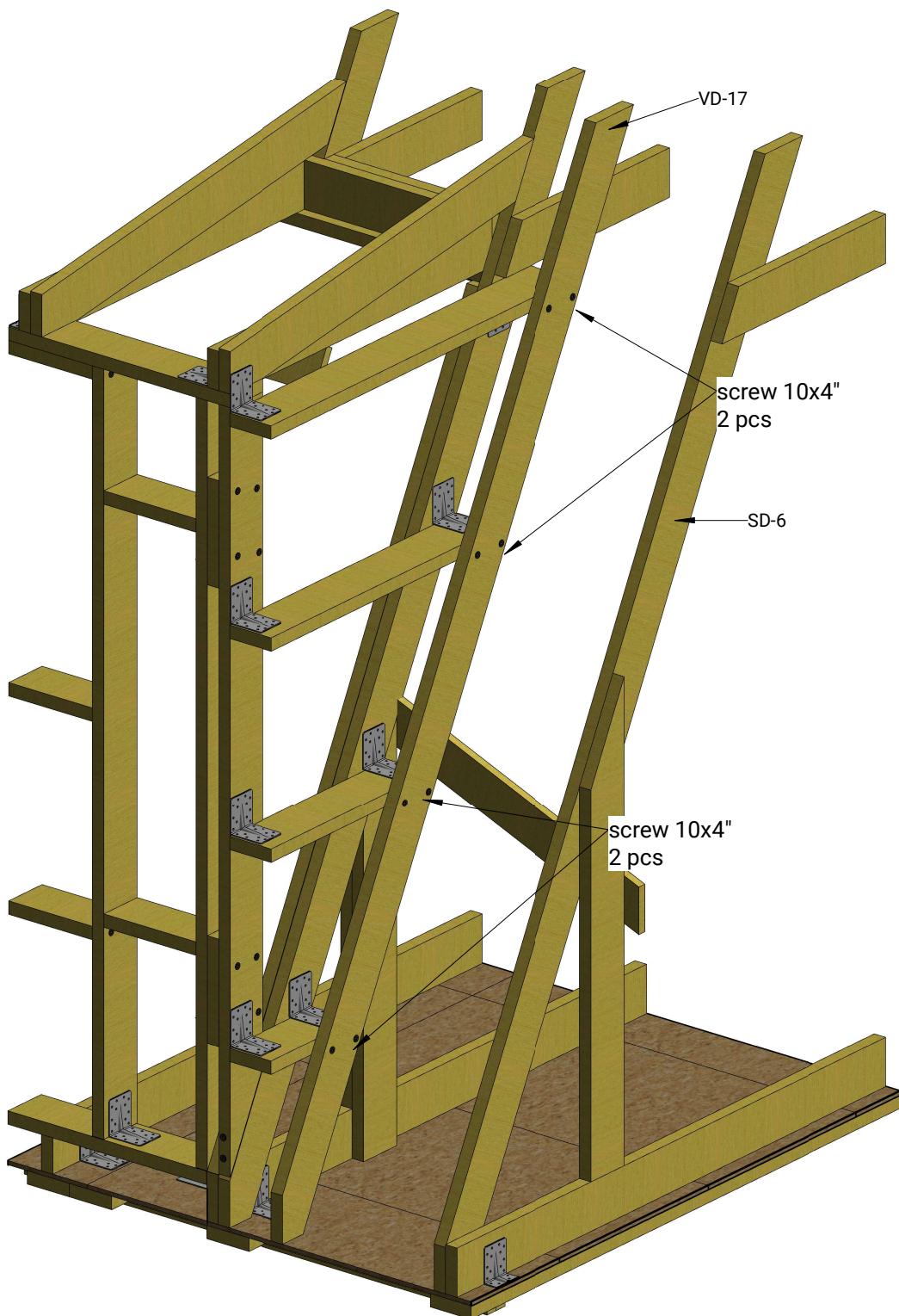
11.11. Connecting side details 3D view

1. Same solution on both sides of dormer.



11.12. Installing detail VD-15 onto dormer

1. Measure location of detail VD-17, it must be on same level and angle as the trusses (detail SD-6).
2. Install detail VD-17 onto dormer.
3. Fix detail VD-17 with screws 10x4".
4. Same solution for both sides of dormer.



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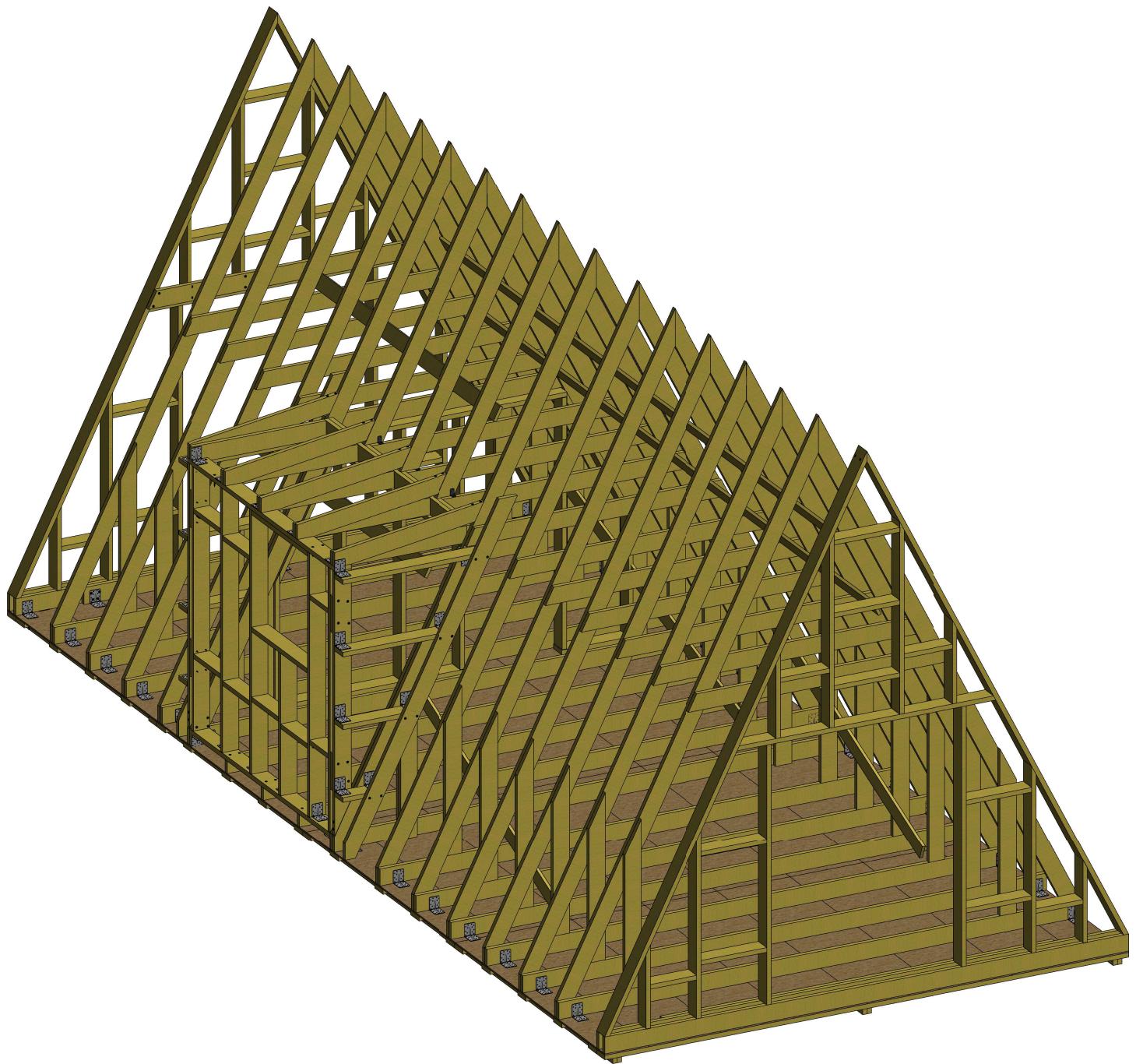
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12-DEC-21

Solo+ 100 IMPERIAL

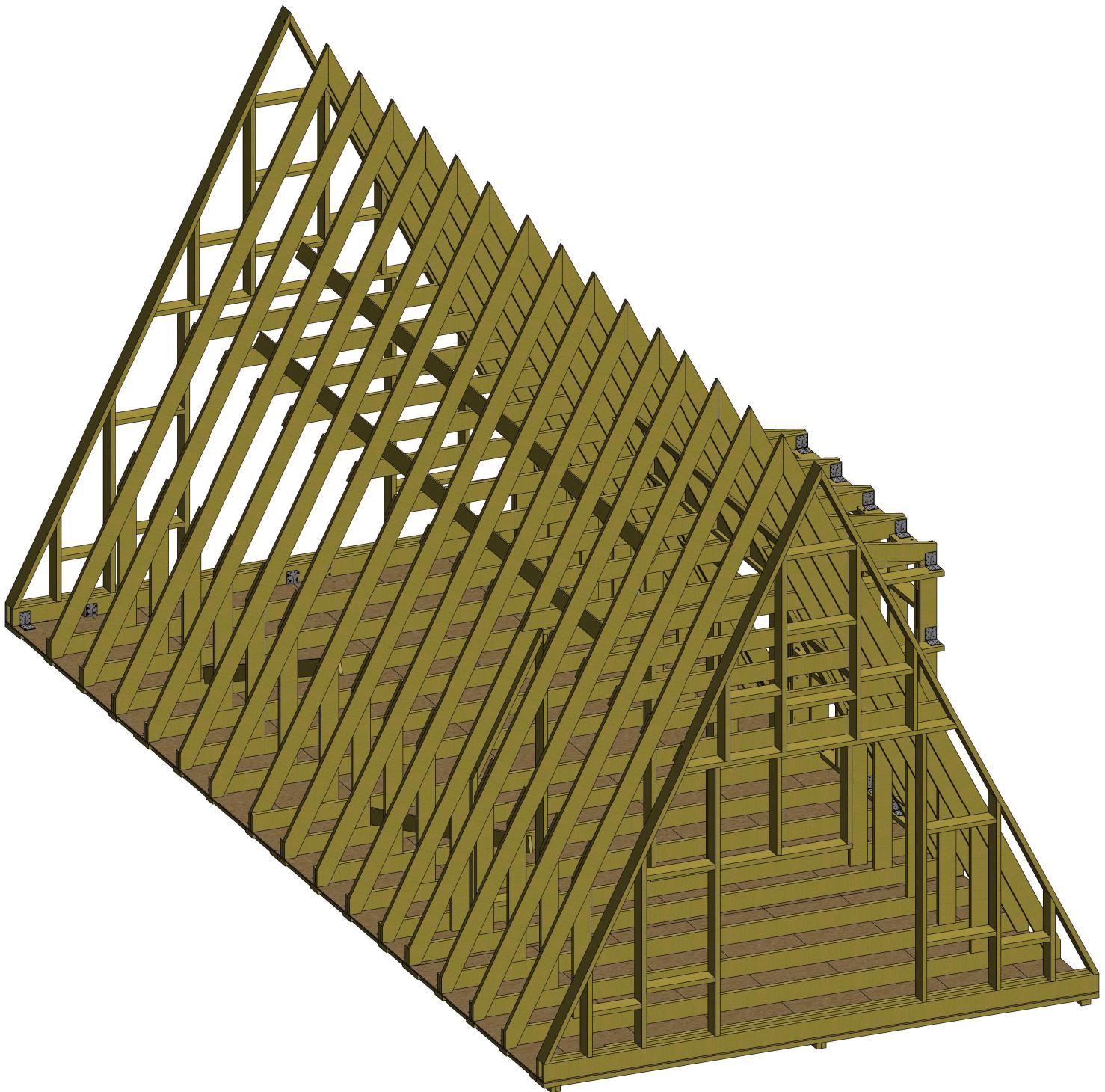
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12. SOLO+ 100 structure 3D views



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12. SOLO+ 100 structure 3D views



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13.1. Interior wall 3D view



1. Build interior wall after You are installed floor OSB.
2. This is optional interior wall, You can build interior wall anywhere inside of SOLO+ 100, because the interior wall is not load bearing wall.

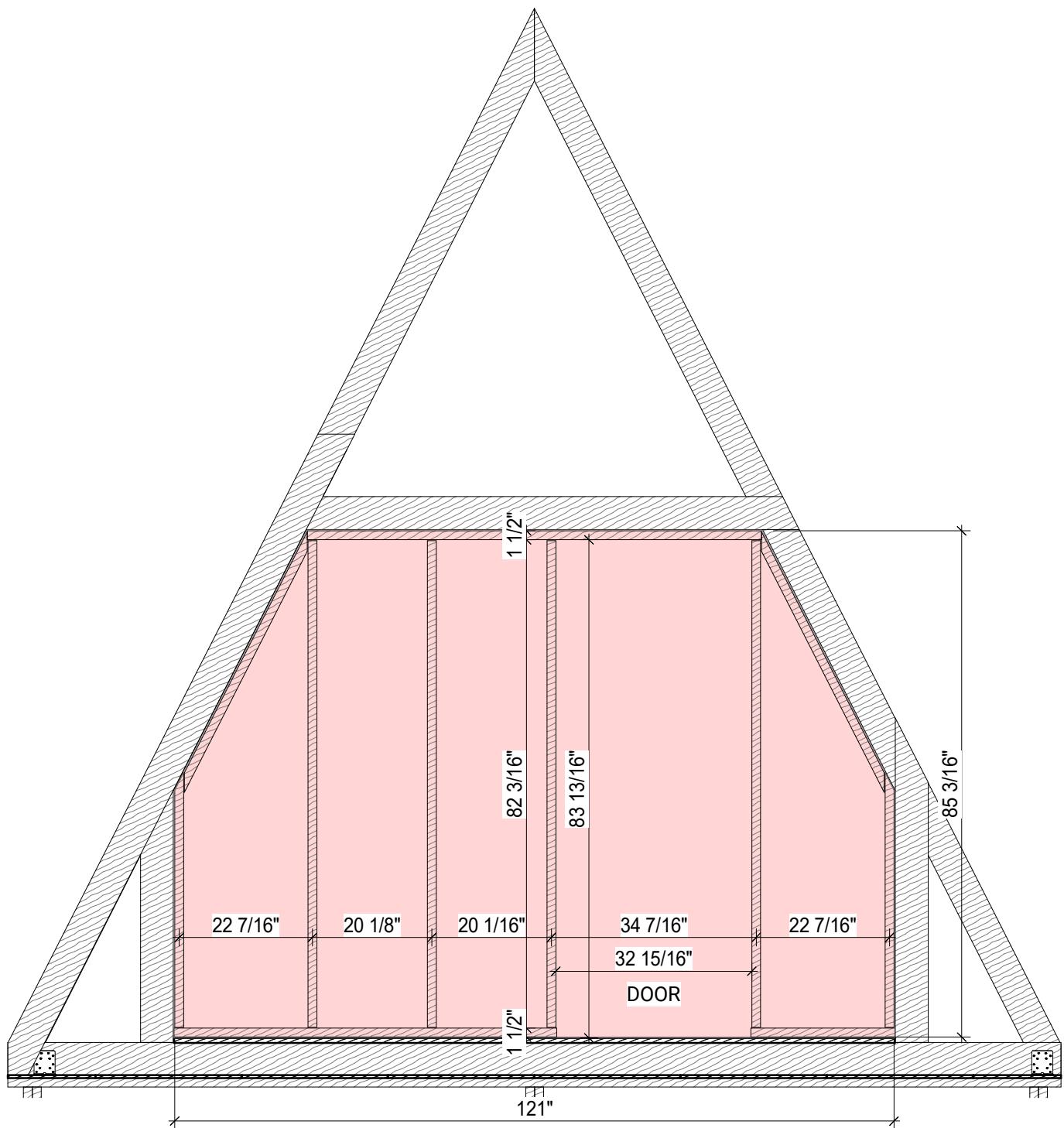


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13.2. Interior wall with measurements

- 1. Build interior wall after You are installed floor OSB.
- 2. This is optional interior wall, You can build interior wall anywhere inside of SOLO+ 100, because the interior wall is not load bearing wall.



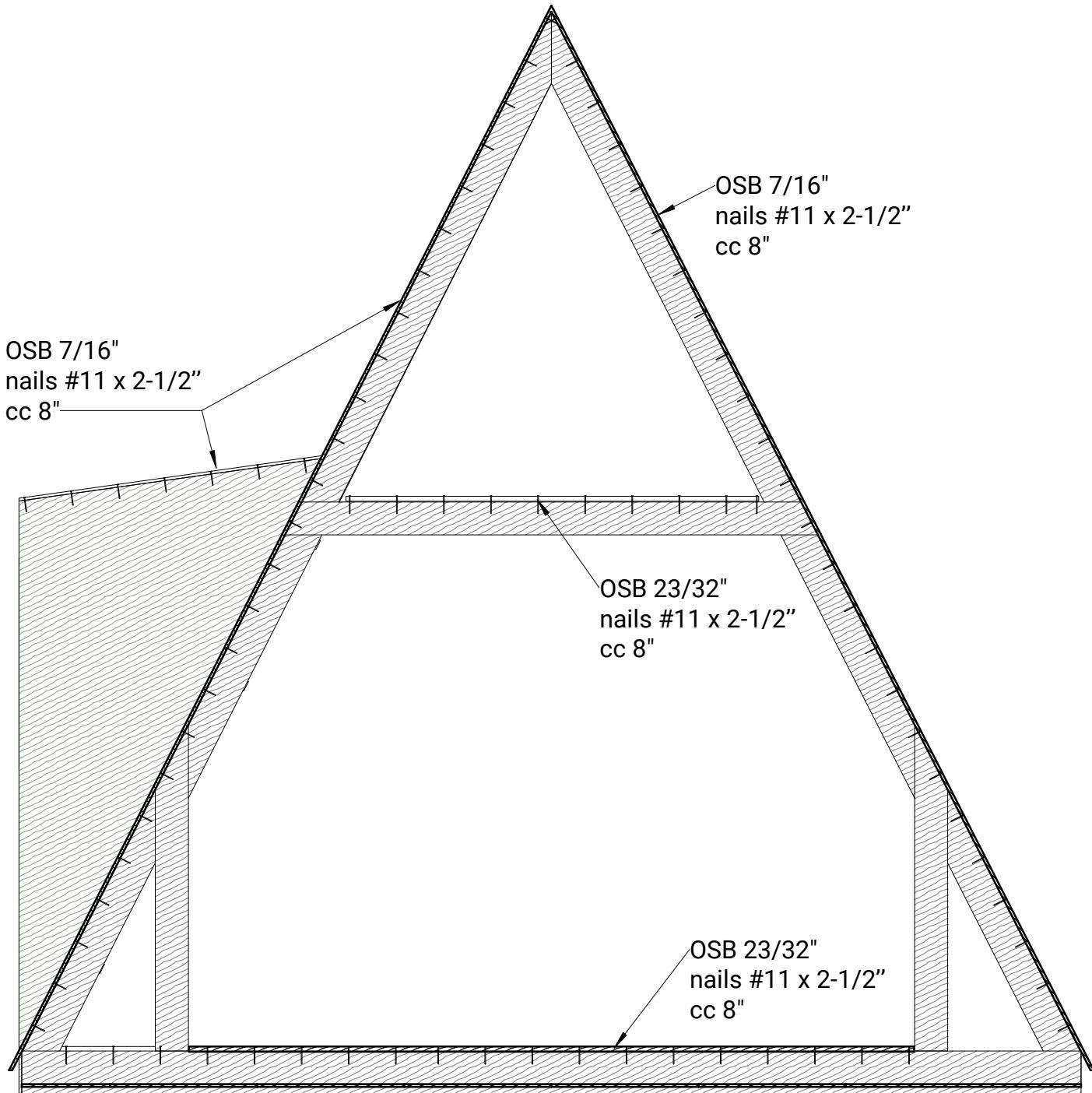


14.1. OSB sheathing on trusses



1. Start OSB installing on outside of SOLO+ 100.
2. Install OSB sheets onto roof, gable walls and dormer.
3. Install OSB sheets onto I floor and loft area.

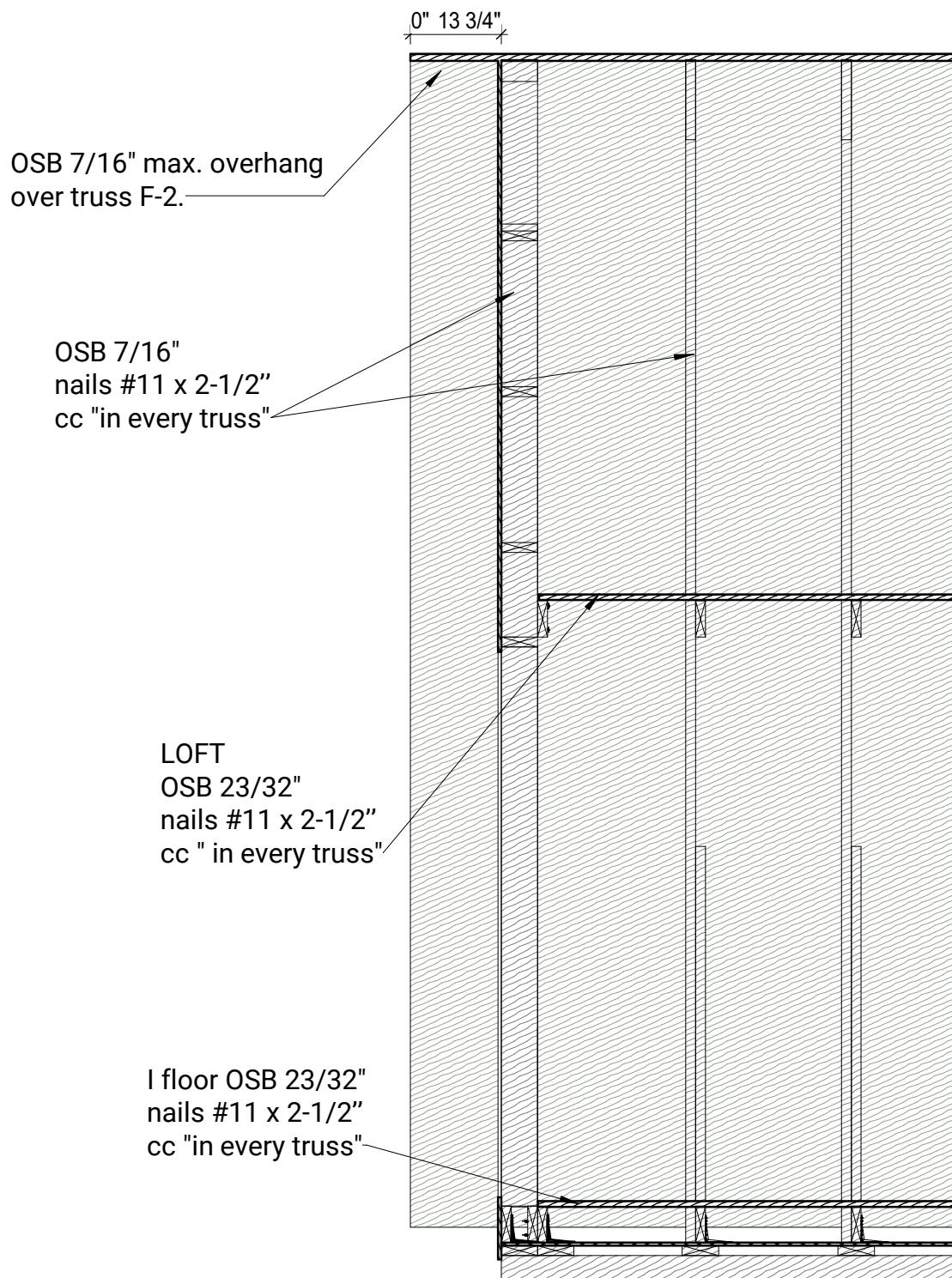
NOTE! Before You start installing OSB sheets on SOLO+ 100 I floor, make sure You have insulated all floor area.



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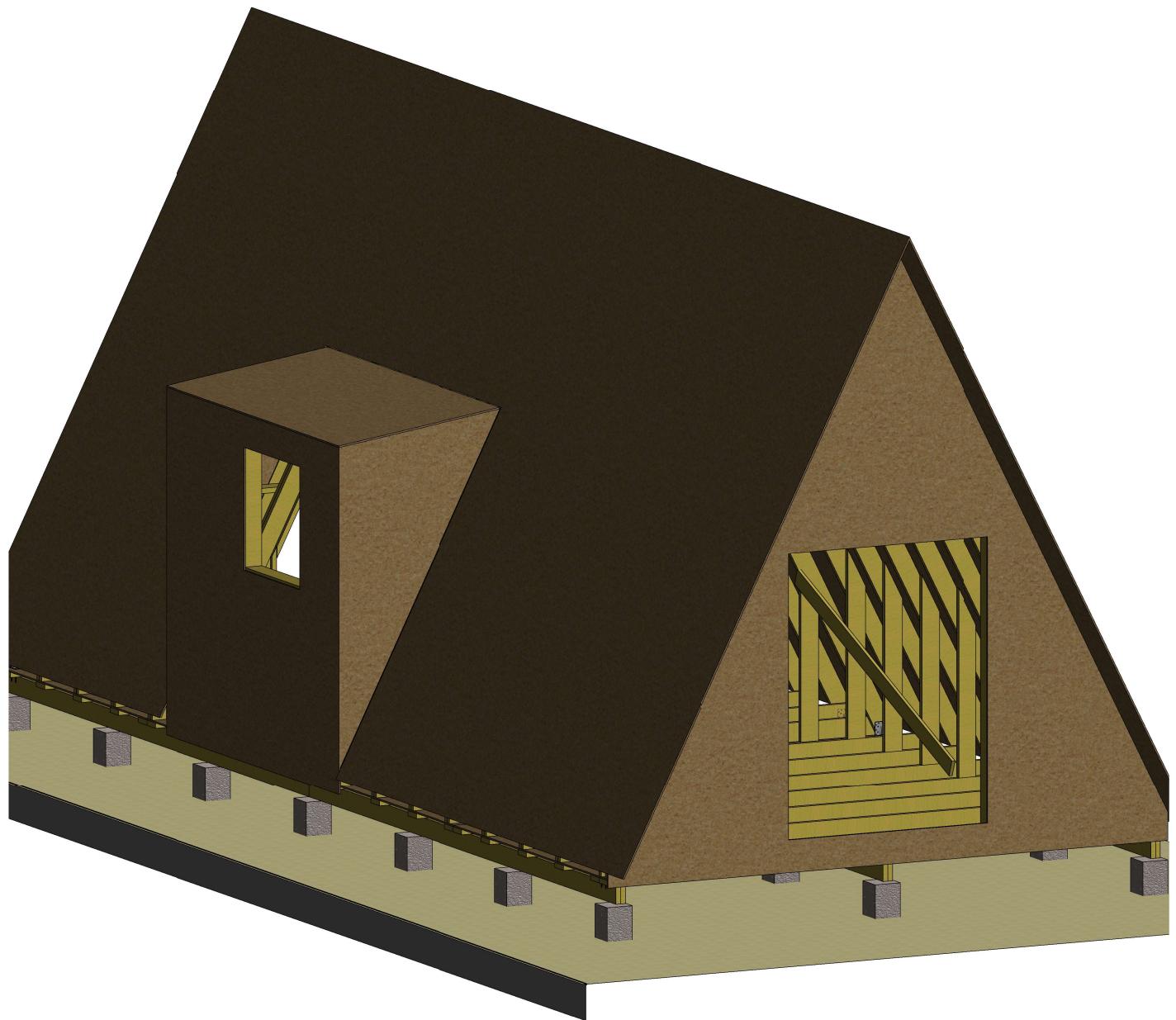


14.2. OSB sheathing section with measurements



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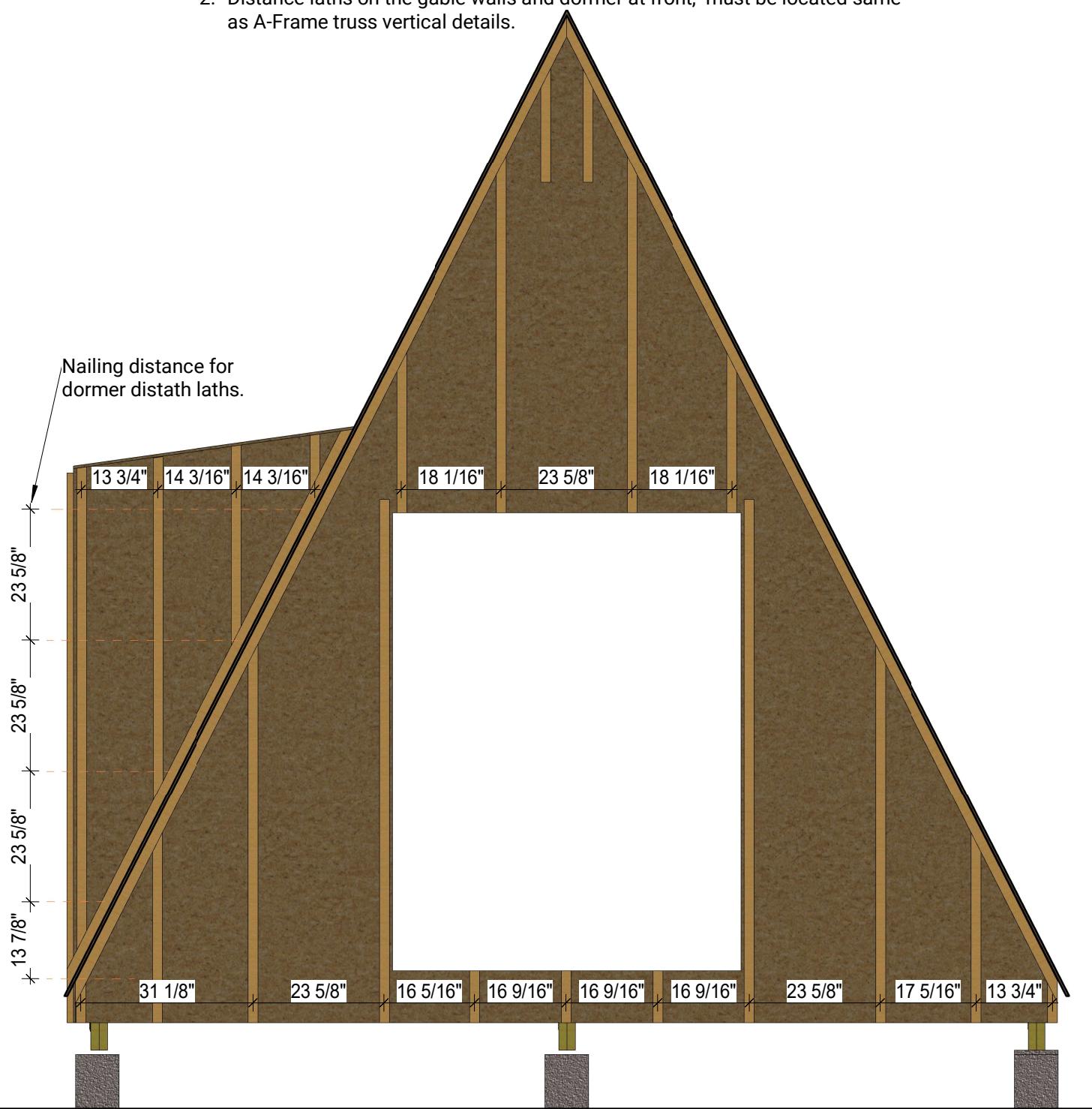
14. OSB Sheathing



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15.1. Installing distance laths view with measurements

1. Install distance laths 30x45 mm onto outside of gable walls and dormer.
2. Distance laths on the gable walls and dormer at front, must be located same as A-Frame truss vertical details.





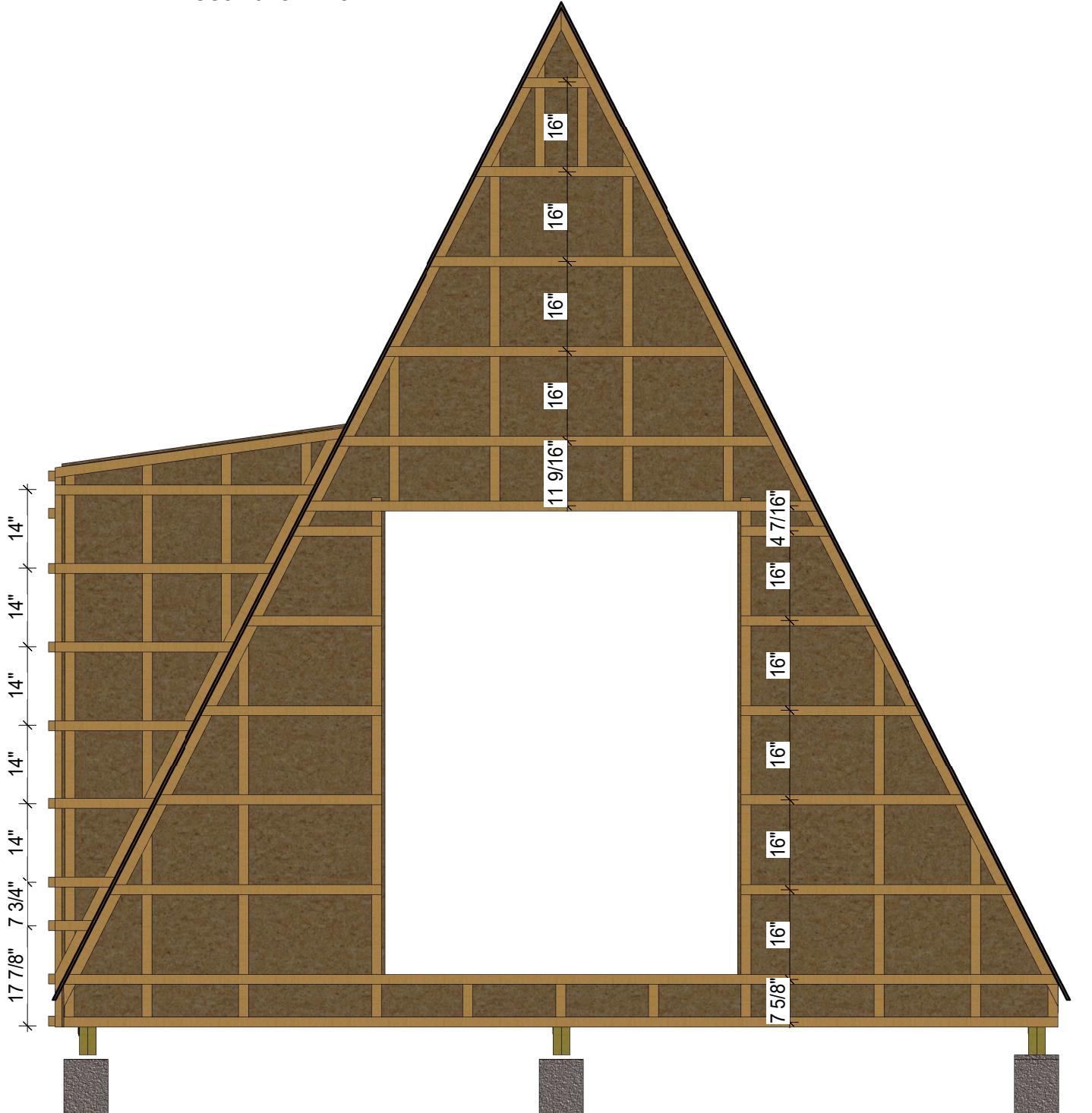
15.2. Distance laths 3D view



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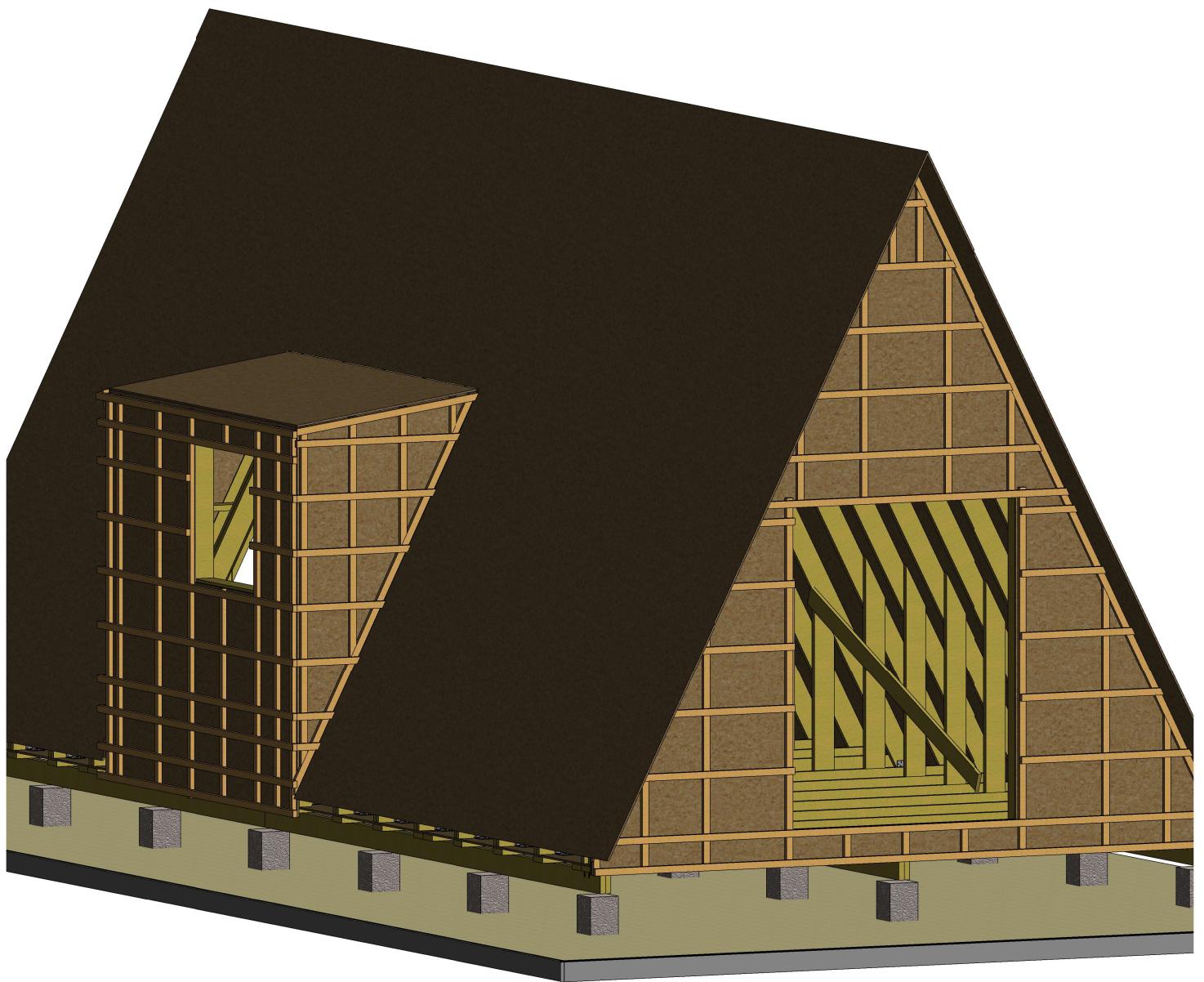
15.3. Installing battens view with measurements

1. Install battens 1"x4" mm onto distance laths of gable walls and dormer.
 2. Use nails #9x3".



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15.4. Battens 3D view



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Following activities are not covered in detail on this guide, because depending on the area you build and the materials available, the installation will vary, but keep in mind our suggestions below:

16.1. Sealing the house

The primary function of the OSB plate is to make the house rigid. But it also serves as part of the wind barrier. Make sure to seal all the OSB connections with the sealing tape. This helps protect the insulation material (and the rest of the interior) correctly from the weather elements. Start installing the OSB from below, and work your way up.

16.2. Choosing the doors & windows

You'll need to choose and install a door for the building and at least one window. While you can pretty much choose any door and window you like, we recommend picking high-quality, low-energy ones. The walls of the SOLO+ are designed to keep cold and heat on the outside. If you pick an average window, you'll break the building's energy balance, and most of the heat will flow out of the window.

The same is true for the door.

So, what to remember when choosing a window or a door?

Thermal transmittance is the amount of heat a material can transfer per area of the material, for every degree temperature of difference between the two sides of its surfaces. Thermal transmittance is also known as U-value, and it is measured in W/(m²K). When you buy a door or a window, you should ask what's its U-value. You want to buy a door/window with the lowest U-value you can find. This will guarantee you keep the interior space warm or chill, and you don't waste the effort we put in creating energy-efficient walls. It will also create a comfortable indoor climate where you will never "feel the cold or hot" coming from the window. Keep in mind that your choice will be affected by what products are available in your area. We suggest contacting a local window manufacturer to get more information on what they can offer you.

Installation

It is essential to install windows components correctly to guarantee there are no air leaks between the frame of the door/window and the structure. Fixing leaking after the installation can be very difficult (and expensive). Therefore we recommend installing the door and the window(s) with the help of a skilled carpenter or window installer.

16.3. Soffit and gable boards battens installation

When fixing the soffit and gable board battens, please do not damage the roofing material. Fix the battens on the inner side of the OSB to both edges (inside and outside) of the overhang. Those battens have to be installed at the full height of the overhang. It is wise to leave a couple of mm gap between every side batten and the surface edge it's being installed to. This helps to improve cladding/boarding ventilation.





16.4. Roofing

There are lots of different roofing materials out there on the market. You have to find a version that works best in your area. The key point is finding the balance between your budget and the aesthetic side of things.

Bitumen shingles roof is likely the least expensive option out there. We recommend using this material because it is easy to install with clips or nails directly to the OSB. You don't need to have any additional battens for roof ventilation in this case. Start installing the roofing material from the bottom, and work your way up. Pay extra attention to the ridge cap, and make sure it is installed tightly.

Steel roofs require ventilation battens. Please consult with the local roofing supplier to verify what kind of battens and in what quantity you need for your steel roof.

Roofing material installation

Roofing material installation normally starts from the bottom. Pay extra attention to the roof cap, and make sure it is installed tightly. In any case, you need to ask your roofing material supplier for a more detailed installation manual.

16.5. Finishing the exterior

The exterior battens are an essential part of the construction. It has the following primary functions; guarantee the necessary ventilation for the walls once the cladding is installed; serve as structural support for the sides of the roof cover.

Pay attention that battens are installed differently for horizontal or vertical cladding installation. Make sure you cut all the pieces of cladding to the correct measure, especially in the proximity of the doors and windows. The wooden cladding should be treated with at least two layers of paint/varnish to avoid moisture, damages, and fast changes in the aesthetics. In an average climate, you do need to repaint the cladding every 5-7 years.

If you need cables or pipes passing from the interior to the exterior of the building (going through the wind-break barrier), you must put them in place and seal them properly before installing the cladding. Use the outdoor tape to fill the membranes after inserting the pipe/cable. Make sure there are no holes and slits for air leakage.

16.6. Electrical wiring and plumbing

We strongly recommend using certified specialists' help for your house's plumbing, electrical, and other (e.g., heating and ventilation) systems. This guarantees a safe and long-lasting solution. Think through where you want to install the toilet, shower, sink, home appliances, electrical fixtures, etc. We suggest installing the wires and pipes behind the walls. You can drill holes in the trusses to run through the cables and pipes. After that's done, you can install insulation and a vapour barrier.





16.7. Insulation & vapour barrier

The frames of the walls are 145mm thick. This means you can fit 150mm of insulation material. You should overlap the layers as much as possible to avoid air gaps going all the way from the interior to the exterior. Take your time to install all the insulation material properly, and DO NOT squeeze in more insulation than necessary. All the insulation material should be cut to measure (with a sharp knife) and comfortably fit into its designated space.

ATTENTION!

When working with insulation in a closed space, you MUST wear a mask and protective clothing (at minimum, long sleeves). The dust coming from the insulation material irritates the skin and can cause respiratory problems! Always use long sleeve clothing and wear a protection mask and protection glasses when handling insulation material.

Once all the insulation has been installed, it is time to close the walls. With the help of the stapler, install the vapour barrier from the ceiling down to the floor. Staple the membrane along with the vertical studs and try to get it as wrinkle-free and as tense as possible. Once the membrane is stapled onto the walls, you need to tape all the connections to make it airtight. Tape the wall membranes to each other and make sure you tape any eventual holes in the membranes. Finally, tape the membrane ends as close as possible to the frame of the door and the window(s). If you have cables or pipes going through the membrane, you need to make sure you seal the hole properly. The connection and final cover should be as airtight as possible.

16.8. Finishing the interior

Interior can be finished in all sorts of different ways. It all depends on personal needs and preferences. There are two main surfaces you need to cover - walls and floor.

Covering the walls

The most common ways are covering the walls with plasterboards or with wooden claddings. Plasterboard installation is relatively easy. You can fix the plasterboard directly to the trusses. After the putty and paint job, it will look great. Horizontal interior cladding can be fixed directly to the existing trusses as well. You don't need to have any additional battens below, since the inside of the house is dry space, and no extra ventilation for cladding is required. Vertical interior cladding installation is a bit more complex task. But the outcome is most likely worth the effort. Vertical lines emphasize height. You need to install horizontal battens to the trusses first. Otherwise, you don't have anywhere to fix the cladding. Please discuss the needed battens dimensions and quantities with your cladding supplier, they know what the proper nailing distance for their product is. You will find the interior cladding quantities from the shopping list. If you decide to go with plasterboard, then the needed m² are the same.

Flooring material installation

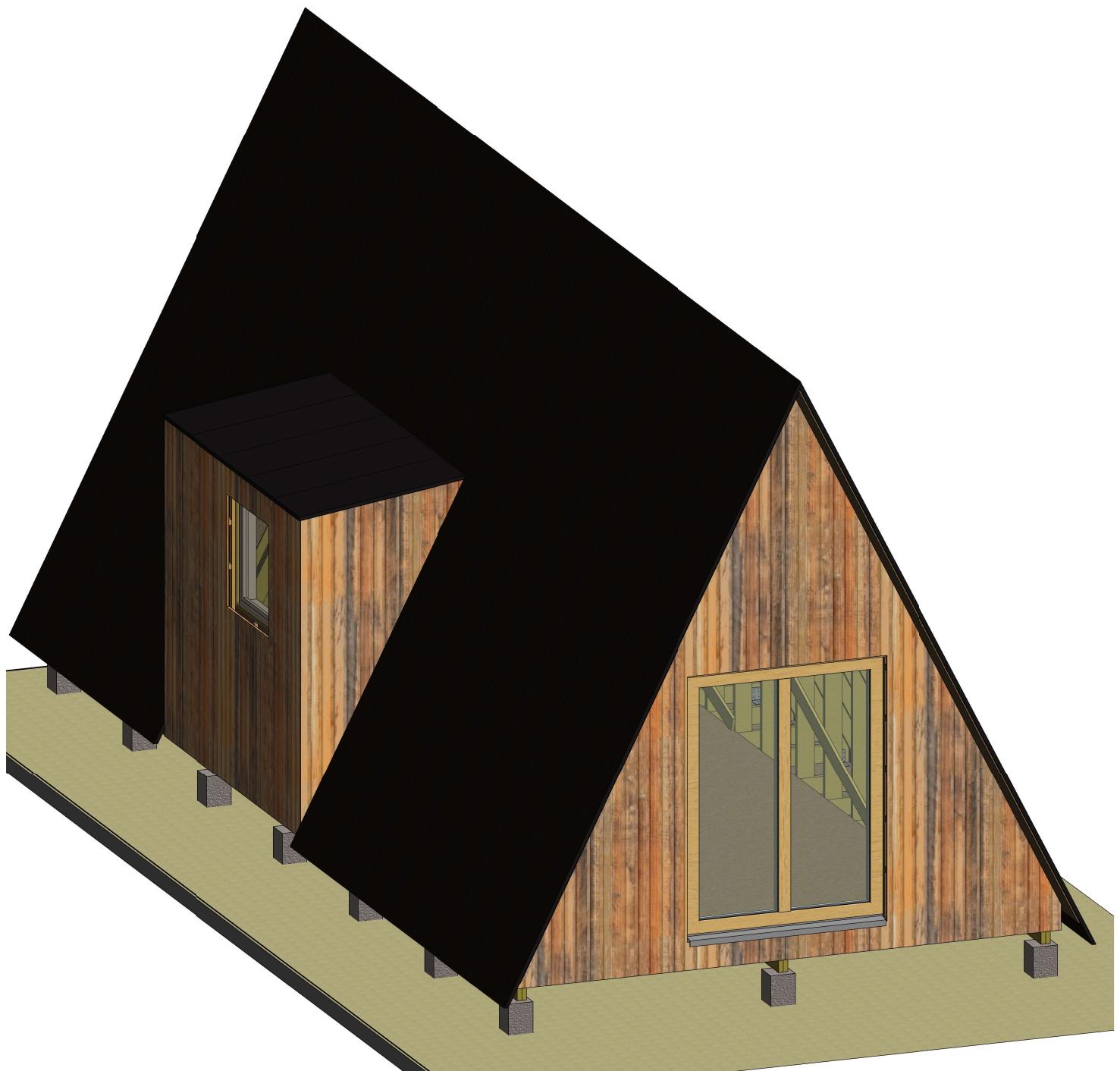
For flooring material, probably the best solution would be using wooden parquet. It has an excellent good look to it and is very durable. The flooring underlayment type depends on what kind of material you want to install. Please consult the installation specifics with local specialists.



17. SOLO+ 100 3D exterior view



17.1. SOLO+100 3D View With Cladding



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**Congratulations, you've made it!**

Our guide ends here. We hope that you found it helpful in all the stages of your build. If you built it following our instructions we believe you ended up having a great tiny house.

In case of any questions, you can reach us out via e-mail or speak directly with the Solo+ community in the closed Facebook group. We all would love to see pictures of the construction progress over there also!

E-mail: soloplus@avrame.com

Facebook group: <https://www.facebook.com/groups/aframetinyhouse>

