NAHB Shed Project

Objective

The NAHB Shed Project resource was developed as a hands-on activity/project for high school/secondary student chapters. Local and State Home Builders Associations can sponsor the construction of a shed for their school, community, or other purpose. Plans, material lists, and detailed fabrication instructions are provided to build an 8’ x 12’ shed. Four configurations were developed to allow students to tailor the project to their available time, skills, and interests. Plans are provided with the Barn Roof shed to add an optional loft, work bench, or solar powered electrical system. These can be used in any configuration. Students can also make other additions or modifications to customize the final product.

The Baseline design is an 8’ x 12’ structure with an 8’-4 1/2” inside height. The shed is framed using 2x4 lumber with tongue-and-groove flooring and LP® SmartSide® Panel wall sheathing. The 4:12 gable roof is supported by rafters with one-foot soffits on all sides. A 36” pre-hung utility door and one 36” x 36” window are included.

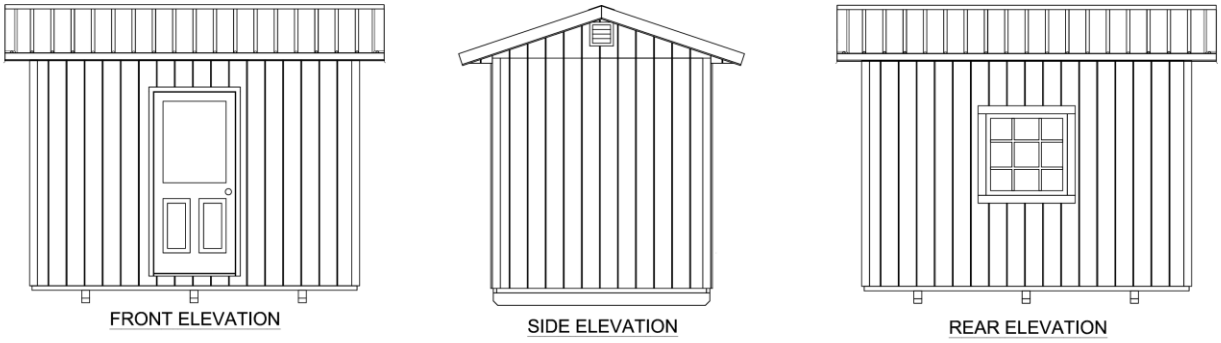

Figure 1. Baseline Shed

The Economy shed eliminates the overhangs and is shortened to use single 8’ sheathing panels. The elimination of soffits simplifies the construction.

Figure 2. Economy Shed

The Hip Roof shed uses a less common roof configuration and introduces students to a more challenging problem that they are likely to experience in future work. This also has one-foot soffits on all sides.

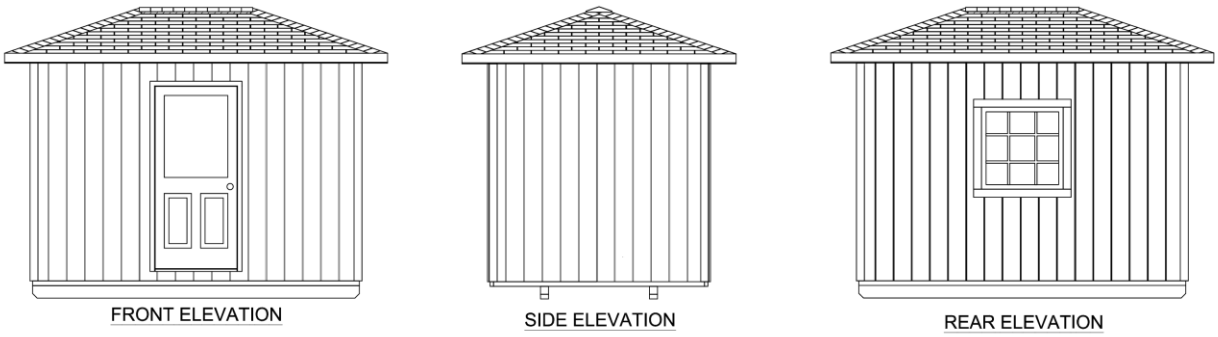

Figure 3. Hip Roof Shed

The Barn Roof shed provides more interior headroom for storage on a loft and more efficient roof slopes for solar panels.

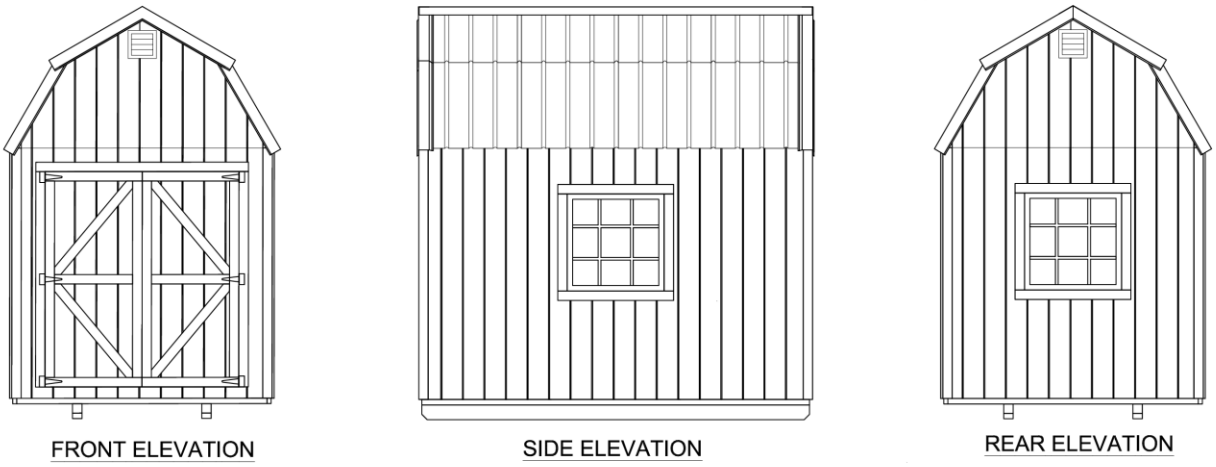

Figure 4. Barn Roof Shed

Safety

Safety on the project is the responsibility of all participants and supervisors. Students in construction programs are expected to be well trained in proper procedures to ensure work-site safety. The Shed Project will involve the use of power tools and require the use of ladders and working on roofs. Concerns with installing metal roofing may be unfamiliar to some participants. Experienced instructors and supervisors should take advantage of the opportunity to teach the student participants how to safely perform each step of the construction.

General Instructions

The construction should be performed on a level, clear worksite. The shed may be constructed at its final location or moved to that location after completion. Planning for transportation should

be fully coordinated before construction to ensure feasibility. Participants should carefully study the plans and instructions before the first board is cut to ensure a good result.

The participants are responsible for ensuring that the construction complies with applicable, local building codes.

The LP® SmartSide® products purchased from a local retailer are primed by the manufacturer but usually must be painted. Panels, trim and soffits should be painted before cutting. Any cut edges must be primed and painted before installation with a high-quality, 100% acrylic, exterior paint.

The shed should be anchored after placement. There are many off-the-shelf systems using helix-auger anchors or arrow-head-type systems. Anchors should be installed at each of the four corners and securely attached to the joists.

Commentary

While developing these plans, many topics were identified that warranted some further explanation:

Fasteners

The instructions refer to Framing Nails and Sheathing Nails. The size of framing nails will probably be determined by the driver used. The default would be 16d with framing hammers; however, there may be situations that require a shorter nail to keep the tip from protruding. Framing nails for pneumatic nailers tend to be shorter than 16d nails. Sheathing nails should generally be selected to go through the sheathing and penetrate the wood framing by 1½ inches. Check manufacturer recommendations for the products used in the construction.

Hot-dip galvanized sheathing nails are required for the siding. Galvanized are not required for the OSB, but it is probably simplest to use them everywhere. Fasteners to pressure treated skids and joists must be rated for this application.

Dimensioning of stud/joist locations

The instructions provide more detailed dimensioning for marking stud and joist locations than an experienced carpenter would need. Carefully observe whether the dimensions are to the edge of the joining member or to the center. In places with double studs, the dimension is usually to the center of the two studs. In some cases where the markings are symmetrical about the center of the piece, a “symmetrical” dimension designation is used.

Double studs

Shed manufacturers using LP SmartSide Panels tend to place a double stud where two panels overlap. This convention is followed in these plans to make it easier to align the panels and to securely fasten them to the studs.

Cutting to exact lengths

Longer framing lumber is frequently not cut to the exact length. For example, the instructions often say to cut a 2x4 x 12' to *exactly* 12'. This will usually require trimming a half inch or so off the end of the 2x4.

Tongue and Groove flooring

Typical tongue and groove flooring panels are 4' x 8'; however, after the tongue is cut and inserted in the groove the net coverage is only 3' - 11½". The plans show panels that are offset slightly from the edge of the floor framing to compensate for this.

Cutting siding

Openings for doors and windows will be cut in the siding. These can be cut using a circular saw, and the instructions provide dimensioning for that approach. Some fabricators will use a router or reciprocating saw to cut the opening after the siding is attached to the framing. The Barn Roof shed has a double door that will use the pieces cut from the wall siding to sheath the door so these must be carefully cut. The plans account for the 1/8" lost to the saw blade.

Birdsmouths

Some rafter configurations require a birdsmouth cut where it attaches to the wall. These cuts can be initiated with a circular saw but should be finished with a handsaw or reciprocating saw to avoid over cutting into the structural material.

Gable siding overlap

A single sheet of siding is used to cover the height of the walls. Additional sheets of siding will cover the gable end below the roof. The plans call for this sheet to overlap the wall siding by 3". The end rafters are installed over the wall siding, i.e. 3/8" from the edge of the wall framing for a smooth installation.

Shiplap

The dimensions of the framing are exact multiples of 4' so two sheets of siding are required for the short walls and three sheets for the long walls. LP® SmartSide® Panels are actually 48¾" wide to account for the overlap of the shiplap joint. The plans call for the shiplap to be cut from the edge of the first sheet of siding on each side of the shed. This is clearly indicated on the drawings.

Punch/drill metal roofing

The instructions call for drilling or punching screw holes in the metal roofing before installation. This makes the screw installation easier and ensures a straight line of screws. Hole locations can be carefully marked on the top sheet then drilled or punched through several sheets. Care should be taken not to slide the top sheet over the underlying sheets to avoid scratching.

Direction of metal panels

One side of a metal panel has a ¼" lip next to the rib. The other side ends at the rib. The drawings show the lip which is especially important when cutting the panels.

Joist configurations

Two different skid/joist configurations are used. The Baseline shed uses 3 - 8' skids with 11'-9" joists. The others have 2 – 12' skids with 7'-9" joists. These are interchangeable and either configuration can be used on any of the sheds. Most sheds use the latter configuration so the skids will be aligned with the tilt bed of a transport vehicle. The 8' skids may make it feasible to lift the shed on and off a truck using a forklift with fork extenders. This option may be considered when planning for transportation.

Dashed lines on the drawings

In drafting, dashed lines are used to indicate that those lines are hidden in the view. This was intended in a couple of places in the drawings, but dashed lines were not supported by the CAD software when publishing PDF documents. Instead, very light-weight lines are used. This will be noticed in the Roof Plans.

Angles/slopes

The roof pitch for most of the designs is 4:12. This angle is 18.43°. Obviously, two-decimal-place precision is not possible/required in construction, but the carpenter may aim for about 18.5° on a miter saw. Both slopes and angles are used in the drawings. The slope is required when using a speed square or carpenter square, while the angle is used on a miter saw.

The barn roof is designed for 30° and 60° slopes. These roughly convert to 7:12 and 12:7 slopes.

Precuts

The Baseline Shed uses 2x4 x 8' studs. The other configurations are shorter so most of the studs can be cut from typical 92-5/8" precut studs. Some full 8' 2x4s are still required on those sheds. If they are lower cost, precut studs may be used, when appropriate.

California corners

All designs show an extra stud at each end of the 12' walls to attach interior sheathing to. This is a common detail in construction. These may be removed if there is no intention to finish the inside.

Ventilation

Building codes usually require a ventilation area equal to $1/150^{th}$ of the floor area. This is 92 sq.in. for these sheds. Three of the designs include two 8" square gable vents. The hip roof relies on vented soffits with a 4' ridge vent (see one example in Useful Links below). This provides about 75% of the required ventilation for a residential structure. It is important to provide some ventilation in a shed, but it is probably not necessary to meet the residential code requirement in most cases.

Fastener Quantity

The required number of fasteners is estimated for each step in the construction. These are not exact values. Constructors should bring an ample supply of each type required. The metal roofing supplier will usually estimate the required number of screws based on your order.

Plumb Rafters

Once rafter assemblies are secured, they will be roughly plumb. Consider marking the rafter locations on the sheathing to ensure that the rafters are properly spaced.

Cutting Plans

Cutting plans are included for all wooden components at the end of each set of drawings. Some cutting plans are duplicated with the drawings/instructions for each Step. It will be necessary in some cases to refer to the Step Instructions for complete detailed dimensioning.

Hip Roof Fabrication

Links to 2 videos showing various aspects of Hip Roof Construction is given below. One discusses using a construction calculator to determine dimensions. This is not required since all dimensions are provided. A compound miter saw can also be used to make the cuts.

Windows

The drawings call out 3030 CS (i.e. 3’-0” x 3’-0” Casement) windows. Any other 3030 window style may be substituted.

Useful Links

LP® SmartSide® Installation

Video: https://youtu.be/BrrDp3gLOfI?si=hIQinSmScJ8VaEzU

Instructions: lp-smartside-panel-siding

Huber Advantech Installation

Instructions:
https://www.huberwood.com/uploads/documents/technical/Installation-Manual-AdvanTech-Subflooring.pdf

Hip Roof Framing

Video showing the construction sequence for roof

https://youtu.be/PNZDe9lEUI4?si=6po4XVweSDk2RdP8

Video that gives more details about marking and cutting rafters with circular saw

https://youtu.be/AAIYR1bs-vQ?si=k1BU0t5LnebgsLH8

Cobra Ridge Vent 3

Instructions:

cobra-plastic-ridge-vents-installation-instructions-trilingual.pdf

Truss Screw Installation

Instructions:

Strong-Drive SDWC Truss Screw Installation Guide | Simpson Strong-Tie