HOUSE PORT®

TEN STEPS IN TEN WEEKS:

A GUIDE TO BUILDING YOUR HOUSE PORT

Creating an Eco-Friendly Pre-Fab House

WWW.EHOUSEPORT.COM

Cover photo: © 2012 Avery Meyers Photography.

NOTICE TO READERS
For safety, use caution, care and good judgement when following the procedures described in this guide. House Port® cannot assume responsibility for any damage to property or injury to persons as result of the misuse of the information provided.

The techniques shown in this guide are general techniques for various applications, in some instances, additional techniques not shown in this guide may be required. Always follow manufacturers' instructions included with products, since deviating from the directions may void warranties. The projects in this guide vary widely as to the skill levels required: some may not be appropriate for all do-it-yourselfers, and some may require professional help.

Consult your local building department for information on building permits, codes, and other laws as they apply to your project.

Contents

A STEP-BY-STEP GUIDE TO BUILDING YOUR HOUSE PORT

Congratulations! You've just entered the extraordinary lightness of green prefab. Are you ready to take the steps to build your 21st century dream house? You can—by filling out your Line-by-Line Worksheet (see Page 6).

By now you've decided if you'll be using a contractor or constructing the House Port® yourself—most likely with the help of your family and friends! And, you've secured your construction loan, since we know money doesn't grow on trees!

So, let's get started! You have received your architectural and engineered drawings from House Port; it's time to proceed to your local permit office for approval. All drawings must adhere to state and local codes, and your local permit department may have additional requirements, which will be your responsibility. Any changes to the basic House Port drawings may be subject to additional fees.

Aside from the drawings provided by House Port, you will need Title 24 documentation in the state of California (please check Energy Effiencency Standards requirements for your state before construction), a survey of the property, a site plan, and a foundation plan.

When you've secured all permits, finalize your contract with your general contractor, if you have one.

PLEASE NOTE:
In addition to reading this Step-by-Step Guide, be sure to review the other House Port support materials, which include:

- SIPs Instructional Manual
- House Port Metal Roof Structure Instruction Manual
- DVD: Step-by-Step construction of prototype

You're almost ready for the full House Port experience. After the foundation has been completed, you must make your final payment plus shipping fees to House Port. Please allow up to five weeks after the receipt of payment for delivery of the House Port components to the site.

One thing to remember before you begin—it's always better to be green. Here's some helpful information from the **Green Scene:**

When making your House Port choices consider energy savings, water efficiency, CO_2 emissions reduction, and improved indoor environmental quality. These are available at your local home improvement store in its building, paint, appliance, plumbing, and lighting departments. Shop green till you drop.

The Green Building Rating System is set by LEED (The Leadership in Energy and Environmental Design), which has been developed by the United States Green Building Council (USGBC).

Four levels of LEED certification are available: Certified (26 – 32), Silver (33 – 38), Gold (39 – 51), and Platinum (52 – 69).

The House Port SIPs (Structural Insulated Panels) can earn up to 23 total LEED points—how green can you go?

Green Points for building an eco-friendly House Port:
Earning LEED or Green Points allows for mortgage loan advantages and tax rebates. In 2005, the United States Energy Policy Act was passed. This legislation gives financial incentives to residential contractors who build energy efficient homes. By using energy efficient building materials, such as SIPs, builders and contractors can qualify for a $2,000 tax credit on residential homes. To receive the tax credit, the builder must follow the guidelines set out in IRS Notice 2006-27 (http://www.irs.gov/irb/2006-11_IRB/ar12.html). To do so, the home must undergo an inspection from an energy rater certified through the Residential Energy Services Network (RESNET). To find a RESNET energy rater in your area visit www.natresnet.org.

To get more information on Green Building Incentives and Rebates, visit www.dsireusa.org. Available environmental tax credits and deductions vary by region.

LINE-BY-LINE WORKSHEETS

http://www.ehouseport.com/purchase/

1. PROFESSIONAL SERVICES (where applicable)

Description	Amount	Complete
Architectural fees		
Engineering fees		
General Contracting fees		
Appraisal		
Survey		
Insurance		
Permit		
Clean up		
Dumpster		
Miscellaneous		

2. SITE PREPARATION (where applicable)

Description	Amount	Complete
Demo/Cleaning		
Excavation		
Grading back fill		
Water/Well		
Septic		
Temporary Utilities		
Portable toilets		
Electric/Cable/Satellite hookup		
Water hookup		
Driveway		
Drainage system		
Landscape		
Patio		
Miscellaneous		

3. CONSTRUCTION AND ASSEMBLY OF HOUSE PORT®

Description	Amount	Complete
Foundation(s) for Cube(s) and House Port® footings including: underground electrical conduit and plumbing PVC		
Installation of Cube(s) SIPS Interior Wall/Roof Systems		
Interior and exterior door installation		
Electrical		
Plumbing		
HVAC		
Fireplace		
Skylights		
Drywall		
Exterior Paneling/Stucco		
Painting (interior/exterior)		
Tile/Carpeting		
Millwork/Carpentry		
Cabinets		
Countertops		
Appliances		
Miscellaneous		

4. FURNISHINGS

Description	Amount	Complete
Furniture		
Window Treatments		
Outdoor Furniture		
Miscellaneous		
TOTAL		

STEP 1: LOCATION

Here's where we began our House Port journey. We picked a rural setting to build our prototype and can't wait to see what you picked—are you at the beach? In the mountains? Where are you? Let us know: http://www.ehouseport.com/contactinfo-1/

Let's see where this road goes…

This looks like a good place for a house.

But it's going to need a little work.

"You lookin' at me?"

One of the structures we left intact is the "Smoke House".

Checking out the new neighbors.

Astro, our local sheep nanny.

The House Port pooches want to know:
"What's she gotten us into now?"

STEP 2: SITE PREPARATION

It is important that the site is cleared and made ready for construction. **Green Scene:** Separate the dead brush and debris, such as metal, glass, rusty wire, old tires, etc. You can earn major **Green Points** by recycling materials this way.

Boy, what a mess!

Tragically, we also needed to demolish the chicken coop. **Green Scene:** Whenever possible, reclaim wood for reuse. Unfortunately, in this case we could not reclaim the wood from the coop due to termite damage. At this point, you may consider spraying the area to prevent insect infestation.

Uh-oh! Here comes the bulldozer—that's not a good sign!

Say goodnight, Gracie!

If necessary, put in a driveway for construction vehicles.

That's all she wrote…

You go, backhoe! Make it two lanes!

Grading the site is a crucial step before you put infrastructure in place.

Smooth, baby, smooth.

If your infrastructure is already in place, you may only have to put in temporary utilities, electric, and water.

If your infrastructure is *not* in place, you will need to dig a well, put in a septic system, and the utility company has to set up a permanent electric source.

A necessity during construction is one or more portable toilets.

It's about time!

Construction projects benefit from having access to the Internet for better communication and links to necessary information sources. You may consider bringing an Internet hookup and telephone landlines to the site. You may also require satellite or cable installation.

Phone home!

Green Scene: Our prototype went the extra mile. We included a greywater system and a rain catchment system for landscape irrigation. Greywater is the household wastewater other than from the toilets. It is generated from the dishwasher, washing machine, sink, shower and bath, and is piped into an underground tank. The rain catchment system pipes rainwater from the gutters into the same tank as the greywater, which in turn is pumped into an above-ground holding tank.

Here is the greywater tank before it goes into the ground.

*I might look yellow, but I'm **GREEN**!*

The pipe for the septic system needs a trench as deep as the outflow of the septic tank, connecting it to the leach field.

It'll be worth it when we have fresh beefsteak tomatoes next summer!

STEP 3: FOUNDATION

Now that your land is cleared and graded you're ready to prepare the pad. This includes excavation, backfilling, compacting and leveling. This step is crucial! Your entire construction depends on the pad being solid, flat and even.

Excavation begins with the bulldozer shaping the area for the pad. Some sites require more excavation than others. Some may include more base rock. That's what happened on our site—we needed more rock for backfill.

Whoa, Nellie!

Here we're bringing backfill to level out the corner of the pad.

"Your pad or mine?"

My, what big teeth you have!

It's necessary to pack down the soil with a sheepsfoot (shown in our picture), a plate vibrator or a similar machine to insure evenness of the pad and to prevent shifting. It is a critical step to making the pad a solid base.

Leveling is the final step in the pad preparation and includes measuring and chalking.

Here we're measuring the pad. The dimensions of the pad are larger than the footprint of the PopUP House and include the patio plus the landscape area.

Keep go-o-o-o-ing!

Don't get strung out!

Once the area is measured, string is placed for chalking, delineating the dimensions of the foundation.

Drive 'em in deep.

The circles go round and round.

If only we'd struck oil instead of sand!

After finishing the pad, it's time to prepare to pour the foundation and the footings.

First, you must build the forms for the House Port Cube foundation slabs and the House Port footings. Securing the stakes in the ground insures that the concrete will dry to a perfect shape.
Green Scene: We used recycled wood to construct the forms.

Here the guys are pounding the stakes into the ground to hold that piece of lumber steady.

Now we're constructing the rebar forms for the House Port footings.

We used 16" diameter piers 8' or more deep to support our foundation. Your engineers will need to help you determine what system is right for your soil conditions.

Placing the rebar footing forms in the hole.

Meanwhile, we begin the trenching for the UG electrical conduit. Here we're securing a coupling to the conduit with primer and glue.

We're attaching the pipes into a cluster.

How many workmen does it take to put in a footing?

Sticky stuff!

Good thing they all came together!

We cover the openings with foil to prevent getting concrete and water inside the conduit.

Like those tin hats!

At the same time, we're trenching for conventional UG pipes for plumbing.

Dig we must.

Even the owner gets involved!

Green Scene: Here we've laid the pipes that will come from the house to the greywater tank.

*I'm in deep **green**.*

Boy, nice raincoat!

Next, to prepare for the foundation pour, heavy-duty plastic is layered over the buried pipes.

Green Scene: Investigate the possibility of using recycled plastic.

Rocky II

Next is the drain rock layer. **Green Scene:** You can use recycled rock from your local quarry, as we did.

Later, the SIPs wall panels will be attached to the foundation by metal straps, which must be installed before the foundation is poured. Half of each strap will be embedded in the concrete.

Can you believe it, I'm stuck!

Anchor bolts, which attach the SIPs base plates to the foundation, must also be embedded in the concrete. Here is an example of an anchor bolt in place after the pour.

At least half of us see the light of day.

Rebar, up close and personal.

After the drain rock is distributed evenly over the plastic sheeting, rebar is laid over it.

Bingo!

Anchors aweigh!

The House Port footings are prepped at the same time the slab foundation is prepared. Here, a set of anchor bolts are precisely placed before going into the footing hole.

Here’s how the anchor bolts look after the concrete has been poured.

Are there any stockings with these footings?

Now we’re ready for the foundation pour. **Green Scene:** We used 75% recycled aggregate. And we mixed the concrete on site, which cuts down on waste considerably. Mix only what you need to use.

Keep on truckin’.

Pouring the foundation takes teamwork.

Don’t fall in!

Who's up for Dairy Queen when we're done?

Call me Mr. Smoothie.

After the pour, the slabs must be troweled to a smooth finish. Using a concrete finishing machine can make the job much easier.

Grooves, known as "control joints", must be cut or troweled in the foundation to prevent cracking.

Are these grooves groovy, man?

The final product:

Fab slab.

STEP 4

PopUP CUBE CONSTRUCTION

Green Scene: Using Structural Insulated Panels (SIPs) is the green way to go. The estimated time for building the House Port Cubes is 10 to 14 days. For all the detailed information you need, see **SIPs Instruction Manual**.

Now that your foundation is smooth, dry and ready, you should have your SIPs delivered and off-loaded on the site.

Orange you glad to see me?

Tall stack comin' through.

After you have thoroughly gone through the SIPs Manual, you should be ready to install the House Port Cubes themselves. We start with the wall systems.

First the base plates are laid out in position on the perimeter of the slab.

Whose side are you on?

Mister Baseman.

Here we have placed the SIPs panels in position on their sides. It's very important to lay the panels out carefully since each panel is marked to correspond to the SIPs drawings.

This is the base plate, secured by the anchor bolts, with the SIPs strap ready to be attached to the wall panel.

Oh nuts!

Wow, what a tight fit.

Careful, don't get your foot stuck.

The first cut is the deepest.

Here is a single 4' x 9' SIPs panel being placed on the base plate.

Here's a close-up on the SIPs panel being fitted onto the base plate.

During erection of the SIPs, we use an electric foam scoop to cut out portions of the insulation to make room for electrical boxes, conduit runs or other intrusions into the wall or ceiling spaces.

Here's a corner going up.

Here the wall SIPs are up and the framing for the interior walls is complete. Note that the door headers have been installed.

Here's a long shot of the two House Port Cubes.

I've got you cornered.

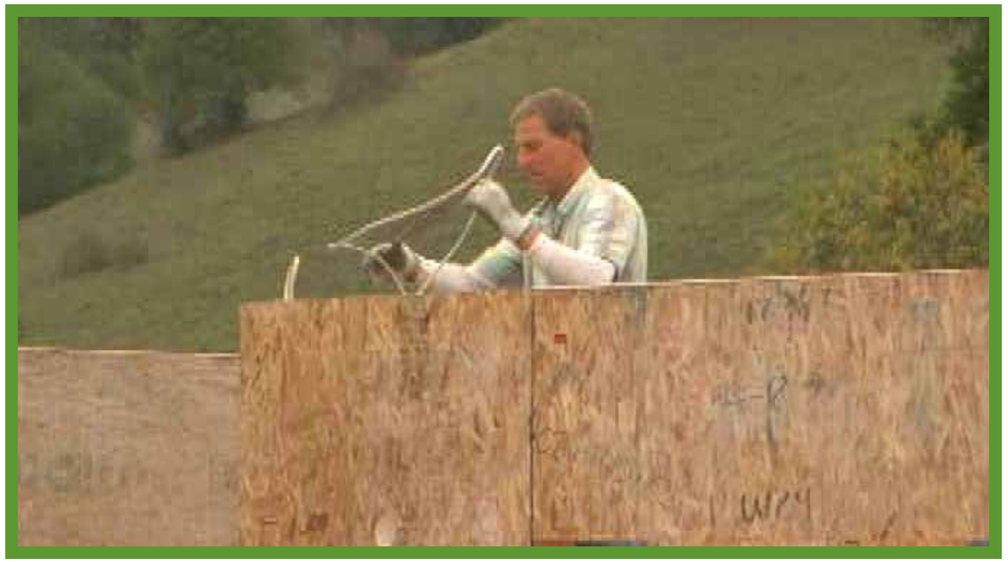
OK, now it's taking shape.

What, no roof?!

At this point the electrician threads the wiring through the pre-drilled chases in the SIPs. He creates openings for the switches and outlets in the appropriate panels. He then pulls the wires through the chases and out through the openings. The "donuts"—small round pieces of wood that he removed—are re-inserted and foamed to create an airtight seal in the panels.

Holey moley!

Make sure enough time is allotted for the electrician to wire all the chases before installation of the roof panels prevents access to them.



Get in there, baby, the roof is on its way.

The roof system installation begins when the forklift delivers a 4' x 16' roof panel to the Cube.

Don't keep me hanging on.

The roof panels are laid in place before they are glued and screwed.

Wall-to-wall roof.

STEP 5 HOUSE PORT CONSTRUCTION

The estimated time for building the House Port is 10 to 14 days. The construction of the House Port can be done simultaneously to the construction of the House Port Cubes. Be sure to read the accompanying **House Port Instructions** provided by our partners in order to be fully prepared to successfully erect your House Port.

First things first, the beams for the House Port are off-loaded.

Beam me up, Scottie!

The House Port vertical beams are placed onto the anchor bolts in the footings.

Still no stockings for these footings?

The cross beams go up.

Don't get cross, it's working fine.

The purlins go up. Struts will reinforce the roof structure when they are attached from the crossbeams to the purlins.

Duck and cover.

Here the skeleton frame is ready for the roof panels to be installed.

Oh dem bones!

The House Port roof panels are affixed with screws.

When the House Port roof is completed, the rake trim and gutters should be fastened to the edges of the metal roof.

Green Scene: The optional rain catchment pipes can be connected to the gutters and the beams at each end of the House Port, then joined to the greywater pipe.

I'm just about tapped out.

STEP 6

EXTERIOR FINISHING OF HOUSE PORT CUBES

While the House Port construction goes on, we complete the exterior of the PopUP Cubes. This includes the door installation, roll-out roofing, facial roof trim and eave trim, and the door and wall trim. The prototype trim is knotty pine, but there are other common trim choices such as cedar or redwood. We did not install any exterior siding but there are many options available. Also, at this stage, we stained the exterior panels.

Green Scene: We used eco-friendly water-based acrylic stain. Oil-based stain is also available.

Here the fascia roof trim is being installed.

Are you bored yet?

We installed interior/exterior sliding doors (sliders), but you could hang standard hinged doors.

Green Scene: Our doors are energy-efficient double-paned glass.

Sliding into home!

Installing screen doors. As you can see, the SIPs panels have been stained "Pepperwood." Again, options abound.

The screen scene.

The House Port is now ready for the interior installation.

I'm done but I'm not finished.

STEP 7

INTERIOR ROUGH IN PREPARATION OF HOUSE PORT CUBES

The initial stage of finishing the interior of the House Port Cubes includes wiring, plumbing, pocket doors, drywall, and painting.

Here the electrician is securing the outlet box to the interior framing.

Shock treatment.

Here he is threading the wire from the interior sub panel to the exterior main panel, which he will do via the UG conduit.

Wired.

At this time the wires for the cable, satellite and phone should be connected from the exterior to the interior via the UG conduits to specific outlet locations. And the wiring for all home appliances should be brought from the exterior to the interior of the House Port Cubes.

The interior plumbing can be done at the same time as the interior wiring. The piping for the bathroom, the laundry room, the washer/dryer and the kitchen is installed in one central location in each House Port Cube.

Pipe dreams.

STEP 8

ROOM INSTALLATION

Before any interior finishing work is done, the drywall, also known as Sheetrock, should be installed. Here the drywall panels are being delivered.

Green Scene: You should know that EcoRock, an eco-friendly drywall, is now available in certain areas.

Three sheets to the wind.

Here the ceiling drywall is being installed. Before painting, all drywall panels need to be taped, mudded and sanded. Once prepared, you can treat the panels in a variety of finishes—from hand-smoothed to sprayed-on texture.

Hurry up, I haven't got all day.

The master bathroom cabinets and hardware are flat-pack, pre-fab units. Our toilet and sink are off-the-rack items from the local home improvement store. You can have yours customized to reflect your taste.

Um? The pipes go under the sink, right?

We decided to tile the shower in the prototype master bathroom, but you can make your own choice.

Heads up!

Don't turn on the juice yet.

Other fixtures installed in the bathroom are the light switches and thermostat and, as seen here, the heater and outlets.

We installed skylights instead of fans for ventilation in all the bathrooms. Because of the House Port, skylights can be opened all year.

You look mahvelous, dahling.

Last but not least, we hung the lights and mirrors.

In the prototype guest bathroom we installed a prefab shower/ bath as an alternative to the tiled shower in the master bath.

Rub a dub dub, two men in a tub.

Both the guest and master bathrooms have double sinks and mirrors.

Double your pleasure...

To finish off the bedrooms, install wall heaters, outlets and switches, cable for internet and TV, and the phone hook-up.

This is "before".

And here is "after"!

Swe-e-e-t.

The House Port guest rooms are L-shaped, providing extra seating or work areas.

Twin beds? At least they're not bunk beds!

In both guest bedrooms there are walk-in closets with flat-pack, pre-fab wire shelving and hanging units. The water heater can be installed in either closet.

I'll lock you in if you don't come out.

The stove is just about this big!

Do you think they'll deliver pizza all the way out here in the middle of cow patty country?

Don't call me a blockhead because I'm a block long.

Boyz in the hood.

Here we are installing the flat-pack, pre-fab cabinets in the kitchen. The island in the center of the room has been wired and plumbed for the sink and dishwasher. Off to the side is the utility room, which houses the stacked washer/dryer, a water heater, shelves for storage and the Internet/ TV router.

Here we're conferring about the cabinet hardware.

We installed an easy-to-maintain laminate countertop, which has a luxurious look to it. Many options are available.

We decided to install a hood over the stove, but this would also be a great place to have a microwave.

After putting in the stainless steel refrigerator, dishwasher and sink, we finished the kitchen off with fluorescent tube lighting, under-cabinet LED lights, switches and outlets.

We put fluorescent lighting in the Dining/Living area, and installed the wall heaters, switches, outlets and thermostat. There's a cable for the Internet and TV, and a phone line.

Smoke alarms are in every room.

Where's the beef?

It's another fine fixture you've gotten me into.

Come on baby, don't light my fire.

STEP 9 INTERIOR FINISHING AND TRIM

The prototype has a painted slab floor but there are many floor finishing options available. Before final painting, the slab must be thoroughly cleaned, sanded and given a primer coat, as seen here.

You floor me.

We recommend finishing the floor with four top coats.

Red-ee for action!

I just need a trim.

Once the floor dries, we start finishing the trim around the base of the walls and the doors. Here we're sawing the trim to size.

We went with stain, though you may choose natural or painted trim instead.

I'm vain about my stain.

Fire away!

We found a good deal on a used, freestanding fireplace on-line. The fireplace is an option, and if you decide to put one in, be sure to install a chimney pipe through both the House Port Cube roof and the House Port roof. And don't forget a spark protector.

STEP 10

EXTERIOR COMPLETION OF HOUSE PORT

Before installing the patio, make sure the area is level and well raked. A soil base must be applied, then compacted with a plate vibrator. After a layer of sand has been put down, the pavers are laid. Upon completion, fine sand is swept into the spaces between the pavers. You may use other patio solutions such as flagstone, slate, gravel, or you could extend the concrete foundation outward.

The patio says, Can't wait for the party!

The next step is to grade the area around the House Port to prepare for landscaping.

Here's looking at you, kid.

Now we're ready for the final touches, which include exterior lighting fixtures, and water resistant outlet and switch plates.

I'm all ready, but where are my accessories?

We opted for water resistant, cotton duck curtains installed on a track, though there are many approaches to personalizing the exterior of your House Port. Or you can leave it plain and simple.

Red carpet ready, baby!

Astro says good-bye for now.

You'll love your House Port living—in green!