SIP DESIGN-BP 9:
SIP Electrical

SIPA
Structural Insulated
Panel Association

SIP DESIGN-BP 9:

SIP Electrical

This document is created specifically for design professionals by the manufacturing members of the Structural Insulated Panel Association (SIPA). It dives deeper and provides more background into each of the summarized topics presented in the *Design with SIPs: DESIGN CONSIDERATIONS* overview which highlights important considerations during the design phase of a Structural Insulated Panel (SIP) structure. Decades of combined knowledge from SIPA manufacturers will help reduce the learning curve and leverage SIPs' exceptional qualities to achieve the high-performance results owners expect when building with SIPs. The considerations of how and why the best practices were developed as the common industry platform for SIP design are explored here.

The index below outlines ten topical areas, listed in sequence to match the order of design considerations and construction. The details in each chapter provide a deeper understanding of the subject matter to facilitate successful SIP design and later implementation. The current chapter is highlighted in blue.

SIP DESIGN-BP 9:

SIP Electrical

SIP DESIGN-BP 9.1:
Vertical and horizontal chases are provided in SIP walls assisting with wiring at outlet and switch heights.

SIP manufacturers may provide electrical wiring chases in wall panels. The chases are approximately 1-1/4” in diameter and are located in the foam insulation core of the SIP. Horizontal chases in the wall panels are located at switch and outlet heights, approximately 14” and 48” from the bottom of the panel. Vertical chases are located approximately 4’ on center in the wall panels. Additional chases may be added. Consult the manufacturer that you are working with.

The sill plates, top plates, cap plates and lumber splines need to be drilled with an approximate 1-1/2” diameter drill bit when the panels are being installed by the installation crew at the vertical or horizontal chase locations. These holes facilitate the installation of the electrical wires during the electrical wiring process.

IMAGE 9.1

SIPS WITH ELECTRICAL WIRING CHASES

IMAGE 9.2

FLOOR SILL PLATE CHASE CUT OUT TO PASS FROM SIP WALL TO BELOW FLOOR.

IMAGE 9.3

INSTALLED LIGHT SWITCHES AND OUTLET BOXES WITH OPEN ACCESS PLUGS NEAR DOOR.

IMAGE 9.4

VARIOUS ELECTRICAL BOX INSTALLATIONS IN SIP WALLS

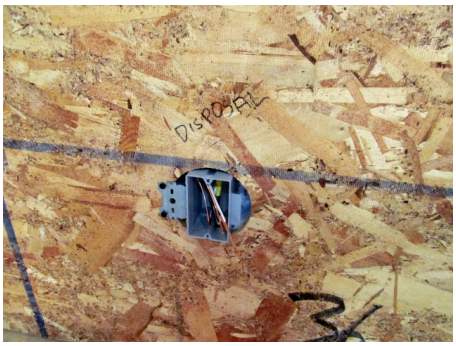


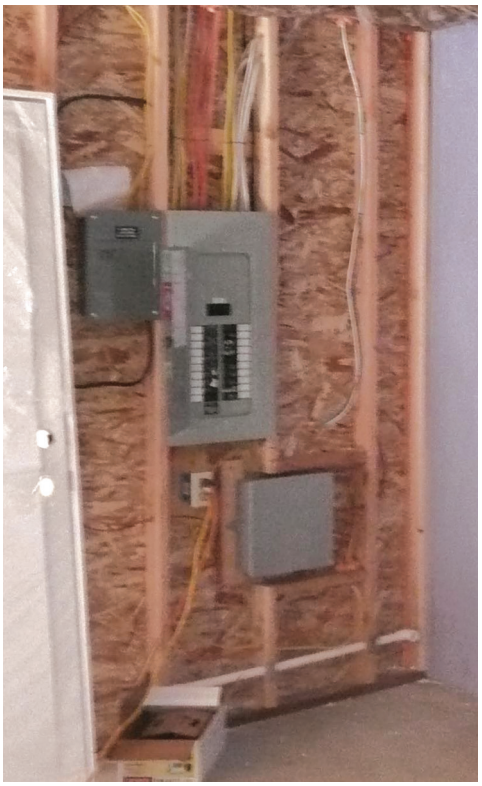
IMAGE 9.5

CEILING BOX INSTALLATION IN SIP ROOF

Note: not shown are the four screw fasteners required to support the weight of a ceiling fan.

IMAGE 9.6

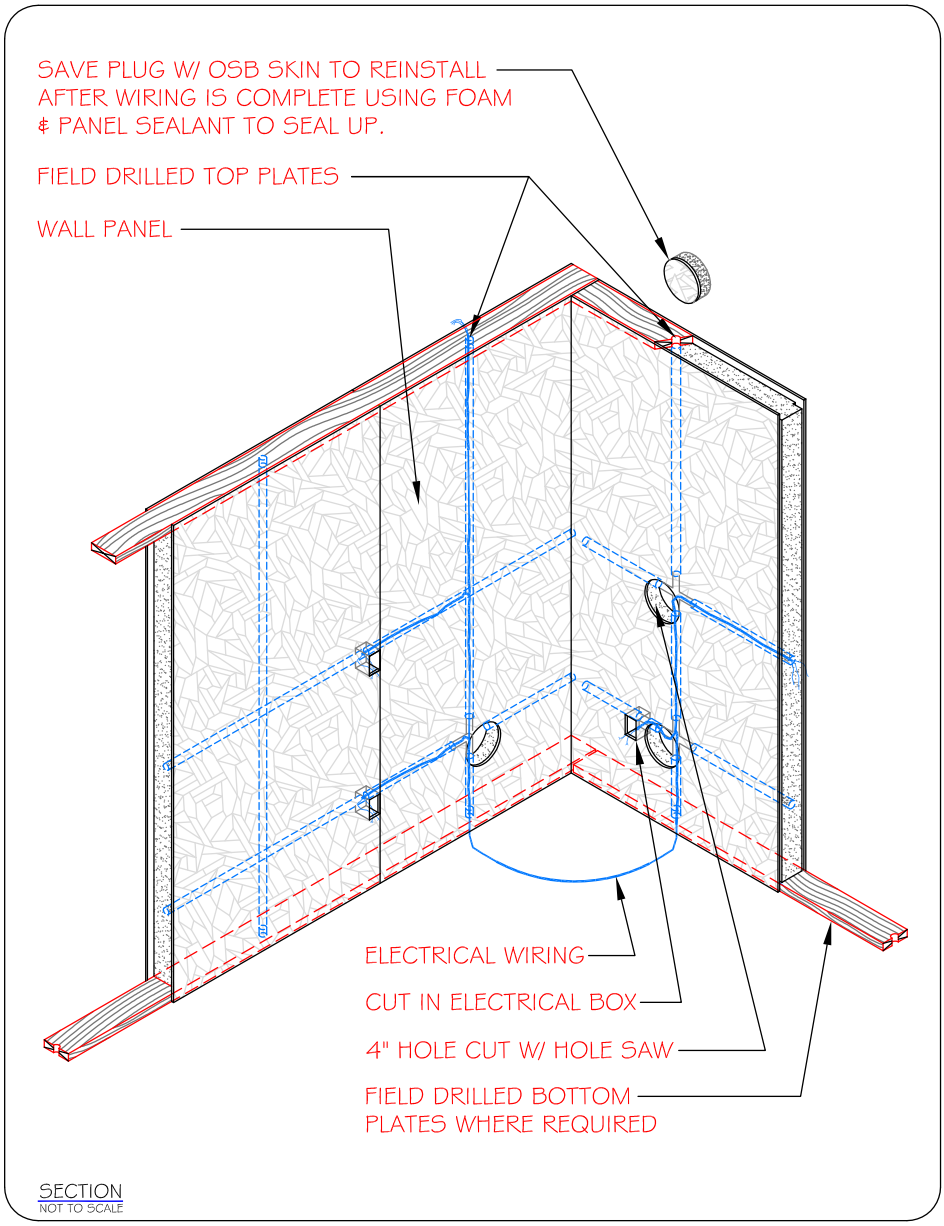
WHEN DESIGNING THE MECHANICAL ROOM, PLAN FOR FRAMING OUT THE WALL TO ACCOMMODATE THE ELECTRICAL BOX AND ALL WIRING.



SIP DESIGN-BP 9.2:

Wall and roof chases can be added or removed, prior to SIP manufacture. Shop drawings confirm all chase locations to avoid unnecessary cutting of SIPs in the field. Pre-planning for installation and special chase locations is critical.

IMAGE 9.7



Electrical chases are cut prior to adhering facers (typically OSB) to the SIP's core. Therefore, it is important that proper chase locations be confirmed prior to project entering production.

Aside from "standard" chases, referenced in 9.1, above, it is possible to add additional chases. Consideration must be given to the number and location of chases. It is important to remember that a SIP functions as a composite, with each material acting together to create a structural component far greater than any of the materials tested independently. Should electrical chases need to be added at a later date, consult the manufacturer for guidance.

Architectural electrical plans are intended to be interpreted by electricians who are familiar with electrical code requirements, circuit runs, etc. SIP manufacturers look to electrical contractors to provide the specific chase locations that coincide with their installation plan. In many cases, two separate electricians may come up with completely different wire run approaches for the exact same architectural electrical plan. Typically, the default factory electrical chases are sufficient to provide adequate access for electrical runs; however, it would be best to review the SIP shop drawings[1] with your electrician and let your SIP manufacturer know if you would like to add any additional electrical chases within the SIPs.

[2] See *SIP Design-BP 5: SIP Shop Drawings*

SIP DESIGN-BP 9.3:
Electrical chases should be sealed after electrical rough-in inspection to maximize airtightness.

All penetrations made in the SIP facers need to be foamed to minimize air flow through the chases. This is important to do after the electrical rough-in and inspection is complete around all electrical box locations.

The process can be done simply by using a minimal expanding foam similar to what is used around windows and doors. Placing a small amount behind the box, where it intersects with the horizonal or vertical electrical chases in the foam insulation core, will minimize air movement.

It is important to use this same process to seal off holes that were drilled through sill (if accessible) and top plate locations in SIP walls, and in SIP roof overhang locations, whether they were used or not.

SIP DESIGN-BP 9.4:
An experienced SIP installer is your best insurance that the electrical rough-in will go smoothly.

The SIP installer should drill approximately 1-1/2" diameter holes in the top plate, cap plate of the walls, as well as the sill plate in multilevel construction for the vertical chases, and in the splines connecting the panels for horizontal chases.

If these holes are not drilled at these locations in the wall SIPs, the electrical rough-in will be very difficult. An experienced SIP installer helps ensure this necessary step.

In roof and wall SIPs, climate zone considerations will dictate chase locations regarding moisture concerns. Refer to the manufacturer's installation instructions regarding electrical rough-in for walls and roofs.

SIP DESIGN-BP 9.5: Recessed lights are not recommended for installation in SIP roofs. Use of surface mounted LED lighting is recommended.

There are limitations on the type of lighting that can be used in SIP roof or ceiling applications. Recessed or can lights that are intended to be recessed into a finished ceiling are not recommended for application in SIP product.

There are two primary considerations with using recessed lighting in SIP roofs (i.e., the interior SIP facer is the ceiling surface). First, the OSB facers of the SIPs are a key component of the structural integrity of the panel and excessive cutting of the face will lead to a reduction of the structural capacity. Secondly, the heat created by the lighting and the reduction of the insulation in the SIP can lead to hot spots on the roof and possible condensation issues. The heat generated from the recessed light fixture can damage the SIP core.

The lighting choices can be resolved in the design stage. Some of the options include the use of track lighting or surface mounted LED lighting. Furring down below the interior roof SIP facer is an alternative for installing recessed lighting.

IMAGE 9.8

FURRED-DOWN CEILING FOR CAN LIGHTS

IMAGE 9.9

ALTERNATIVE FURRED-DOWN CEILING

IMAGE 9.10

THIN PROFILE LED LIGHT

Glossary of Terms

Cap plate: lumber ripped to the width of the panel that bears on the top of both facers of the SIP below. Not a top plate; it bears on the top plate. For illustration, refer to Details 3.1 and 3.2 in *SIP Design Best Practices 3: SIP Structural Capabilities.*

Capillary break: a material used to separate the OSB facers from the concrete. Consult SIP manufacturer for appropriate recommendations.

Electrical Chase: a channel in a wall to allow electricians to run their cables in.

Electrical Cut-out: an opening in the facer to recess an electrical box.

Sill (or sole) plate: a wood framing component on the bottom of a wall.

SIP tape: an all-weather vapor-tight joint sealing tape developed for SIPs and other high-performance building envelopes.

SIPA: Structural Insulated Panel Association (www.sips.org), a non-profit trade association representing manufacturers, suppliers, dealer/distributors, design professionals and builders committed to providing quality structural insulated panels for all segments of the construction industry.

SIPs: Structural Insulated Panels, a high-performance building component for residential and light commercial construction.

Spline: connection system used to connect two panels together at vertical, in-plane joints. Many different spline systems are available including box/block, surface, I-joist, dimensional lumber and engineered lumber.

Top plate: a horizontal member positioned between the SIP facers above the foam. Sits under the cap plate. For illustration, refer to Details 3.1 and 3.2 in *SIP Design Best Practices 3: SIP Structural Capabilities.*

Written and compiled by SIP Industry Professionals:
- David Gould – PorterSIPs
- James Hodgson – Premier Building Systems
- Jeremy Dieken – Extreme Panel Technologies
- Joe Pasma, PE – Enercept
- Tom Williamson, PE – Timber Engineering, LLC

Structural Insulated Panel Association Staff:
- Jack Armstrong, Executive Director
- Elaine Valby, Technical Coordinator

Structural Insulated Panel Association